THE GREAT LAKES– OUR SHARED NATURAL HERITAGE– OUR GREATEST FRESH WATER RESOURCE

A GUIDANCE DOCUMENT FOR DECISION MAKERS

Regarding the siting of industrial

wind turbines in the Great Lakes

Compiled by Keith Stelling 29 March, 2019

Lake Erie and all the Great Lakes must be kept free of industrial wind turbines.

Here are the reasons why:

1

Consider the growing scientific evidence that industrial wind turbines are not as clean and green as the developers’ myth.

WIND ENERGY IS VERY EXPENSIVE. IT DOES NOT REDUCE CARBON EMISSIONS

There are practical complications to adding intermittent and unpredictable wind energy to the grid.

Stability can only be maintained by running fossil-fuelled plants inefficiently on full time standby to provide back up when the wind drops.

In Ontario, huge fluctuations in available wind power force conventional power suppliers to curtail (lower output) giving priority on the grid to double-the-price wind. Ontario electricity consumers then pay again for the "curtailed" energy. Electricity bills have skyrocketed-- from among the lowest to the highest in North America.

The Irish Electricity Supply Board (ESB) National Grid study of installed wind power in Ireland (2004) concluded: "The evidence shows that **as the level of wind capacity increases, the CO2 emissions actually increase** as a direct result of having to cope with the variation of wind-power output".

Wind developers claim that turbines have benign environmental footprints– that they lower CO2 emissions.

But **the ideology** behind industrial wind turbines **has not been validated** by the experience of reality.

It is now apparent that hundreds of turbines will not diminish Ontario's carbon footprint just as they have failed to do anywhere else in the world.

Similar reports corroborating this conclusion include

- **Tallinn Technical University study** (2003)

- **Rhine-Westphalia Institute for Economic Research study** (2009), and

- **Bentek study (2011)** which determined that CO2 savings from wind energy in Colorado were "insignificant".

2

Consider the human health problems reported world wide

ADVERSE HUMAN HEALTH EFFECTS DOCUMENTED IN EVERY COUNTRY WITH TURBINES

- Chronic sleep deprivation
- Leading to lowered immunity, cardiovascular problems and many other complications including diabetes
- Whole body vibrations
- Chronic nausea, tinnitus and headaches
- Disorientation and inability to concentrate

Over the last ten years, adverse health effects have been documented from many people living near wind turbines around the world. The Society for Wind Vigilance is an international federation of physicians, engineers and other professionals concerned with the safe siting of wind turbine facilities. Its website provides links to the most recent human health research.

www.windvigilance.com

Sleep disturbance undermines health

BASNER *et al.* IN THE *LANCET*, 2014:

"Observational and experimental studies have shown that **noise exposure** leads to annoyance, **disturbs sleep** and causes daytime sleepiness, affects patient outcomes and staff performance in hospitals, **increases the occurrence of hypertension and cardiovascular disease, and impairs cognitive performance in schoolchildren**".

ROBERT THORNE 2013:

Thorne made a **7-year study collecting acoustic data at a number of homes, so that cumulative acoustic exposures could** be estimated.*

He found that **"individuals living near the wind farms . . . health is significantly and seriously adversely affected (harmed) by noise.**

"There is a known risk of serious harm (also termed 'significant adverse effect') to health."

*Thorne, R. "Wind Farm Noise and Human Perception A Review". Noise Measurement Services, Pty. Ltd, Queensland, Australia, 2013.

The bibliography of the following document provides a compilation of current research: https://waubrafoundation.org.au/resources/stelling-k-infrasound-low frequency-noise-and-industrial-wind-turbines/

Dr. Michael Nissenbaum 2012:

A "stratified cross-sectional study" by two medical doctors published in a peer reviewed journal of the health effects of persons living within 1100 meters 28 turbines at **Mars Hill, Maine**. They observed:

Sleep disturbances/sleep deprivation and the multiple illnesses that cascade from chronic sleep disturbance.

Including: cardiovascular diseases; increased stress hormones; metabolic disturbances including impaired glucose tolerance up to **diabetes**.

Psychological stresses resulting in additional effects including **cardiovascular disease**, chronic **depression**. Increased **headaches.** Increased requirement for and use of prescription medication.

3

Consider the threat to biodiversity being caused by collision mortality, habitat destruction and fragmentation and interruption of wildlife corridors.

How is wildlife affected?

Documented adverse effects :

- Habitat fragmentation, disturbance and loss
- Life history disruption
- Reduced survival or reduced breeding productivity
- Species depletion -- a particular concern for declining populations.

