



Wind Turbines

Do They Cause Health Problems?

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Intrinsic's Renewable Energy Health Team

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Review

Highly accessed

Open Access

Health effects and wind turbines: A review of the literature

Loren D Knopper^{1*} and Christopher A Ollson²

Energy Policy 62 (2013) 44–50

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol



McCallum et al. *Environmental Health* 2014, **13**:9
<http://www.ehjournal.net/content/13/1/9>



RESEARCH

Open Access

Measuring electromagnetic fields (EMF) around wind turbines in Canada: is there a human health concern?

Lindsay C McCallum^{1,2}, Melissa L Whitfield Aslund², Loren D Knopper², Glenn M Ferguson² and Christopher A Ollson^{2*}



Letter to Editor: Are the findings of “Effects of industrial wind turbine noise on sleep and health” supported?

Christopher A. Ollson,
Loren D. Knopper, Lindsay C. McCallum,
Melissa L. Whitfield-Aslund



A Bi-monthly Inter-disciplinary International Journal
www.noiseandhealth.org

Noise & Health, March-April 2013, Volume 15:63, 148-52

Projected contributions of future wind farm development to community noise and annoyance levels in Ontario, Canada

Melissa L. Whitfield Aslund, Christopher A. Ollson, Loren D. Knopper*

The Issue

- Public generally favours the idea of wind energy.



In the future, there will be no difference between waste and energy.

HSBC 



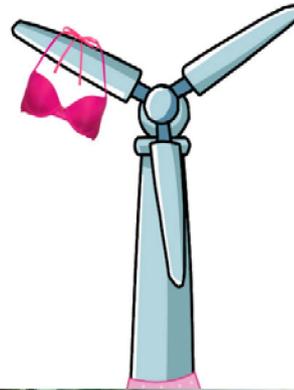
Note to Aust. Med. Assoc.



"First, do no harm!"

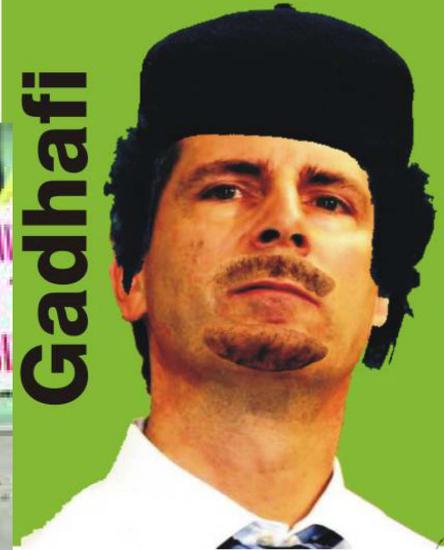
WHEN THE SCIENCE OF WIND ENERGY
TURNS INTO THE ART OF PROSTITUTION
(EDITORIAL)

Mar 1, 2014



Dictators with Green Revolutions

Gadhafi

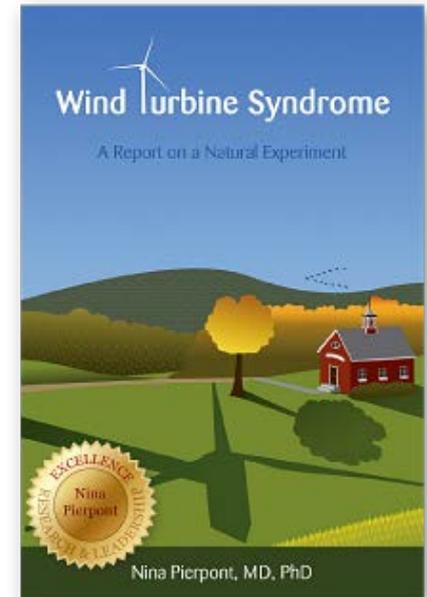


McGuinty



Wind Turbine Syndrome

- Self-reported symptoms generally included:
 - Annoyance, sleep disturbance, tiredness, headache, tinnitus, irritability, nausea, lack of concentration.
- This collection of effects is commonly called “Wind Turbine Syndrome” (Pierpont, 2009).
- The reason for the self-reported health effects is highly debated.



