

Update on the Potential Health Impact of Wind Turbines

*Why action on the 2010 Chief Medical Officer of Health
for Ontario report is needed now*

SUMMARY

After passing the Green Energy and Green Economy Act to foster wind power development in the province in 2009, the government of Ontario, Canada promised to respond to any concerns citizens had about the operation of wind turbines. In 2010, a brief report was published by the provincial Chief Medical Officer of Health or CMOH which stated that there was no direct link between wind turbine noise emissions and adverse health effects.

Despite pledges to follow developing research around the world and changes to regulations in other jurisdictions, as of 2021 no new updates have been published in Ontario.

This is a concern because research shows that:

- The indirect pathway to adverse effects is important, and recognized;
- “Annoyance” is a health concern that should be addressed;
- The noise limit regulations are not adequate and measures to evaluate noise (e.g., use of dBA) are insufficient; and
- More research into turbine noise has been cited as an important direction for the future in Ontario, but none has been done yet.

The number of wind turbines installed and operating in Ontario has increased significantly since 2010, and the wind power generators have increased in physical size and power ratings, yet no changes have been made to the regulations.

The 2010 CMOH report continues to be relied upon by the environment ministry in Ontario even though the government has received thousands of citizen complaints about wind turbine noise. It is referenced by other jurisdictions as an authority. The document itself is short, and was never subjected to independent peer review.

Although COVID-19 is a focus in public health right now, Wind Concerns Ontario believes it is important for the current Ontario government to take the initiatives needed, and neglected by previous administrations, to protect the health of people living inside and near wind power facilities. We recommend that the government:

- Retire the 2010 report, by making a statement that it is no longer a relevant resource, and removing it from the government’s website;
- Issue a statement to all Ontario medical officers of health to that effect;
- Undertake a new review of current literature and research;
- Take note of the recommendations for the type of clinical studies using actual noise measurements, not turbine manufacturers’ theoretical noise modeling, and fund studies that incorporate resident complaints;
- Review and revise regulations for noise limits and setback distances; and, last,
- Return responsibility for responding to reports of adverse health effects to the Ministry of Health, removing it from the environment ministry as directed by the Green Energy Act.

WIND CONCERNS ONTARIO

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INTRODUCTION

In 2009, the provincial government in Ontario, Canada passed the Green Energy and Green Economy Act, legislation that enabled the development of grid-scale wind power facilities in rural areas. Regulation 359/09 contained details on conditions for development such as noise levels and setback distances.

There were already 20 large-scale wind power projects in operation in the province including Wolfe Island, the Amaranth facility in Dufferin County, and the Ripley and Underwood projects in Bruce County.

Ontario's premier promised that if there were concerns about the impact of these power projects on health, safety and the environment, the government would address them.¹ At the time the Green Energy Act was passed, the government had already received more than 650 complaints about operating wind power projects.²

An undated document, obtained via a request under Freedom of Information (FOI) legislation, was called a "Stakeholder Consultation Plan" that was developed in order to address the issue of health effects from wind turbines. The impetus was apparently media stories describing public concern. The document also mentions "Lobbying against wind turbines is underway mainly by Wind Concerns Ontario, an umbrella organization of small community groups concerned with the health impacts of wind turbines". The goal of the plan was to engage in consultation with government agencies and discuss a literature review which, the document stated, had already shown no direct causal link.³

In 2009, Ontario's Chief Medical Officer of Health (CMOH) Dr. Arlene King wrote a memorandum to all medical officers of health in the province on the subject of wind turbines, stating that the Ontario Public Health Division has "reviewed the concerns expressed by some regarding health impacts of wind turbines," and that the department would produce an update to "support common levels of information and public communication." A literature review, the CMOH told the medical officers of health, showed that while there are "anecdotal reports" of symptoms of adverse health effects, "there is no scientific evidence to date to demonstrate a causal association between wind turbine noise and adverse health effects." She added that some studies confirmed wind turbine noise is "annoying."

In that memorandum to her public health colleagues, Dr. King pledged that "we will continue to provide updates on this issue *as new information is received*."⁴

THE 2010 CMOH REPORT

The CMOH did follow up with a report published in 2010, based on a review of select literature available in 2009, titled *The Potential Health Impact of Wind Turbines*.⁵

The 14-page report, including a cover page and brief summary, indicated that its purpose was to focus on several questions:

- What scientific evidence is available on the potential health impacts of wind turbines?
- What is the relationship between wind turbine noise and health?
- What is the relationship between low frequency sound, infrasound and health?

- How is exposure to wind turbine noise assessed?
- Are Ontario wind turbine setbacks protective from potential wind turbine health and safety hazards?
- What consultation process with the community is required before wind farms are constructed?
- Are there data gaps or research needs?

