**Health Canada and Wind Turbines: Too little too late?**

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Industrial wind turbines (IWTs) are being erected at rapid pace around the world. Coinciding with the introduction of IWTs, some individuals living in proximity to IWTs report adverse health effects including annoyance, sleep disturbance, stress-related health impacts and reduced quality of life. [1,2,3,4,5,6,7,8,9,10,11,12] In some cases Canadian families reporting adverse health effects have abandoned their homes, been billeted away from their homes or hired legal counsel to successfully reach a financial agreement with the wind energy developer.[13]

To help address public concern over these health effects Health Canada (HC) announced the *Health Canada Wind Turbine Noise and Health Study* (HC Study) 2 years ago and brought forth preliminary results November 6, 2014.

This blog will briefly comment on the HC Study results with the backdrop of some historical context.

Acknowledgement of IWT adverse health effects is not new. The term “annoyance” frequently appears when discussing IWT health effects.

In a 2009 letter the Honourable Rona Ambrose, disclosed:

> “Health Canada provides advice on the health effect of noise and low-frequency electric and magnetic fields from proposed wind turbine projects…To date, their examination of the scientific literature on wind turbine noise is that the only health effect conclusively demonstrated from exposure to wind turbine noise is an increase of self-reported general annoyance and complaints (i.e., headaches, nausea, tinnitus, vertigo).” [14]

In 2009, the Canadian Wind Energy Association (CanWEA) sponsored a literature review which acknowledges the reported symptoms such as headaches, nausea, tinnitus, vertigo and state they "… are not new and have been published previously in the context of "annoyance"…" and are the "… well-known stress effects of exposure to noise …"[15]

In 2011, a health survey of people exposed to IWTs in Ontario reported altered quality of life, sleep disturbance, excessive tiredness, headaches, stress and distress. [16]

In the same year, CanWEA posted a media release which advised those impacted by wind turbine annoyance stating "The association has always acknowledged that a small percentage of people can be annoyed by wind turbines in their vicinity. … When annoyance has a significant impact on an individual's quality of life, it is important that they consult their doctor."[17]

It turns out it's not a small percentage of people annoyed by wind turbines. An Ontario Government report concluded a non-trivial percentage of persons are expected to be highly annoyed.

The December 2011 report prepared by a member of CanWEA for the Ontario Ministry of Environment states in the conclusions:

> "The audible sound from wind turbines, at the levels experienced at typical receptor distances in Ontario, is nonetheless expected to result in a non-trivial 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."[18]

The World Health Organization (WHO) acknowledges noise induced annoyance to be a health effect [19] and the results of WHO research "…confirmed, on an epidemiological level, an increased health risk from chronic noise annoyance…" [20]

HC also acknowledges noise induced annoyance to be an adverse health effect. [21], [22] The Principal Investigator of the recent HC Study also states "noise-induced annoyance is an adverse health effect". [23]

Canadian Government sponsored research has found statistically significant relationships from IWT noise exposure.

A 2014 review article in the *Canadian Journal of Rural Medicine* reports:

> "In 2013, research funded by the Ontario Ministry of the Environment indicated a statistically significant relation between residents' distance from the turbine and the symptoms of disturbed sleep, vertigo and tinnitus, and recommended that future research focus on the effects of wind turbine noise on sleep disturbance and symptoms of inner ear problems." [24]

Recently on November 6, 2014, HC posted on its website preliminary results of its HC Study[25]. Wind turbine noise "…. annoyance was found to be statistically related to several self-reporting health effects including, but not limited to, blood pressure, migraines, tinnitus, dizziness, scores on the PSQI, and perceived stress" as well as related to "measured hair cortisol, systolic and diastolic blood pressure."

These troubling results come as no surprise. Since at least 2007 HC employees including the Principal Investigator of the HC Study recommended wind turbine noise criteria which they

predict will result in adverse health effects. (i.e. result in an increase percentage highly annoyed).[26],[27],[28]

Then turbines were built and HC spent 2.1 million dollars to find out it appears to have under predicted the impact of IWT noise. HC's IWT noise criteria does not use a dose response based on IWT noise but rather road noise. But of course IWTs are not cars and peer-reviewed studies consistently document that IWTs produce sound that is perceived to be more annoying than transportation or industrial noise at comparable sound pressure levels. [29],[30]

IWT noise annoyance starts at dBA sound pressure levels in the low 30s and rises sharply at 35 dBA as compared to road noise which starts at 55 dBA. These findings are further supported by the HC Study's preliminary results. [31]

IWT noise characteristics that are identified as plausible causes for reported health effects include amplitude modulation, audible low- frequency noise (LFN), infrasound, tonal noise, impulse noise and night-time noise. [32]

The logical solution would be to develop IWT noise criteria which will protect human health but that would present a barrier to wind energy development. Noise limits impacts IWT siting, cost of energy produced [33] and by extension corporate profits. The wind energy industry has actively lobbied governments to be granted IWTs noise exposure limits which benefit their industry.

Canadians trying to understand this should be mindful the Government of Canada has invested and distributed significant amounts of public money to attract and support the wind energy industry. [34],[35],[36],[37],[38],[39],[40],[41] In addition to providing funding, the Government of Canada in collaboration with wind industry stakeholders has developed the Wind Technology Road Map

(Wind TRM) [42] which Natural Resources Canada defined to be an "…industry-led, government supported initiative that has developed a long-term vision for the Canadian wind energy industry …".[43]

Canada's Wind TRM states "Members of the Steering Committee, government and our industry will be using this roadmap to direct the actions that are necessary for Canada to develop its vast wind resources."[44] HC is a member of the Interdepartmental Wind Technology Road Map Committee [45] which was created to assist in the implementation of Canada's Wind TRM. [46] One of the "key action items" detailed in the Wind TRM calls for Government and Industry collaboration to develop and maintain government documents that address concerns raised about wind energy projects including that of noise, infrasound and other. [47]

Some jurisdictions are trying to take action to protect their residents. For example, several municipalities in Ontario are trying to establish bylaws that protect from IWT noise. In Wisconsin, on October 14, 2014 the Brown County Board of Health unanimously approved a motion to declare the IWTs at a local project a Human Health Hazard. [48]

It would appear HC's research effort is too little too late. A non-trivial percentage of Canadians continue to experience adverse health effects. HC now has additional scientific evidence of the "conclusively demonstrated" effects from exposure to IWT noise. It is time for HC to take acton to help Canadians maintain and improve their health.

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