Dr Scott Petrie, Adjunct Professor at the University of Western Ontario and Lake Erie waterfowl biologist has referenced these documents in this research paper:

Stelling K & Petrie, S: *Threats from industrial wind turbines to Ontario's wildlife and biodiversity.*

https://waubrafoundation.org.au/resources/stelling-k-infrasound-low-frequency-noise-and-industrial-wind-turbines/

Post construction avian mortality records at Wolfe Island

have disclosed the highest recorded rate of raptor casualties outside California.

Each of the 86 industrial wind turbines killed an average of13.4 birds during the first year of operation. Some of the species killed are already experiencing population declines: for example, the Tree Swallow and the Bobolink.

The wind turbine development on Wolf Island in Lake Ontario (near Kingston) is on a migratory flight path.

Long Point Water fowl data clearly indicate that fields within 2 km of coastal wetlands are used readily by large populations of field feeding waterfowl (as well as many other species of migratory and non-migratory wildlife) and that these are also critical corridors for wildlife movements.

For information on the importance of the lower Great Lakes for migratory and wintering waterfowl, also see: Dennis et al. 1984; Prince et al. 1992; Petrie et al. 2002; Petrie and Wilcox 2003; and Schummer 2005.

Avian mortality studies in Ontario show collision mortality is endangering the survival of bird and bat insect species of importance to agriculture.

International biologists have warned that wind turbines must not be placed on migratory flyways– the annual migration routes taken along the shores of the great Lakes

International biologists warn:

“Industrial wind turbines must be kept well away from sensitive natural habitats, including important migratory corridors. --Everaert and Kuijken 2007

“Developers should avoid sites that are important to wildlife”. --Dr. Mark Avery, Royal Society for the Protection of Birds, U.K.

“Wind turbine developments should not be placed within 1000 meters of waterfowl roost sites; not be placed within 1 kilometre of staging areas; not be placed in flight corridors between roosts and feeding grounds; not be placed on major migratory corridors”

How wind turbines affect sensitive habitats

- Biologists are most concerned about habitat disruption and disturbance, leading to long term irreversible abandonment

- Access roads, towers, rotating blades and new power lines fragment habitats and create barriers leading to collision mortality for birds and bats (especially songbirds, waterfowl and raptors)

- Disruptive noise and vibration, particularly prolonged intermittent and low frequency, lead to reproductive difficulties and species decline

- This will inevitably result in loss of biodiversity

4

The menace of infrasound and LFN (Low Frequency Noise)

Industrial wind turbines emit infrasound and low frequency noise.

Infrasound is harmful to the health of humans and wildlife.

Infrasound can be measured 10 miles from the site of a wind turbine.

The wind industry denies that wind turbines emit infrasound or that they could possibly ever produce adverse health effects.

The industry has known this is not the case since the 1987 American Wind Energy Association "Windpower '87 Conference and Exposition", in San Francisco, California when NASA scientist Dr. Neil Kelley presented his research.

Kelley's field work from 1982 to 1988 used scientific noise measurements covering the whole range of frequencies, time of operation and variation in emissions.

- **He demonstrated that wind turbines *do e*mit infrasound.**

- **That infrasound emissions directly relate to turbine operation in time and intensity.**

- **That they also relate directly to the diarized health complaints of many of the people living nearby.**

He went on to test the effect of infrasound on human subjects in the laboratory and found similar symptoms to those reported by the wind turbine victims.

Kelley's publication output: 1982 to 1988

•1. N. D. Kelley, R. R. Hemphill, M. E. McKenna. **"A Methodology for Assessment of Wind Turbine Noise Generation", 1982**. (First published in J. *Solar Engineering, Vol. 21 (1981), pp.341-356).*

•2. E. W. Jacobs, N. D. Kelley, H. E. McKenna, N. J. Birkenheuer. **"Wake Characteristics of the MOD-2 Wind Turbine at Medicine Bow, Wyoming". November 1984.**

•3. N. D. Kelley, H. E. McKenna, R. R. Hemphill, C. l. Etter, R. l. Garrelts, N. C. Linn. **"Acoustic Noise Associated with the MOD-1 Wind Turbine: Its Source, Impact, and Control". February 1985.** (First published by the Solar Energy Research Institute, February 1985). **(262 pages)**

•4. N.D. Kelley. **"A Proposed Metric for Assessing the Potential of Community Annoyance from Wind Turbine Low-Frequency Noise Emissions", November 1987.**

•5. N. D. Kelley, H. E. McKenna, E. W. Jacobs, R. R. Hemphill, J. Birkenheuer. **"The MOD-2 Wind Turbine: Aeroacoustical Noise Sources, Emissions, and Potential Impact".** Solar Energy Research

Recent verification of Kelley's work

MALCOLM SWINBANKS 2012:

Swinbanks demonstrated the perception of infrasound at significantly lower levels than has hitherto been acknowledged.