The answers to those questions were based on the review of selected research papers available in 2009 on “potential health and safety hazards,” as well as studies investigating the relationship between exposure to wind turbine noise and “annoyance”. (Note: annoyance in this context is not merely irritation but rather, a medical term denoting stress or distress.⁶)

The CMOH report concluded that “while some people living near wind turbines report symptoms such as dizziness, headaches and sleep disturbance, the scientific evidence available to date does not demonstrate a *direct causal link* between wind turbine noise and adverse health effects.” Further, “low frequency sound and infrasound from *current generation upwind model wind turbines* are well below the pressure sound [sic] levels at which known health effects occur.” [Emphasis is ours.]

Also in the conclusion was this statement: “sound measurements at residential areas around wind turbines...to assess actual ambient noise levels prevalent...is a *key data gap* that could be addressed. An assessment of noise levels around wind power developments...including monitoring for compliance, is an important prerequisite to making an informed decision on whether epidemiological studies looking at health outcomes will be useful.”⁷

The CMOH report therefore looked only for and at a *direct* link between wind turbine noise and adverse health effects. To explain, a direct health impact would be if some ice from a turbine blade hit a bystander, while poor health that could result from months of disturbed sleep and anxiety would be an indirect effect.

The report also noted that actual noise measurements (as opposed to the computer-generated models of wind turbine noise) could be useful; however, there was a slight suggestion that the noise measurements might show there was no need for further study (mirroring the conclusion of a report funded by the wind power lobby), and also, patronizingly, that “concerns about fairness and equity” could influence “allegations about effects on health.”

Comments from reviewers

In documents obtained via Freedom of Information requests made by private individuals and provided to WCO, one of the reviewers, Dr. Ray Copes, then Director of Environmental and Occupational Health (now Public Health Ontario), and who was involved in the literature review, made 18 comments on the draft CMOH report, many of them critical of the content. For example, Dr. Copes noted that the word “direct” should be added as “the studies would support a link through annoyance”.⁸ He also noted that the statement in the draft report that wind turbine noise was not sufficient to “damage hearing or cause any other adverse health effects” was

problematic because “we have little in the way of measurements to document the sound levels around wind power developments... There is little or no good data on sound levels around WT”.⁹

Dr. Copes recommended dropping altogether the draft statement that infrasound and low frequency levels are “well below the levels at which known health effects occur.” Moreover, he commented that “Additional field work should be done to confirm that this level of performance [the regulated limit of 40 decibels] is actually met.”¹⁰

The draft report sent out for review contained a statement about indirect effects stating “There are no known indirect links,” to which Dr. Copes commented “Not really true. The link between perceived noise and symptoms is probably linked to annoyance. The link with annoyance should be recognized. ... Either ‘fess up to the annoyance link or delete.”¹¹

Following the release of the CMOH report in 2010, Dr. Copes was interviewed by the Owen Sound Sun Times (whose readership serves an area populated by wind turbines and where there have been significant problems with noise). He said, “I think it’s a fair comment that there is other material that could have been in the report and wasn’t... there are really important and quite legitimate questions about wind farms but I guess the CMOH’s report wasn’t the place for it.”¹²

Issues with the 2010 report

At the time the report was published concerns were expressed about the content: it consisted of a scant seven pages of actual documentation and discussion and had significant problems and gaps according to members of its own review committee. The report overlooked an important area of research, i.e., the indirect pathway to adverse effects and specifically the role of annoyance, a health effect in itself. However, it did identify the lack of actual noise measurement of wind turbine noise emissions as an important gap.

Subsequently, Ontario’s Environmental Review Tribunal heard other concerns during the appeal of a wind power project approval (*Erickson v. Director*), in which witness statements referred to the 2010 Chief Medical Officer of Health report. Dr. Gloria Rachamin, whose background is in pharmacology and toxicology, testified that she was the lead author of the CMOH report. Although the literature review gave greater weight to peer-reviewed papers, she said, she admitted that the CMOH report had never undergone independent peer review.¹³ She also admitted that the reference to nighttime noise limits described by the World Health Organization were for “community noise” and were not specifically related to wind turbines.¹⁴ Finally, Dr. Rachamin admitted that the focus of the literature review was only on direct effects, and did not incorporate indirect effects of wind turbine noise.¹⁵

The Environmental Review Tribunal stated in its decision that it was concerned “about the Director’s apparent lack of consideration of the indirect health effects”.¹⁶ The Tribunal went further: “... The Tribunal has found above that ‘serious harm to human health’ includes both direct impacts (e.g., a passer-by being injured by a falling turbine blade or a person losing hearing) or indirect impacts (e.g., a person being exposed to noise and then exhibiting stress and

developing other related symptoms). This approach is consistent with both the WHO definition of health and Canadian jurisprudence on the topic.”¹⁷

Despite these known issues, lengthy experience with wind turbine operations in Ontario and many studies done in Ontario and elsewhere over the years, the 2010 report remains available on the Ontario government website today, and is relied on by the wind power industry and public health officials as the landmark document justifying wind power development in Ontario.