Noise and Health

- Environmental noise above certain levels is a recognized factor in a number of human health issues
 - e.g., hearing, sleep, myocardial infarction, annoyance
- Noise from wind turbines can be annoying to some and associated with sleep disturbance
 - especially when found at levels greater than 40 dB(A)
 - WHO (EU) night noise guideline
- Proper siting of wind turbines is key!
 - Even when noise limits are enforced it is possible that a segment of the population may remain annoyed (or report other health impacts)

Human Health – The Debate

Health effects related to wind turbine operation*

- Audible noise
- Low frequency noise
- Infrasound
- Shadow flicker

*often regardless of regulated setbacks

Health effects related to subjective issues*

- Attitude
- Visual cue
- Stress
- Expectations
- Economics.

*based on proper noise setbacks

Weight of Scientific Evidence from ~60 Peer-Reviewed Articles

1. People tend to notice sound from wind turbines almost linearly with increasing sound pressure level

ORIGINAL ARTICLE

Wind turbine noise, annoyance and self-reported health and well-being in different living environments

Eja Pedersen, Kerstin Persson Waye

Occup Environ Med 2007;**64**:480–486. doi: 10.1136/oem.2006.031039

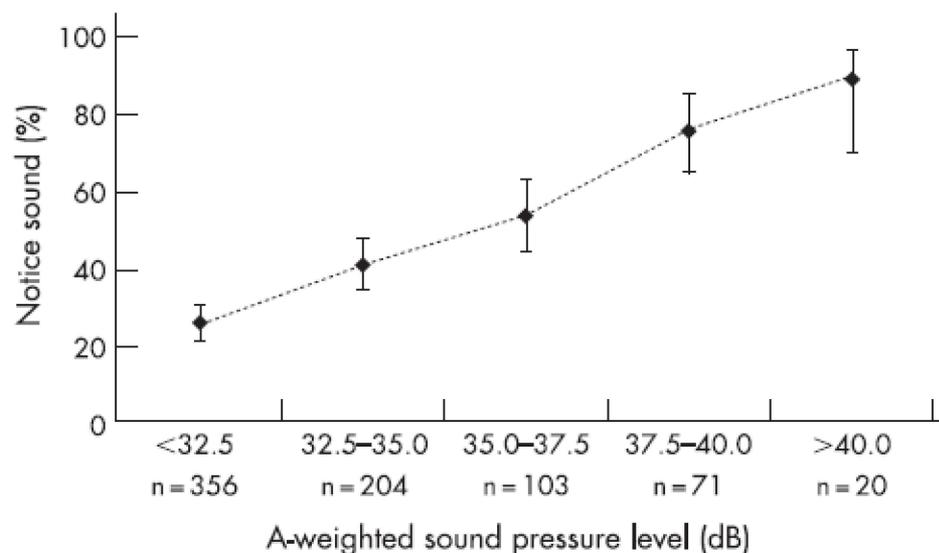


Figure 1 Proportion of respondents who noticed sound from wind turbines outside their dwelling, in relation to A-weighted sound pressure levels in 2.5-dB intervals. Vertical bars indicate 95% confidence intervals; n, the total number of respondents in each interval.

