

Wind Energy: Siting Decisions, Health Concerns and Scientific Evidence



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The Author

DR TED CHRISTIE

Environmental lawyer

Legally Accredited Mediator

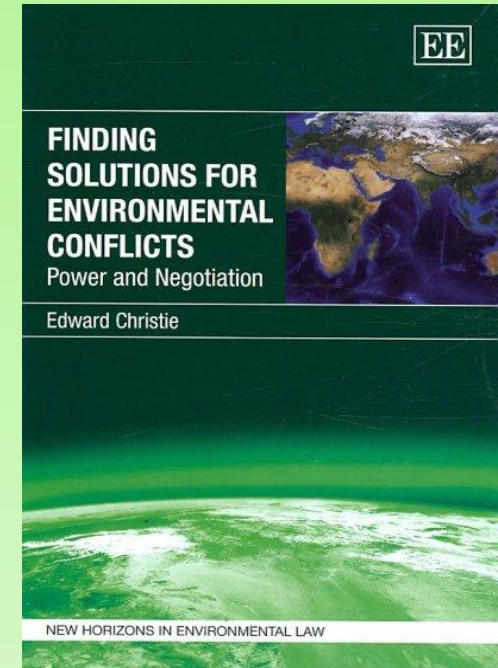
Environmental Scientist

Author of *“Finding Solutions for Environmental Conflicts: Power and Negotiation”* (2008) 2009), Edward Elgar , Cheltenham, UK

E. ted.christie@bigpond.com

W. www.tedchristie.blogspot.com

W. www.adr-environment.com



The Scientific Method (1)

- ❖ Science relies on the give and take of criticism, testing, experimentation and review to ascertain validity.
- ❖ The central test to determine the validity of a theory or reasoning, in any given context, is acceptance through widespread consensus.
- ❖ Contrary to a long-held misconception, science does not generate exact knowledge with logical certainty.

The Legal Method (1)

- ◆ When scientific evidence is in issue, our Courts rely on expert witnesses.
- ◆ The expert witnesses' role is to provide judges with the necessary scientific criteria to test the accuracy of their conclusions; and
- ◆ Judges can then form their own independent judgement, by applying these criteria to the facts proved in evidence.

The Legal Method (Cont.)

- ◆ An expert cannot give opinion evidence as to the ultimate issue - the determination of which is the concern of the Court.
- ◆ Expert evidence presented to the court should be, and should be seen to be, independent assistance provided to the court by way of objective, unbiased opinion regarding matters within the expertise of the expert witness.

The Scientific Method (2)

- ◆ If inadequate information exists, the scientific method will defer a decision and not produce a final adjudication of fact.
- ◆ In essence, there is a total absence of finality in the scientific method as it operates under no deadlines.

CASE STUDY: The Scientific Method and Final Determination of Facts

- ❖ One of the first warnings of health dangers following exposure to asbestos dust emerged in an article in the *British Medical Journal* in 1924.
- ❖ Further scientific research was published throughout the world from this time.
- ❖ But, it was not until the rigorous epidemiological studies of Professor Irving Selikoff, published in the *Journal of the American Medical Association* (1963) into the link between asbestos exposure and the deadly lung cancer, mesothelioma, that many people were persuaded that asbestos had to be restricted e.g. workplace safety protocols for asbestos in USA.

CASE STUDY: The Scientific Method and Final Determination of Facts (Cont.)

- ◆ This “asbestos history” illustrates the time-span taken for science to produce sound scientific evidence for action to be taken.
- ◆ Unlike asbestosis and mesothelioma, which are diseases specific for exposure to asbestos dust, the symptoms of ‘Wind Turbine Syndrome’ are non-specific. Similar symptoms may arise, generally, caused by other factors.
- ◆ This makes establishing a link between the infrasound produced by wind turbines and adverse health effects problematic.

The Legal Method(2)

- ◆ The final determination of facts is crucial.
- ◆ In marked contrast to the scientific method, the legal method produces a final adjudication of fact.
- ◆ The legal method will resolve a factual dispute, even in circumstances where uncertainty exists.
- ◆ The party having the onus of proof must persuade the court according to the legal standard of proof - or fail!

Understanding the Current Factual Situation for Wind Turbine Syndrome in Australia

- ◆ The recently completed Commonwealth Government's Senate Inquiry by the Community Affairs References Committee into "The Social and Economic Impact of Rural Wind Farms (June 2011)" provides a detailed, independent assessment of factual evidence: from scientific experts as well as claims by some people who lived in close proximity to wind farms.

Understanding the Current Factual Situation for Wind Turbine Syndrome in Australia (Cont.)