The HOWE GASTMEIER AND CHAPNIK REPORT

In 2010, the Ontario government’s environment ministry commissioned a review¹⁸ of the latest research on low frequency noise and infrasound from wind turbines, to make recommendations to Ontario’s regulations if needed. The review, completed by consulting firm Howe, Gastmeier and Chapnik (HGC), aimed to answer three questions:

- What kind of noise do wind turbines produce?
- Is wind turbine noise harmful?
- Are Ontario's rules to control wind turbine noise stringent enough?

This was a literature review and did not include any assessments of operating wind turbines. It concluded that Ontario should continue with its regulations and processes at that time but also follow new research and any changes made to wind turbine noise regulations in other jurisdictions.

Included in the full Howe Gastmeier Chapnik (HGC) report of 2010 (the same year the CMOH report was released) was this statement:

The audible sound from wind turbines, at the levels experienced at typical receptor distances in Ontario, is nonetheless expected to result in a nontrivial percentage of persons being highly annoyed. As with sounds from many sources, research has shown that annoyance associated with sound from wind turbines can be expected to contribute to *stress-related health impacts* in some persons.¹⁹ [Our emphasis]

A news release was published by the environment ministry (not health) in December 2011 summarizing the results, with the headline “Expert report confirms no direct health effects from wind turbines.”

Key points: The Ontario government received a report it had commissioned in 2010 and which contained information about health effects from wind turbine noise, but the government failed to take note of information on the importance of annoyance and expected impacts on health. It also ignored the conclusions and concerns of its own quasi-judicial panel, the ERT, and failed to follow through on the CMOH pledge to stay abreast of new research around the world.

UNPUBLISHED UPDATES

Draft report 2013

Eventually, according to documents released through a request under Freedom of Information, the Ontario government embarked on a new literature review and contracted with Public Health Ontario to review any new and relevant scientific research.

A draft report was received by the Chief Medical Officer of Health on April 18, 2013, titled “Update to the Evidence Review for the CMOH: Potential Health Impacts of Wind Turbines.”²⁰

Wind Concerns Ontario received copies of several documents associated with this review: a letter dated May 31, 2013 to Dr. Vivek Goel of Public Health Ontario (PHO) asking for a review of comments by Dr. Richard Schabas and Dr. David Colby on the draft; the response to the Schabas-Colby comments; and a new draft report, dated July 2014.²¹

Letter CMOH to PHO – In the letter from the CMOH to Public Health Ontario following the first draft of the Update report, Dr. King states that “I am of the opinion that my position as stated in my [2010] report remains the same.” She appended review comments from Dr. David Colby who stated that annoyance is not a health effect referring to the World Health Organization, and who also demanded that six papers by authors who had presented at a symposium organized by an academic “activist” group, the Society for Wind Vigilance be rejected, and not included in the review. As to the concern found in some papers about the effect of wind turbines on the landscape, Dr. Colby countered, “Many people find the view of wind turbines as beautiful and majestic.” He also asked that the list of factors behind annoyance include “extreme community acrimony and polarization.” Other noise sources have not been the subject of such “activism,” he said. He believes such activism “is the main reason why wind turbine noise has been rated as more annoying”. He concluded by repeating the statement that wind turbine noise cannot cause “pathological effects on tissues.”²²

Reply Letter PHO to CMOH – Public Health Ontario responded by disagreeing with Dr. Colby over annoyance and took issue with his reference to the World Health Organization. The reference, PHO said, was from 2004 and only addressed occupational noise. The request to exclude certain authors was not accepted: “We agree several authors have strong views on wind energy developments but do not believe this should disqualify their peer-reviewed publications from consideration.” Last, in response to Colby’s comment about activism and “acrimony,” the PHO agreed there has been polarization but said it is “difficult to assess whether annoyance precedes acrimony or vice versa; one can construct plausible arguments either way. ...it is possible that wind turbines as a ‘new’ source of noise may be perceived as more annoying... Longitudinal studies on noise annoyance around wind turbines may shed light on whether this is an important explanatory factor.”

Wind Concerns Ontario received only a partial copy of the 2013 draft document which unfortunately does not include the conclusions.

The 2014 Update

A third draft of the Update was provided, dated April 15, 2014, with authors listed as Dr. Nicholas Brandon and Dr. Ray Copes. The range of documents for review was expanded to the end of December 2013, whereas the earlier update document review ended at October 2012. The paper is 46 pages long and includes a detailed discussion of the review undertaken. Included is this statement:

The issue of wind turbines potentially causing adverse human health effects is complex and controversial. Much of the current evidence shows that wind turbines have the potential to cause annoyance and possible sleep disruption to those that live in their immediate vicinity.²³

The discussion also stated:

Annoyance is not itself a *direct* health effect [our emphasis].” Some have argued that the definition of health by the World Health Organization could be extended to include annoyance. Others have argued that annoyance may result in indirect health effects, possibly mediated by the stress response. The research covered in this literature review does not provide evidence that wind turbines have direct effects on human health. It does support that wind turbines can cause annoyance whether through noise or other factors, detract from the visual aesthetic of the landscape for certain individuals, and may disrupt sleep.