Weight of Scientific Evidence

1. People tend to notice sound from wind turbines almost linearly with increasing sound pressure level
2. A proportion of people that notice sound from wind turbines find it annoying

A comparison between exposure-response relationships for wind turbine annoyance and annoyance due to other noise sources

Sabine A. Janssen^{a)} and Henk Vos

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Arno R. Eisses

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P.O. Box 96864, 2509 JG The Hague, The Netherlands*

J. Acoust. Soc. Am. 130 (6), December 2011

Eja Pedersen^{b)}

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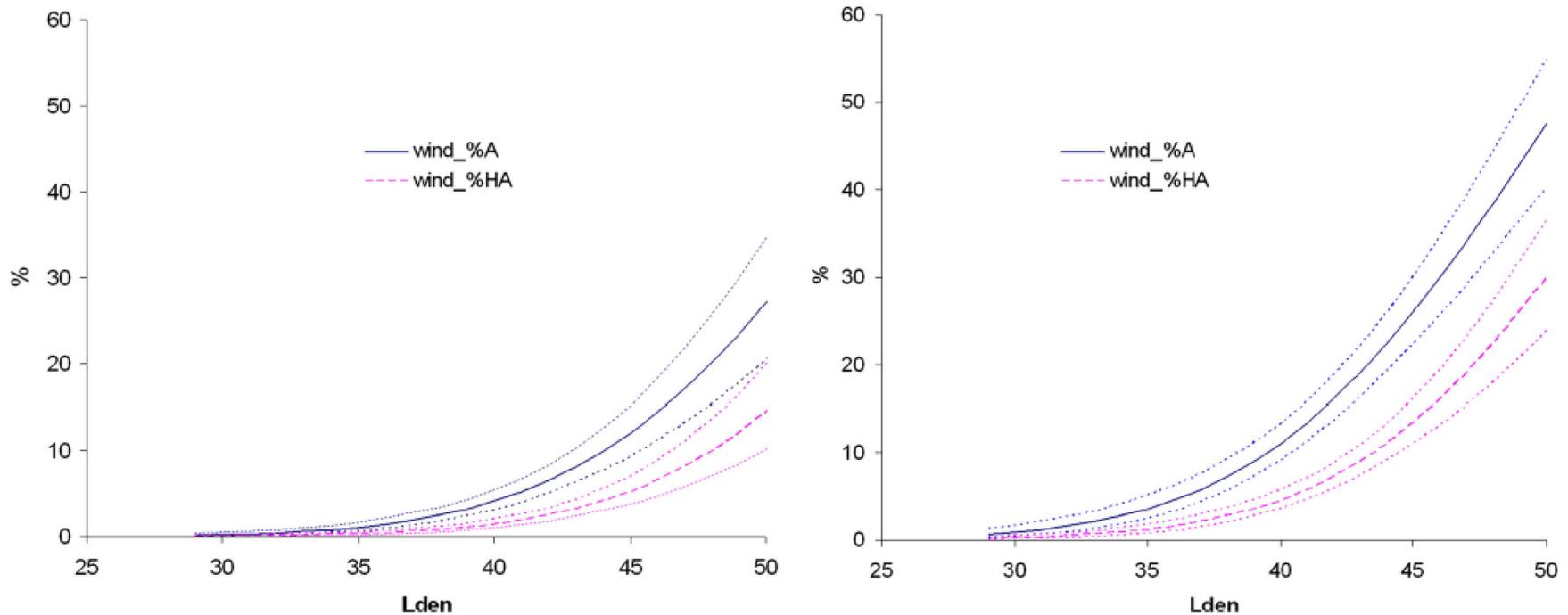


FIG. 1. (Color online) The exposure-response relationships between L_{den} and the percentage of residents annoyed (%A) and highly annoyed (%HA) indoors (left) and outdoors (right).

Weight of Scientific Evidence

1. People tend to notice sound from wind turbines almost linearly with increasing sound pressure level
2. A proportion of people that notice sound from wind turbines find it annoying
3. Noise-related annoyance from turbines can be within the range of existing levels of community noise related annoyance

Impact of Wind Turbine Noise in The Netherlands

Verheijen, E., Jabben, J., Schreurs, E., Smith, K.B

Noise & Health, November-December 2011, Volume 13:55, 459-63



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

- *“The percentage of severely annoyed at 45 dB [Lden] is rated at 5.2% for wind turbine noise, which is well below 10% that corresponds to the existing road and railway traffic noise limits”.*

