

**Submission to Senate Standing Committees on Environment and  
Communications  
Renewable Energy (Electricity) Amendment (Excessive Noise from Wind Farms) Bill  
2012**

by

**Dr David Burraston  
BSc(Hons) PhD**

I support these proposed amendments to the Renewable Energy Act, because of the need for transparency about the noise and wind mast data, and for serious consequences for breaches of noise guidelines (non payment of RECS) if wind farm owners break the rules. I live on a farm near Cootamundra, and there are a number of proposed wind farm developments in our area, which will impact my family and friends if they go ahead.

There is a growing body of published research in this area, which I hope will be of use in supporting these proposed amendments. I have listed a number of research publications below. In addition the Acoustic Ecology Institute publishes a well balanced report on wind farm noise each year, as well as providing pdf files of a number of key papers on wind farm noise:

<http://www.acousticecology.org/wind/>

Thank you for taking the time to consider this submission.

Dr David Burraston  
BSc (Hons), PhD

**BIBLIOGRAPHY**

Ambrose, S. E., Rand, R. W., and Krogh, C. M. E., 2012. Wind turbine acoustic investigation: infrasound and low-frequency noise – a case study, *Bulletin of Science, Technology & Society*, published online 17 August 2012, DOI: 10.1177/0270467612455734

Appelqvist, P., and Almgren, M., 2011. Wind turbine noise in sheltered dwelling areas. Fourth International Meeting on Wind Turbine Noise, Rome, Italy, 12-14 April, 2011

Bakker, H., and Rapley, B., 2010. Sound characteristics of multiple turbines, pp. 233-258 of Rapley and Bakker (eds), 2010

Bengtsson, J., Persson Waye, K., and Kjellberg, A., 2004. Sound characteristics in low frequency noise and their relevance for the perception of pleasantness. *Acta Acoustica* (2004) 90: 171-180

Dickinson, P. J., 2010. Sounds from wind turbines: theory, practice, assumptions and reality, pp. 181-205 of Rapley and Bakker (eds), 2010

Frank H. Brittain, F & Hale, E (2008) “*Some limitations of ray-tracing software for predicting community noise from industrial facilities*”, 2008 International Noise Conference(Noise-Con), Dearborn, Michigan. Available on line at :

<http://www.windaction.org/documents/18087>

This paper covers limitations and problems with the sound propagation standard (ISO 9613-2). This standard model is used for noise assessment studies in the NSW environmental assessments. **A key point with relation to wind energy developments is that the ISO 9613-2 model can give no estimation of its own accuracy beyond 1km, yet it is routinely used for distances exceeding 1km.**

Hanning, C and Nissenbaum, M. (2011) Selection of outcome measures in assessing sleep disturbance from wind turbine noise. Fourth International Conference on Wind Turbine Noise.

Harrison, J. P., 2011. Wind turbine noise. *Bulletin of Science, Technology & Society*, 2011, 31: 256-261

Kamperman, P & James, R (2008) “*Simple guidelines for siting wind turbines to prevent health risks*”, 2008 International Noise Conference (Noise-Con), Dearborn, Michigan. Available on line at :

<http://www.windaction.org/documents/17095>

Reviews sound studies conducted by consultants for governments, wind turbine owners, and local residents for a number of sites with known health or annoyance problems. The purpose is to determine if a set of simple guidelines using dBA and dBC sound levels can serve as the ‘safe’ siting guidelines.

*Keith, S. E., D. S. Michaud, and S. H. P. Bly. 2008. A proposal for evaluating the potential health effects of wind turbine noise for projects under the Canadian Environmental Assessment Act. Journal of Low Frequency Noise, Vibration and Active Control, 27 (4): 253-265.*

McMurtry et.al. (2009) “*Community-based health survey, Ontario*” Report for Wind Concerns Ontario. Available on line at :

<http://www.windaction.org/documents/22261>

*“This community based surveillance activity was conducted under the guidance of Dr. Robert McMurtry, the Former Dean of Medicine at the University of Western Ontario. The health survey revealed that out of 76 respondents, 53 people now living near different wind power facilities in Ontario reported that industrial wind turbines were having a significant negative impact on their lives. The adverse effects range from headaches and sleep disturbance to tinnitus (ringing in the ear) and depression.”*

Minnesota Department of Health Environmental Health Division (2009) "*Public Health Impacts of Wind Turbines*" Report requested by Minnesota Department of Commerce Office of Energy Security May 22, 2009. Available on line at :

<http://www.windaction.org/documents/21436>

Health report "white paper" evaluating possible health effects associated with low frequency vibrations and sound arising from large wind energy conversion systems (LWECS).

Northern Maine Medical Center (2009) "*Health Concerns and the Need for Careful Siting of Wind Turbines*" Press Release March 4, 2009

Medical Staff of Northern Maine Medical Center unanimously approved this press release and requested a moratorium on "wind farm" developments. Three excerpts from this press release :

*"We echo the concerns of the Medical Staff of Rumford Community Hospital as regards an increasing body of literature and reports from Canada, the USA, and particularly from Europe suggesting that the deployment of industrial wind facilities in close proximity to places where people live, work or attend schools results in negative health effects, including and especially sleep deprivation and stress."*

*"These effects arise not only from audible noise frequencies but also from persistent inaudible low frequency noise waves of a cyclical nature which are felt, but not heard. There are a growing number of scientific observations and studies suggesting that people living up to 2 miles away from these industrial wind farms may be affected."*

*"In light of these growing, serious medical concerns, we propose a moratorium on the building of any such "wind farms" until more research is done on the health impact that such facilities will have on the communities surrounding such technology. These communities and the Maine DEP and Health Services must be allowed time to study and learn from the European and Canadian experiences, as well as from the many affected families in Mars Hill, Maine, and put into place appropriate regulation prior to expanding the wind industry in the State of Maine."*

Pedersen, E., and Halmstad, H. I. 2003. Noise annoyance from wind turbines – a review. Swedish Environmental Protection Agency, Report 5308.