The authors pointed out that the field of research into wind turbine noise emissions is relatively new and as a result:

...well designed case-control or cohort studies are conspicuously absent. The experimental studies that have been published are informative with respect to the stimulus presented but they do not replicate exposures as they occur in the community. ... Adverse effects of low frequency noise and infrasound from wind turbines have not been demonstrated although studies of chronic exposure to low frequency noise or infrasound are lacking.²⁴

To the best of our knowledge, the 2014 update document was never published and cannot be found on the Ontario government website; the 2010 document, now at least 10 years old, is still presented as the standard for Ontario wind turbine policy on wind turbines and health effects.

Key points: In the 2012–2014 period, the review asked for by the health ministry following the 2010 report confirmed that wind turbine noise emissions can cause health effects. The idea of indirect pathways was accepted, and the link between annoyance and health impacts such as sleep disturbance was noted. The need for action to fill gaps in the research was identified again.

THE HEALTH CANADA STUDY 2014

It is possible that Ontario chose to rely on the study done by Health Canada (released in late 2014) in lieu of the review and update of research promised. The scope of this study was limited as it focused only on audible noise.

However, Health Canada itself cautioned against use of the study report to influence policy by saying the study does “not provide definitive answers” and further, the results were *not to* “be generalized to areas beyond the sample as the wind turbine locations in this study were not randomly selected from all possible sites.” While the authors stated that the study does “not support any conclusions” about causality between wind turbine noise and health,²⁵ they did find health problems as a result of exposure to wind turbine noise emissions, specifically “annoyance” which in this context is used as an accepted medical term to describe stress or distress. Health Canada found cases of elevated blood pressure and blood cortisol levels, all physical indicators of stress. Problems were linked to locations exposed to noise emissions at 35 dBA and higher. The research team also discovered that 16.5% of people living within one km of wind turbines were experiencing distress; that figure jumped to 25% at 550 metres, i.e., the Ontario setback.²⁶

Key points: The findings at the locations assessed in the Health Canada study raise questions about the adequacy of Ontario regulations related to wind turbines as they indicated health issues were identified in locations exposed to 35 dBA of noise and within 1 kilometre of wind turbines. Both these findings confirm the need for changes to the Ontario standard for siting wind turbines.

COUNCIL OF CANADIAN ACADEMIES

In 2015, the Council of Canadian Academies published its own review of current literature worldwide, as requested by the Government of Canada and specifically, Health Canada. The Council had been charged with responding to the following question:

Is there evidence to support a causal association between exposure to wind turbine noise and the development of adverse health effects?²⁷

Further, the Council confirmed that:

The Panel defined health in a way that is consistent with the World Health Organization’s concept of health: “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1946). The Panel interpreted noise to include both objective measures of acoustic signals in the environment (sound), as well as subjective perceptions of sound sensations that are unwanted by the listener (noise).²⁸

In reporting on its work, the Council noted that the methods being used to assess actual noise in Canada in order to evaluate risk to health and safety were not completely effective, and should not be regarded as a complete solution to the problem of wind turbine noise emissions.

Standard methods of measuring sound may not capture the low-frequency sound and amplitude modulation characteristic of wind turbine noise. Measurement of sound for health surveillance and research uses standard methods. The most commonly used methods include A-weighting, which emphasizes the frequencies according to human hearing sensitivity, and deemphasizes low and very high frequencies. Although A-weighted measurement is an essential method, *it may fail to capture the low-frequency components of wind turbine sound*. In addition, measurement is often averaged over time (Leq), which does not convey changes in sound pressure levels occurring in short periods

(for example, within a second). Time-averaged measurement may thus fail to capture amplitude modulation. *A-weighted measurements are an important first step in determining people's exposure to audible sound in most cases, but more detailed measurements may be necessary* in order for researchers to fully investigate the potential health impact of specific sources of wind turbine noise. The metrics of sound exposure most relevant to potential health outcomes are not completely understood, however, and remain an important area for further research.²⁹

The Council found that the research to date was lacking in terms of being used to state there is a direct causal relationship between wind turbine noise emissions and health effects (there is more evidence to link to an indirect relationship) but rather than dismissing the possibility, the Council said more research is needed, particularly for vulnerable populations and over the long term. The Council wrote a statement about annoyance and indirect pathways to health effects, in a section titled "Research on long-term exposure to wind turbine noise would provide a better understanding of the causal associations between wind turbine noise exposure and certain adverse health effects".

Chronic annoyance and sleep disturbance have been linked to stress responses in studies of long-term exposure to other sources of noise, such as air and road traffic. Furthermore, these health effects are themselves risk factors for other diseases, such as cardiovascular diseases, which have previously been associated with long-term exposure to other sources of community noise. Given the burden of cardiovascular diseases on society and Canada's health care system, *further research on the long-term effects of exposure to wind turbine noise, in particular on stress and sleep disturbance, would provide more data to assess the health effects of wind turbine noise. ... Further research and surveillance would provide a better understanding of this prevalence, both in those exposed to wind turbine noise and in the general population.*³⁰

Despite the information in the Council of Canadian Academies review, including criticism of the noise measuring protocol which is the standard in Ontario, the Ontario government did not fund any research, nor has it updated the 2010 literature review.