"Conventional assessments of the perception of infrasound energy levels underestimate the ***importance of the associated crest factor*** *of* ***very low frequency sound pressure variations****".*

RICHARD JAMES 2012:

"There is sufficient research and history to link the ***sensitivity of some people to <u>inaudible amplitude-modulated infra- and low-frequency noise</u> to the type of symptoms described by those living near industrial wind turbines****".* ***

* R. James. "Wind Turbine Infra and Low-Frequency Sound: Warning Signs That Were Not Heard"

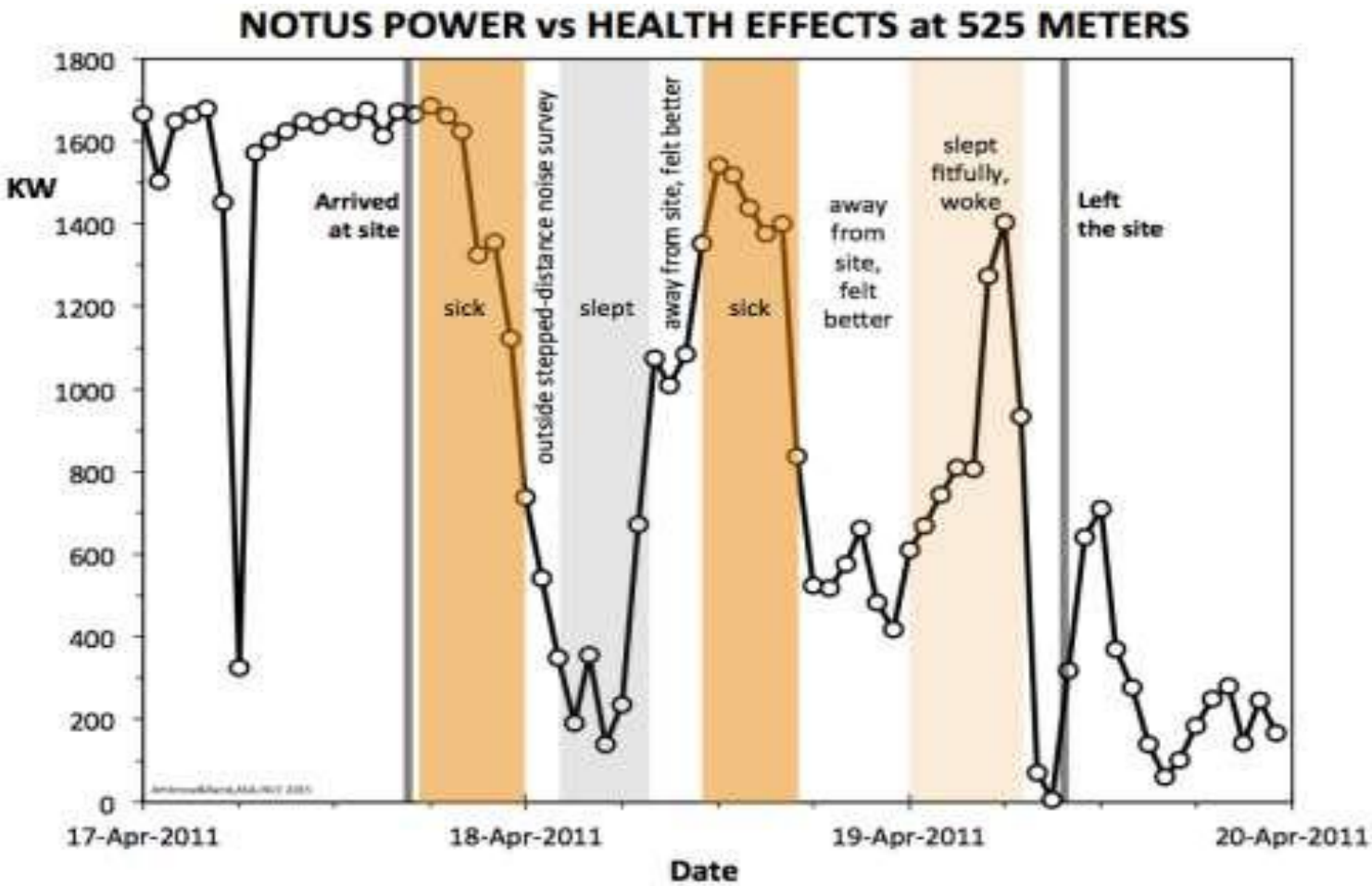
The Falmouth Study, December 2011

("Bruce McPherson Infrasound & Low Frequency Noise Study") Falmouth, Massachusetts. **Responding to adverse health complaints**, the study set out to confirm or deny the presence of infrasonic and low frequency noise emissions (ILFN) from the "WIND 1", a **municipally-owned Vestas V82** industrial wind turbine.

- **After 20 minutes, the chief investigators, Stephen Ambrose and Robert Rand, experienced the same adverse health symptoms.**

- It **took** them **a week to recover** from the adverse health effects experienced during the study, with lingering recurring nausea and vertigo for almost seven weeks for one of them.

The graph below presents the daily time-history variations in IWT output, observations and physiological symptoms experienced. There is a **strong correlation between IWT power output and physiological symptoms.**



Shirley, Brown County, Wisconsin, 2012

The investigation of the Shirley wind project was carried out co-operatively by four different acoustic firms. They concluded:

"The four investigating firms are of the opinion that [there is] enough evidence to classify **LFN and infrasound as a serious issue, possibly affecting the future of the industry".**

"It should be addressed beyond the present practice of showing that wind turbine levels are magnitudes below the threshold of hearing at low frequencies".

5

Ice

Great Lakes winter storms are often fierce and always unpredictable

The formation of ice on the lakes creates added complications for wind turbines.

A sudden midwinter thaw pouring in from flooding rivers can fill the lake with perilous chunks of floating ice powerful enough to knock out bridges and destroy houses– and topple turbines.

6

Consider the cost to taxpayers of decommissioning

Damaged and abandoned/bankrupt wind installations present an expensive decommissioning problem.