Weight of Scientific Evidence

1. People tend to notice sound from wind turbines almost linearly with increasing sound pressure level
2. A proportion of people that notice sound from wind turbines find it annoying
3. Noise-related annoyance can be within the range of existing levels of community noise related annoyance
4. **People who economically benefit from wind turbines have significantly decreased levels of annoyance compared to individuals that received no economic benefit**



Impact of wind turbine sound on annoyance, self-reported sleep disturbance and psychological distress

R.H. Bakker ^{a,*}, E. Pedersen ^b, G.P. van den Berg ^c, R.E. Stewart ^d, W. Lok ^{a,1}, J. Bouma ^e

Table 4

Response to indoor wind turbine sound among economically benefitting and non-benefitting respondents.

	Response											
	Do not notice		Notice, not annoyed		Slightly annoyed		Rather annoyed		Very annoyed		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
No economical benefit	394	68	98	17	46	8	21	4	20	4	579	100
Economical benefit	53	54	39	39	7	7	0	0	0	0	99	100

Table 7

Sound sources of sleep disturbance in rural and urban area types, only respondents who did not benefit economically from wind turbines.

Sound source of sleep disturbance	Rural		Urban		Total	
	n	%	n	%	n	%
Not disturbed	196	69.8	288	64.9	484	66.8
Disturbed by people/ animals	33	11.7	64	14.4	97	13.4
Disturbed by traffic/ mechanical sounds	35	12.5	75	16.9	110	15.2
Disturbed by wind turbines	17	6.0	17	3.8	34	4.7
Total	281	100	444	100	725	100

Weight of Scientific Evidence

1. People tend to notice sound from wind turbines almost linearly with increasing sound pressure level
2. A proportion of people that notice sound from wind turbines find it annoying
3. Noise-related annoyance can be within the range of existing levels of community noise related annoyance
4. People who economically benefit from wind turbines have significantly decreased levels of annoyance compared to individuals that received no economic benefit
5. Annoyance is not only related to wind turbine noise but also to subjective factors like attitude, visual cue, stress and expectations

Perception and annoyance due to wind turbine noise—a dose–response relationship

Eja Pedersen^{a)} and Kerstin Persson Waye

J. Acoust. Soc. Am. **116** (6), December 2004

Health Psychology

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0278-6133/13/\$12.00 <http://dx.doi.org/10.1037/a0031760>

Can Expectations Produce Symptoms From Infrasound Associated With Wind Turbines?

Fiona Crichton, George Dodd, Gian Schmid, Greg Gamble, and Keith J. Petrie
University of Auckland

[Health Psychol.](#), 2013 Nov 25. [Epub ahead of print]

The Power of Positive and Negative Expectations to Influence Reported Symptoms and Mood During Exposure to Wind Farm Sound.

[Crichton F](#), [Dodd G](#), [Schmid G](#), [Gamble G](#), [Cundy T](#), [Petrie KJ](#).

The Effects of Vision-Related Aspects on Noise Perception of Wind Turbines in Quiet Areas

Luigi Maffei^{1,*}, Tina Iachini², Massimiliano Masullo¹, Francesco Aletta¹,
Francesco Sorrentino¹, Vincenzo Paolo Senese² and Francesco Ruotolo²

Int. J. Environ. Res. Public Health **2013**, *10*

OPEN ACCESS Freely available online

 PLOS ONE

The Pattern of Complaints about Australian Wind Farms Does Not Match the Establishment and Distribution of Turbines: Support for the Psychogenic, 'Communicated Disease' Hypothesis

Simon Chapman*, Alexis St. George, Karen Waller, Vince Cakic

Sydney School of Public Health, University of Sydney, New South Wales, Australia

MEASUREMENT AND LEVEL OF INFRASOUND FROM WIND FARMS AND OTHER SOURCES

Chris Turnbull, Jason Turner and Daniel Walsh
Acoustics Australia Vol. 40, No. 1, April 2012 - 45