Key points: The Council's review confirmed that noise can cause annoyance which in turn is linked to health consequences such as stress and sleep disturbance. It also noted that the standard dBA measures used by Ontario to assess wind turbine noise emissions are not sufficient, and do not capture the full range of emissions. Further research was recommended in both areas.

NEW RESEARCH

It is beyond the scope of our abilities as a coalition of community groups to gather scientific research and conduct a meta-analysis of studies and reviews. It is important to note, however, that the field of research into wind turbine noise emissions and adverse health effects has grown exponentially since the cut-off date of the last review done in Ontario, in 2013.

Grey-Bruce Health Unit: In 2014, a literature review was led by Dr. Hazel Lynn (Medical Officer of Health for Grey-Bruce, and a member of the original review team for the 2010 CMOH report) and Dr. Ian Arra. That review found:

...we have demonstrated the presence of reasonable evidence (Level Four and Five) that *an association exists between wind turbines and distress in humans*. The existence of a dose-response relationship (between distance from wind turbines and distress) and the consistency of association across studies found in the scientific literature argues for the credibility of this association.³¹

In short, the physicians and public health specialists found a link between wind turbine noise and distress (also called “annoyance”). This had been disputed by the Chief Medical Officer of Health, the wind power industry, and the Ontario government, and is still.

Many other studies have been completed since, including studies employing actual measurement of wind turbine noise emissions (as opposed to the “modeling” employed by the Ontario government approval process).

Studies have also been completed by researchers around the world, in response to concerns about adverse health effects, just as had been expressed by the residents of, and communities in, Ontario.

Some studies were funded by governments, in response to concerns.

Japan – For example, in Japan, a large, nation-wide study was funded by that country’s environment ministry. Researchers in a multi-disciplinary (nursing, engineering, architecture, psychology) team in Japan conducted a “nationwide socio-acoustic” study of more than 1,000 residents in 34 areas near “wind turbine plants” in 2010 through 2012.³² The goal of the Japanese study was to “clarify the exposure-response relationships between WTN (wind turbine noise) and these self-reported symptoms, taking non-acoustic variables into account.” In previous studies, the authors noted, WTN was not measured at residents’ houses, but rather exposure to noise was assessed on the “basis of distance from the nearest wind turbine to their houses or using mathematical models to estimate the outdoor level of WTN.” The research team in this instance took actual field measurements of noise.

As well, the team determined that “sleeplessness” or sleep disturbance warranted better definition. They asked respondents whether they had difficulty initiating sleep; difficulty maintaining sleep; premature morning awakening; and a feeling of light overnight sleep. The team concluded that “Insomnia diagnosed on the basis of self-reported symptoms was significantly prevalent in the areas where noise exposure levels exceeded 40 dB, showing that WTN disturbed sleep among residents in the WT sites.”³³

The paper produced by the Japanese research team for the government noted that at the time of publication in 2016, “many previous studies focused on WTN-induced annoyance and showed positive relationships between outdoor sound levels and prevalence rate of annoyance with WTN.”³⁴ The researchers cited seven such studies and further, referred to six more studies looking at the effects of WTN on human health in Japan.

Poland – Poland provides another example, where the country’s National Institute of Public Health reviewed scientific studies and produced a policy statement in 2016.³⁵ In the first paragraph the statement says the government institute is “of the opinion that wind farms situated

too close to buildings intended for permanent human occupation may have a negative impact on the well-being and health of the people living in their proximity.” The document then goes on to list the risks to human health and states that current regulations³⁶ in Poland “fail to guarantee a sufficient degree of public health protection.” Specifically, the Institute found that a setback of 500 to 700 metres was needed to protect against audible noise without taking into account any corrections for pulsating/tonal/modulated characteristics of emitted noise. When the modulations and low frequencies are considered, setbacks of 1.5 to 3 km are required. The Institute concluded its formal statement by recommending 2 kilometres as the minimum distance between wind power projects and buildings. Currently, the recommended setback in Poland is 1250 m for large turbines.

Interestingly, the Polish statement claims that in its review, it found the setback distances recommended by government bodies “around the world” were 1 to 5 kilometres.

The European Union – A document on wind power development was prepared for the European Union (EU) and published in 2018 which lists current setbacks employed in member countries.³⁷ While the Ontario setback of 550 m is not uncommon, a significant number of jurisdictions have adopted greater setback distances for safety. And, where setbacks are still in the region of 500 metres, the country standard may be from wind turbine areas to residential areas, not the distance from a turbine to the centre of an actual house, as is the case in Ontario.