- ◆ Chair of the Committee, Senator Rachel Siewert, stated:
- ◆ *"We have found that there have been adverse health effects found in some people near wind farms.*
- ◆ *However, and this is a very important, we have not found that this is necessarily associated with noise or vibration ...*
- ◆ *We are saying that there's not enough information, but that people are feeling possible adverse health effects, it could be related to other factors, and we had a lot of evidence around stress associated with location of wind farms."*

Understanding the Current Factual Situation for Wind Turbine Syndrome in Australia (Cont.)

- ◆ The Senate Committee recommended:
- ◆ *“That the Commonwealth Government initiate, as a matter of priority thorough, adequately resourced epidemiological and laboratory studies of the possible effects of wind farms on human health.*
- ◆ *This research must engage across industry and community, and include an advisory process representing the range of interests and concerns”.*

The Position of Science on Wind Turbine Syndrome in Australia

- ◆ The National Health and Medical Research Council (“NHMRC”) has reviewed the evidence from current literature on the issue of wind turbines and potential impacts on human health.
- ◆ In their Report of this Study (July, 2010), the NHMRC concluded:

“This review of the available evidence, including journal articles, surveys, literature reviews and government reports, supports the statement that: There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines”.

The Position of Science on Wind Turbine Syndrome in Australia (Cont.)

- ◆ The NHMRC recommended:
- ◆ *“that relevant authorities take a precautionary approach and continue to monitor research outcomes. Complying with standards relating to wind turbine design, manufacture, and site evaluation will minimise any potential impacts of wind turbines on surrounding areas.”*

The Position of Law on Wind Turbine Syndrome

The Canadian Case of Erickson v. Director, Ministry of the Environment (July 2011)

- ◆ It should be recognized the decision of the Environmental Review Tribunal, Ontario, Toronto, Canada – however persuasive or influential it may be – is not binding on an Australian Court.
- ◆ The Tribunal acknowledged that there were *“certainly legitimate concerns and uncertainties about the effects of wind turbines on human health”*. However, it could not conclude that engaging in this wind farm project, as approved by the Government agency, would cause *“serious harm to human health”* – the statutory test that had to be satisfied.

The Position of Law on Wind Turbine Syndrome

The Canadian Case of Erickson v. Director, Ministry of the Environment (Cont.)

- ◆ The Tribunal concluded that:
- ◆ *“This case has successfully shown that the debate should not be simplified to one about whether wind turbines can cause harm to humans.*
- ◆ *The evidence presented to the Tribunal demonstrates that they can, if facilities are placed too close to residents. The debate has now evolved to one of degree.*
- ◆ *The question that should be asked is: What protections, such as permissible noise levels or setback distances, are appropriate to protect human health?”*

Conclusions

- ◆ There is common ground between law and science on the significance of planning and evaluation of wind farm sites to minimize or to avoid potential adverse health effects.
- ◆ There is also common ground between law, politics and science for the need for more research and monitoring.
- ◆ But a key issue in dispute is the potential impacts on human health. The position of science that there are no direct pathological effects from wind farms seems inconsistent with the position of law that wind turbines can cause harm to humans if facilities are placed too close to residents.

Conclusions (Cont.)

- ◆ The Senate Inquiry received 1017 submissions from researchers, wind farm developers and the general public. This becomes a relevant consideration as “*much of the evidence that the Committee received related to claimed adverse health effects of wind turbines*”.
- ◆ A major focus for future research may well be to define the protections *e.g. permissible noise levels or setback distances*, appropriate to protect human health.
- ◆ Siting decisions to manage the risk of adverse health effects from wind farms need to recognize that setting permissible noise levels that are at an acceptable level of health risk for science may differ significantly from public opinion.

References and Web Links

Slides 3, 6, 9: Black, B. (1988), 'A unified theory of scientific evidence', *Fordham Law Review*, **56**, 595; and Christie, E. (1991), 'The role of law and science in the resolution of disputes over factual evidence', *Environmental and Planning Law Journal*, **8**, 200.

Slides 4, 5: Summary of key common law legal principles for expert evidence.

Slide 7: Bartrip, PWJ (2004) History of asbestos related disease. *Postgrad Med J* **80**, 72; and The Asbestos Industry vs. Dr Irving Selikoff (2009).

<http://www.maacenter.org/blog/the-asbestos-industry-vs-dr-irving-selikoff.html>

Slides 10, 12: "The Social and Economic Impact of Rural Wind Farms ". Commonwealth of Australia, Senate Inquiry (June 2011).

http://www.aph.gov.au/senate/committee/clac_ctte/impact_rural_wind_farms/report/report.pdf

Slide 11: Senate inquiry calls for wind farm health study, ABC Rural (23/06/2011)

<http://www.abc.net.au/rural/news/content/201106/s3251958.htm>

Slides 13, 14: Release of National Health and Medical Research Council Public Statement: Wind Turbines and Health (July 2010)

<http://www.nhmrc.gov.au/guidelines/publications/new0048>

Slides 15, 16: *Erickson v. Director, Ministry of the Environment*. Decision of the Environmental Review Tribunal, Toronto, Ontario, Canada (18 July 2011).