Table 2. Measured levels of infrasound

Noise Source	Measured Level (dB(G))
Clements Gap Wind Farm at 85m	72
Clements Gap Wind Farm at 185m	67
Clements Gap Wind Farm at 360m	61
Cape Bridgewater Wind Farm at 100m	66
Cape Bridgewater Wind Farm at 200m	63
Cape Bridgewater Wind Farm ambient	62
Beach at 25m from high water line	75
250m from coastal cliff face	69
8km inland from coast	57
Gas fired power station at 350m	74
Adelaide CBD at least 70m from any major road	76

- Infrasound is prevalent in urban and coastal environments at similar (or greater) levels to the level of infrasound measured close to a wind turbine.

Weight of Scientific Evidence

- Based on the findings and scientific merit of the available studies, the weight of evidence suggests that when sited properly, wind turbines are not related to adverse health effects
- Government findings
 - National Health and Medical Research Council in Australia, 2010
 - Chief Medical Officer of Health (ON), May 2010
 - MassDEP and MDPH, 2012
 - Oregon Health Authority, 2013
 - National Health and Medical Research Council in Australia, 2014

Intrinsik's Health Based Siting Recommendations

1. Setbacks should be sound-based rather than distance-based alone.
2. Preference should be given to sound emissions of ≤ 40 dBA (outside, not including ambient) for non-participating individuals.
3. Post construction monitoring should be common place to ensure actual sound levels are within required noise limits.
4. If sound emissions from wind projects in the 40-45 dB(A) range for non-participating individuals, we suggest community consultation and community support.

Intrinsik's Health Based Siting Recommendations

5. Setbacks of >45 dB(A) (wind turbine noise only; not including ambient noise) for non-participating individuals directly outside a dwelling are not supported due to possible direct effects from audibility and possible levels of annoyance above background.
6. When ambient noise is taken into account, wind turbine noise can be >45 dB(A), but a combined wind turbine-ambient noise should not exceed >55 dB(A) for non-participating and participating individuals.

Red Lily Legal Challenge



QUEEN'S BENCH FOR SASKATCHEWAN

Citation: 2010 SKQB 374

Date: 2010 10 07
Docket: Q.B.G. No. 1251 of 2010
Judicial Centre: Saskatoon

2010 SKQB 374 (CanLII)

BETWEEN:

DAVID McKINNON

PLAINTIFF

- and -

THE RURAL MUNICIPALITY OF MARTIN NO. 122, and
THE RURAL MUNICIPALITY OF MOOSOMIN NO. 121,
RED LILY WIND ENERGY CORP. and 7314507 CANADA
INC., operating as a general partnership known as RED LILY
WIND ENERGY PARTNERSHIP

DEFENDANTS

Alberta AUC Rule 012 Upheld



Bull Creek wind project approved by Alberta Utilities Commission

Story Comments Image (1)

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Posted: Friday, February 28, 2014 12:06 pm

Kelly Clemmer, Editor-in-Chief | 0 comments

The Alberta Utilities Commission have approved the application to build the BluEarth Renewable's Bull Creek Wind Project, February 20, 2014, at the south border of the MD of Wainwright and northern border of the MD of Provost.

"All of the councillors were pleased with the end result," said Jim Klasson, the MD of Wainwright's development officer. "Council and admin supported the project.

"It can't be overlooked that the rest of the province knows that we're open for business," said Klasson.

The Bull Creek wind energy project was applied for in June, 2012, and after a number of steps in the process, the Killarney Lake Group (KLG) opposed the project. AUC held public hearings on October 28, 2013 to November 1, 2013 in Provost. The hearing resumed in Calgary from November 18 to 22. It was from that hearing that AUC made its decision, that the Bull Creek project was "in the public's interest"



1646658 Alberta Ltd.

Bull Creek Wind Project

February 20, 2014



Thank you

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