A sampling of recommended setback distances:

Austria–1000m minimum (from wind turbine zones, not the structures)

Belgium– 3 times rotor diameter

Denmark–600m

Estonia–1000m but 2000m in some places

Finland–1000m

Germany–1000m recommended by many states, average is 500m

Hungary–1000m

Ireland–500m from turbine to the “nearest point of property”

Italy–750m

Poland–1250m

Spain–setbacks from settled/urban areas is 1000m, otherwise 500m

Sweden–500m to 1000m

Switzerland–500m but several cantons have dedicated industrial spaces for turbines

Scotland–some local recommendations are 2000m

Note that although the EU review was published in 2018, the researchers cited the Ontario 2010 CMOH report as one of two references in a discussion on setbacks.³⁸

Similarly, a university in Michigan charged with reviewing setback distances referred to the CMOH report as an authority in 2017,³⁹ and more recently, a physician presenting at an Iowa county board of health on behalf of a wind power developer cited several studies from Canada.⁴⁰

Key points: Recent research continues to confirm a link between wind turbine noise and health effects. While it is clear a number of jurisdictions have reviewed setbacks, they also seem to have reviewed regulations and requirements for approving wind power developments with the result that in a significant number of cases, current regulations for protection of residents are now more stringent than those in Ontario.

DEMONSTRATED NEED FOR AN UPDATE IN ONTARIO

The dated CMOH report continues to represent Ontario's official assessment of the impact of wind turbines on health. Despite its age, the fact it was not independently peer-reviewed, and contains many flaws, the report is still referenced by researchers and public health officials as an authoritative document. There were several areas of concern seen in communities living with wind turbines by 2014, concerns that continue today. As the number of industrial-scale or grid-scale wind turbines installed and operating has increased around the globe, so too have reports of problems for people living near the wind power facilities. In specific:

- The indirect pathway to adverse health effects is important;
- Annoyance is recognized as a health concern that leads to other health problems;
- Noise limits for wind turbines in Ontario (40 dBA, based on preliminary modeling, not actual noise measurement) is insufficient, and current protocols to assess compliance are inadequate;
- No field work has been done on wind turbine noise emissions, despite recommendations to do so, even in the 2010 CMOH report;
- The number of wind turbines operating in facilities has increased, and the power rating of the wind power generators has increased significantly, yet no changes have been made to regulations.

Public health initiatives

In Ontario there have been several instances in which real-life experiences with wind turbines have spurred local health units to undertake reviews of their own. Bruce-Grey public health officials led their own literature review in 2014.⁴¹ A year later, Kingston Frontenac Lennox & Addington Public Health (KFL&A) did its own review, citing reports about “health concerns from wind turbine noise including headaches, migraines, stress, tinnitus, vertigo and sleep disturbance” while noting that scientific evidence for these reports was “weak.” KFL&A concluded that more research is needed, including “multiple studies that use both objective and subjective health outcome measures, measure sound directly, measure exposures and outcomes both pre- and post-turbine installation, and consider vulnerable populations such as children.”⁴²

In 2019, due to hundreds of noise complaints made to the environment ministry and to the local public health unit, the Huron County Public Health Unit undertook a survey of residents and published a summary of results. Unfortunately, the study did not receive the participation hoped for and therefore the conclusions were not likely to be acted on by government.^a However, they are significant:

*Analysis of study participants confirmed an association between wind turbine exposure and annoyance. Of participating households within one kilometre of at least one wind turbine, 58% had at least one person reporting they were bothered, disturbed or annoyed by noise or light from wind turbines.*⁴³

The epidemiologist author of the Huron County report and the lead investigator also noted the conundrum faced by Ontario public health units due to the Green Energy Act and its support of wind power facility operations:

It is likely that Ontario public health units will continue to be asked to examine potential health hazards which the Ontario Ministry of Health does not have the legislative authority to regulate. Also, there will likely be more instances where a consistent data collection system is needed to better understand the experiences of those experiencing the potential health hazard. Further work is needed to examine how these issues can be addressed.⁴⁴

Complaints about noise mount up

Documents obtained by Wind Concerns Ontario annually via Freedom of Information request since 2015, shows that between 2006 and the end of 2017, more than 5,400 formal reports of excessive noise, vibration and other effects from wind turbine noise have been filed with the government’s environment ministry. Data shows that in the years 2009–2010, complaints about wind turbine noise had increased significantly, from 1 % of the total of pollution reports to 10% in 2010. The government stopped publicizing these numbers after 2010.⁴⁵

Wind Turbine Noise vs. Other Pollution Reports

Year	Land	Water	Air	Total ^b	Wind Turbine	% Wind Turbine ^c
2006	2,208	1,097	627	4,541	47	1%
2007	2,078	1,039	893	4,450	113	3%
2008	2,303	1,270	1,030	5,067	34	1%
2009	2,146	1,162	1,442	5,154	459	9%
2010	N/A	N/A	N/A	N/A	521	10%

^a During the appeal of the Nation Rise wind power project, when preliminary results of the Huron County study were presented by a witness, and during the time the health unit was still actively seeking participants, the lawyer acting for the Ministry of the Environment and Climate Change told the Environmental Review Tribunal that the government did not intend to take any notice of its conclusions. Source: J. Wilson, Wind Concerns Ontario.