Pedersen, E. and Persson Waye, K. 2008. Wind turbines – low level noise sources interfering with restoration? Environmental Research Letters, 3: 1-5.

Pedersen, E., and Persson Waye, K. 2007. Wind turbine noise, annoyance and self-reported health and wellbeing in different living environments. Occup. Environ. Med. 64: 480-486.

Pedersen E. and Persson Waye, K. 2004. Perception and annoyance due to wind turbine noise – a dose-response relationship. J. Acoust. Soc. Am. 116: 3460-3470.

Pedersen, E, (2007) “*Human response to wind turbine noise - perception, annoyance and moderating factors*”, Doctoral Thesis (Medicine) Inst of Medicine. Dept of Public Health and Community Medicine, Göteborg University. Sahlgrenska Academy, Sweden. Available on line at :

<http://gupea.ub.gu.se/dspace/handle/2077/4431>

Rapley, B., and Bakker, H. (eds), 2010. *Sound, Noise, Flicker and the Human Perception of Wind Farm Activity*, Atkinson and Rapley Consulting Ltd (Palmerston North, New Zealand) in association with Noise Measurement Services Pty Ltd (NMS) (Brisbane, Australia), 2010

Ring, S., and Webb, B., 2012. Wind farm noise and private nuisance: a return to common sense. *Journal of Planning & Environment Law* (2012) 892

Salt, A. N., and Hullar, T. E., 2010. Responses of the ear to low frequency sounds, infrasound and wind turbines, *Hearing Research* (2010) 268 (1-2): 12-21

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Salt, A. N., and Lichtenhan, J. T., 2011. Responses of the inner ear to infrasound. Fourth International Meeting on Wind Turbine Noise, Rome, Italy, 12-14 April 2011

Salt, A. N., and Lichtenhan, J. T., 2012. Perception-based protection from low-frequency sounds may not be enough. Inter.noise 2012, August 19-22, New York City, USA

Shepherd, D., McBride, D., Welch, D., Dirks, K. N., & Hill, E. M. (2011). Evaluating the impact of wind turbine noise on health-related quality of life. *Noise and Health*, 13(54), 333.

Shepherd, D et al (2011). Wind turbine noise and health-related quality of life of nearby residents: a cross-sectional study in New Zealand. Fourth International Conference on Wind Turbine Noise.

Shepherd, D., & Billington, R. (2011). Mitigating the Acoustic Impacts of Modern Technologies Acoustic, Health, and Psychosocial Factors Informing Wind Farm Placement. *Bulletin of Science, Technology & Society*, 31(5), 389-398.

Shepherd, D. (2010). Wind Turbine Noise and Health in the New Zealand context. In: *Sound, Noise, Flicker and the Human Perception of Wind Fard Activity*. Editors Rapley, B., and Bakker, H. Atkinson and Rapley: Palmerston North. ISBN 978-0-473-16558-1

Shepherd, D., Welch, D., Dirks, K.N., Mathews, R. (2010). Exploring the Relationship between Noise Sensitivity, Annoyance and Health-Related Quality of Life in a Sample of Adults Exposed to Environmental Noise. *International Journal of Environmental Research and Public Health*. 7(10): 3579-3594.

Shepherd, D., Dirks, K., McBride, D., & Welch, D (2010b). Opposition to wind turbines: noise about nothing? International Symposium on Sustainability in Acoustics, International

Congress  
on Acoustics, Auckland, New Zealand.

Swinbanks, M.A. (2011) The audibility of low frequency wind turbine noise. Fourth International Conference on Wind Turbine Noise.

Thorne, Bob, 2010. Wind Farms: The Potential for Annoyance, pp. 127-133 of Rapley and Bakker (eds), 2010

Thorne, Bob, 2011. The problems with “noise numbers” for wind farm noise assessment. *Bulletin of Science, Technology & Society*, 2011, 31: 262-290

Thorne, Bob, and Thorne, Max, 2010. Wind farm noise management conditions, pp. 301-319 of Rapley and Bakker (eds), 2010

van den Berg, G. P., 2004a. Do wind turbines produce significant low frequency sound levels? 11<sup>th</sup> International Meeting on Low Frequency Noise and Vibration and its Control, Maastricht, The Netherlands, August 30-September 1, 2004

van den Berg, G. P., 2004b. Effects of the wind profile at night on wind turbine sound. *Journal of Sound and Vibration* (2004) 277 (4-5): 955-970

Van den Berg, G. P. (2006) “*The Sounds of High Winds: the effect of atmospheric stability on wind turbine sound and microphone noise*” PhD thesis available online :

<http://dissertations.ub.rug.nl/faculties/science/2006/g.p.van.den.berg/>

van den Berg, G. P., 2007. Wind profiles over complex terrain. Second International Meeting on Wind Turbine Noise, Lyon, France, September 20-21, 2007

*Van den Berg, F., Pedersen E., Bouma, J., and R. Bakker. 2008. Project WINDFARM perception. Visual and acoustic impact of wind turbine farms on residents. FP6-2005-Science-and-Society-20 Project no. 044628: 1-99*

The research of van den Berg shows that there are significantly higher levels of noise pollution at night than are experienced in the daytime, and the effects of complex terrain such as hills are different to flat terrain. Sound levels can be up to 15dB higher at night relative to the same reference wind speed in daytime. These papers also discuss the flawed methodology of wind induced microphone noise during background sound monitoring.