In water there could be no containment of pollution released from heavy metals in the nacelles or toxic make up of the fibreglass blades These are expensive items to salvage– even more so in water.

7

Consider the precautionary principle needed to protect the Great Lakes basin ecosystem from collapse

Risks to the fishery

Turbines not infrequently leak toxic lubricating oils and solvents onto their bases and the surrounding land.

Once released into the lake they would jeopardize its delicate ecosystem/

- Fish and many underwater species rely on extremely subtle communication because of their great sensitivity to vibrations and LFN. When extraneous noise, vibrations, and cyclical sound from the turbines are introduced into a significant wildlife habitat, the consequences for entire species can be devastating.

- Reproductive and predator defense systems are disabled. Species decline can be sudden and drastic or gradual– but always inevitable.

- Ultimately as interrelated parts of the system crash, adjoining areas and interdependent species collapse too.

There is no effective mitigation

8

Consider the risk of water contamination for communities along both shores of the lakes.

Contamination of area wells has been reported in a wind turbine development in North Chatham, Ontario.

It was first noticed when pile driving began (often 90 feet deep).

The aquifer is now contaminated.

9

Making a legally defensible decision

THERE IS NOW PLENTY OF SCIENTIFIC EVIDENCE TO SUPPORT A DECISION MAKER’S REFUSAL TO ALLOW A DEVELOPMENT.

THIS IS IS AN INTERNATIONAL ISSUE OF CONCERN TO BOTH CANADIANS AND AMERICANS.

It involves international treaties on the protection of endangered and migrating species and IBAs (International Bird Area).

It risks drinking water contamination to shore line communities on both sides of the lake.

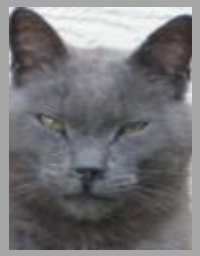
It is a commendable strategy to **protect North America's strategic drinking water resource** and the Great Lakes fishery.


The risk of ecosystem collapse is too great
to allow wind turbines in the Great Lakes

About

The Multi-municipal Wind Turbine Working Group was formed by municipal councillors in Grey, Bruce, and Huron Counties in Ontario in response to the growing number of health complaints they were receiving from constituents living near newly installed industrial wind turbines throughout the area.

Keith Stelling is an independent Ontario researcher. For the last ten years, he was an appointed citizen advisor for the Multi-municipal Wind Turbine Working Group.



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