^b Total does not include wind turbine noise complaints.

^c Wind turbine complaints as percentage of total other complaints. As no other data are available for 2010, wind turbine complaints expressed as a percentage of 2009 other complaints.

This level of complaints about operations of wind power facilities is a clear indication that problems are being created for “host” communities. While the complaint report documents do not provide a lot of detail, notes prepared by Provincial Officers and notes taken from calls to the Spills Action Centre point toward human distress and health impacts. In its review of complaint data supplied by the Ministry of Environment, Conservation and Parks under Freedom of Information request for 2017, Wind Concerns Ontario calculated the following:

- 42% of the 2017 complaint records specifically mention health impacts;
- 23% of the records contained notes written by the Environmental Officers/Spills Action staff on health-related complaints;
- 16% mentioned or described symptoms that could be suggestive of exposure to infrasound/low frequency noise. This includes any mention of "pressure" in the chest, head or ears, feelings of anxiety; debilitating headaches and the feeling of exhaustion /fatigue or "brain fog";
- 22% contained mentions of sleep disturbance or other effects that might reasonably be thought to have an effect on health.⁴⁶

These complaints provide an opportunity for focused field testing of wind turbine noise. In place of the generic testing set out in the Noise Audit Protocol, testing involving the specific conditions that triggered these complaints with a goal of identifying and eliminating the cause as required by the Renewable Energy Approvals would provide learning that could be used to assess health effects and regulations related to wind turbine siting.

CONCLUSION AND RECOMMENDATIONS

Given the content of “stakeholder plans” and other government correspondence, it may be said that issues management and particularly responding to media coverage of the government’s “green energy” plan was the impetus for the original 2010 CMOH report — not the need for effective public health policy or to fulfill the government’s responsibility to citizens.

Moreover, it is clear that the government failed to follow through on its promises to keep up with current research and reviews (even those conducted and published in Canada) or to monitor and consider the policy implications of research and policy changes in other jurisdictions.

It is nothing short of alarming that the 2010 Chief Medical Officer of Health report stands as a guideline and policy statement today, in 2021, and that medical officers of health dealing with resident complaints of poor health are directed to it as a resource and policy statement. Worse, the document shows up in citations by researchers and policy makers in other countries when, by the author’s own admission, it is limited, and never subjected to the independent peer review process the original authors used to select documents for the review.

The fact that several public health units in Ontario felt the need to complete their own reviews indicates that the 2010 report has outlived its usefulness. That is particularly true as the number

of wind turbines in Ontario grew substantially after the 2010 publication date, with a number of new, large power facilities constructed afterwards.

Given the thousands of noise complaints on record, many of which include references to adverse health effects, it is time for the Government of Ontario to:

- Retire the 2010 report, by making a statement that it is outdated and no longer a relevant resource, and removing it from the government's website;
- Issue a statement to all Ontario medical officers of health to that effect;
- Undertake a new review of current literature and research;
- Take note of the recommendations for the type of clinical studies using actual noise measurements, not turbine manufacturers' theoretical noise modeling, and fund studies that incorporate resident complaints;
- Review and revise regulations for wind turbine noise limits and setback distances; and, last,
- Return responsibility for responding to reports of adverse health effects to the Ministry of Health, removing it from the environment ministry as directed by the Green Energy Act.

It is our hope that the hundreds of families who have been exposed to excessive wind turbine noise and troublesome noise emissions, and who have experienced adverse health effects with little or no response from government, despite promises to protect their health and safety, may soon be acknowledged. It is past time to see change in Ontario's wind turbine noise regulations, so they may truly protect health and the environment.

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- ¹ Toronto Star, February 11, 2009. “McGuinty vows to stop wind farm NIMBYs.” Available at: https://www.thestar.com/news/ontario/2009/02/11/mcguinty_vows_to_stop_windfarm_nimbys.html
- ² Wind Concerns Ontario. 2017. Response to Wind Turbine Noise Complaints, p. 4.
- ³ Ministry of Health and Long-Term Care. ND. Wind Turbines and Public Health. Stakeholder Consultation Plan.
- ⁴ Ministry of Health and Long-Term Care. 2009. Memorandum from Dr. Arlene King to Medical Officers of Health and Environmental Health Directors, October 21, 2009. Ministry reference: HLTC2976AC-2009-728.
- ⁵ Ontario Chief Medical Officer of Health. 2010. The Potential Health Impact of Wind Turbines. Available at: [30419-1-Eng-report.indd \(gov.on.ca\)](#)
- ⁶ World Health Organization. 2011. Burden of disease from environmental noise, . xvi.
- ⁷ CMOH report, Ibid p. 10.
- ⁸ Dr. Ray Copes. 2010. Email to Dr. Gloria Rachamin, copied to Dr Arlene King, Dr. David Williams and others, subject windturbinesQAMay112010GR. PDF available on request. Comment R1.
- ⁹ Ibid., comment R2.
- ¹⁰ Ibid., comment R5
- ¹¹ Ibid., comments R7 and R8.
- ¹² Jankowski, P. 2011. Turbine report missing impact section. Owen Sound Sun Times, June 22, 2011
- ¹³ Erickson v. Director, Ministry of the Environment. Case Nos 10-121, 10-122, transcript, p. 208, lines 14-16.
- ¹⁴ Ibid., p. 212, lines 10-16.
- ¹⁵ Ibid., p. 216, lines 10-11.
- ¹⁶ Erickson v. Director, Ministry of the Environment. Case Nos 10-121, 10-122, Decision, p. 206.
- ¹⁷ Ibid., p. 190.
- ¹⁸ Ontario Ministry of the Environment. 2010. Backgrounder: Low Frequency Sound and Infrasound Report. Available in archived version at: [Backgrounder: Low Frequency Sound and Infrasound Report | Ontario Newsroom](#)
- ¹⁹ How Gastmeier Chapnik Limited. 2010. Low-frequency noise and infrasound associated with wind turbine generator systems: a literature review. Ontario RFP No. 078696
- ²⁰ Arlene King CMOH. 2013. Letter to Dr. Vivek Goel, Public Health Ontario, May 31, 2013.
- ²¹ Documents were obtained via a request under Freedom of Information legislation.
- ²² Dr. Colby is noted by the College of Physicians and Surgeons as being a “medical microbiologist.” In 2009, he was among a group of authors who prepared a report for the Canadian and U.S. wind power lobbies insisting there were no health impacts from wind turbines. He has also appeared before judicial tribunals as a witness for wind power developers.
- ²³ Ontario. 2014. Draft document Evidence update – wind turbines and health. Unpublished (?), p. 39.
- ²⁴ Ibid., p. 40.
- ²⁵ Health Canada, 2014. Health Canada Wind Turbine Noise and Health Study Results Overview, page 19. Copy provided to Wind Concerns Ontario as a stakeholder; can be provided on request.
- ²⁶ Health Canada. 2014. Health Canada wind Turbine Noise and Health Study Results Overview.
- ²⁷ Council of Canadian Academies, 2015, p. xi. Available at: <https://cca-reports.ca/reports/understanding-the-evidence-wind-turbine-noise/>
- ²⁸ Ibid., p. xii.
- ²⁹ Ibid., p.xiv.
- ³⁰ Ibid., p. xviii.
- ³¹ Arra,I.,Lynn,H., Barker, K.,Ogbuneke,C., Regalado, S. 2014. Systematic Review 2013: Association Between Wind Turbines and Human Distress. Available at: [Cureus | Systematic Review 2013: Association Between Wind Turbines and Human Distress](#)
- ³² Kageyama, T., Yano,T.,Kuwano,S.,Sueoka,S., Tachibana,H. 2016. Exposure-response relationship of wind turbine noise with self-reported symptoms of sleep and health problems. Noise & Health, 18:81, pp. 53-61. Available at:

[Exposure-response relationship of wind turbine noise with self-reported symptoms of sleep and health problems: A nationwide socioacoustic survey in Japan - PubMed \(nih.gov\)](#)

³³ Ibid., p. 14.

³⁴ Ibid., p. 2.

³⁵ National Institute of Health, Poland. 2016. Position of the National Institute of Public Health-National Institute of Hygiene on wind farms. Available at: . [Position of the National Institute of Public Health – National Institute of Hygiene on wind farms – PZH](#)

³⁶ European Commission. 2018. Wind potentials for EU and neighbouring countries, p.52.

³⁷ Ibid., pp. 47-54.

³⁸ Ibid., p. 6.

³⁹ Michigan State University. 2017. Sample zoning for wind energy systems, in Land Use Series. Available at: [MSU_WindEnergyZoning.pdf \(wind-watch.org\)](#)

⁴⁰ KMA Land, 2017. Page Co Board takes no action on proposed wind turbine moratorium. January 18, 2017.

⁴¹ Arra et al, op cit.

⁴² KFL&A Public Health. ND. Wind Turbine Noise and Potential Health Effects: A Rapid Review. Available at: [Wind Turbine Noise and Potential Health Effects: A Rapid Review - KFL&A Public Health \(kflaph.ca\)](#)

⁴³ Huron County Health Unit. 2019. Final Report Huron County Wind Turbine Study about Noise, Vibration and Light, p.4. Available at: [Final Report - Huron County Wind Turbine Study about Noise, Vibration and Light, December 2019. \(hpph.ca\)](#)

⁴⁴ Ibid.

⁴⁵ Wind Concerns Ontario. 2017. Response to Wind Turbine Noise Complaints by the Ontario Ministry of Environment and Climate Change, p.3.

⁴⁶ Wind Concerns Ontario. 2020. Response to Wind Turbine Noise Complaints by Ontario's environment ministry: Third Report 2017, p. 16.