<http://www.ert.gov.on.ca/files/201107/00000300-AKT5757C7CO026-BGI54ED19RO026.pdf>

NOTE: In its decision, the Environmental Review Tribunal commented that it had evidence before it from an impressive array of 25 leading experts from around the world who were at the cutting edge of scientific inquiry. The qualifications of these expert witnesses is summarised in Slides 20, 21.

Qualifications of the Expert Witnesses: Environmental Review Tribunal, Toronto, Ontario, Canada

- ◆ 1. **Mr. Richard James' Evidence**
Mr. James was qualified to provide opinion evidence as an acoustician.
- ◆ 2. **Dr. Michael Nissenbaum's Evidence**
Dr. Nissenbaum was qualified to give expert opinion in the areas of diagnostic imaging with knowledge of medical physics, internal medicine and primary care.
- ◆ 3. **Dr. Robert Thorne's Evidence**
Dr. Thorne was qualified as an expert in environmental health with knowledge of acoustics and psychoacoustics.
- ◆ 4. **Dr. Daniel Shepherd's Evidence**
Dr. Shepherd was qualified as an expert psycho-acoustician with knowledge of human health and quality of life.
- ◆ 5. **Dr. Jeff Aramini's Evidence**
Dr. Aramini was qualified to give opinion evidence as an epidemiologist with knowledge of public health, statistics and statistical analysis.
- ◆ 6. **Dr. Jeffrey Wilson's Evidence**
Dr. Jeffrey Wilson gave opinion evidence in this proceeding as an expert in epidemiology, with knowledge of public health, statistics and statistical analysis.
- ◆ 7. **Dr. Christopher Hanning's Evidence**
Dr. Hanning was qualified to give evidence as a medical doctor with experience in sleep medicine and sleep physiology. He authored a January 2011 report titled "Wind turbine noise, and health."
- ◆ 8. **Dr. Arline Bronzaft's Evidence**
Dr. Bronzaft was qualified to give expert opinion evidence in the areas of environmental psychology with knowledge of noise and its effects on humans.
- ◆ 9. **Dr. Carl Phillips' Evidence**
Dr. Phillips was qualified to give opinion evidence in the area of public health with knowledge of epidemiology and related health sciences and scientific epistemology and methodology.
- ◆ 10. **Dr. Robert McMurtry's Evidence**
Dr. McMurtry was qualified to give opinion evidence as a physician and surgeon with experience in delivery of health care, health care policies and health policy.
- ◆ 11. **Dr. Gloria Rachamin's Evidence**
Dr. Rachamin was qualified to give opinion evidence as an expert human toxicologist and pharmacologist with expertise and extensive experience in assessing potential health risks of chemicals and physical agents and in developing standards, guidelines and policies for the protection of human health.
- ◆ 12. **Dr. Syed Mansoor Mahmood's Evidence**
The Director, Mansoor Mahmood, testified as to the process he followed in approving the REA, as a Director under section 47.5 of the *EPA*. He explained that he has been a practising professional engineer for 23 years.
- ◆ 13. **Mr. John Kowalewski's Evidence**
Mr. Kowalewski was qualified as a mechanical engineer with specific experience and expertise in environmental noise issues and in the application and development of noise guidelines.

Qualifications of the Expert Witnesses: Environmental Review Tribunal, Toronto, Ontario, Canada (Cont.)

- ◆ 14. **Dr. Cornelia Baines' Evidence**
 - ◆ Dr. Baines was qualified as a physician epidemiologist with a special expertise in dealing with scientific evidence affecting public policy. Dr. Baines, who received a medical degree and Masters of Science from the University of Toronto, is a professor emerita at the Dalla Lana School of Public Health at the University of Toronto.
- ◆ 15. **Dr. Mark Speechly's Evidence**
 - ◆ Dr. Speechly was qualified to give opinion evidence as an epidemiologist with special expertise in population science and psychosocial epidemiology.
- ◆ 16. **Dr. William David Colby's Evidence**
 - ◆ Dr. Colby was qualified to give opinion evidence as a medical expert in public health with special expertise and knowledge in the issue of public health and wind turbines.
- ◆ 17. **Mr. Brian Howe's Evidence**
 - ◆ Mr. Howe was qualified to give opinion evidence as a mechanical engineer with expertise in acoustics, noise and vibration, with special expertise in infrasound, low frequency noise and wind turbine noise. He is a principal of Howe Gastmeier Chapnik Limited (HGC) and was involved in the preparation of the following reports: HGC "Wind Turbines and Infrasound: A Discussion" (2006) ("HGC Report 2006"), HGC "Wind Turbines and Sound: Review and Best Practice Guidelines" (2007) ("HGC Report 2007") and the HGC Report 2010.
- ◆ 18. **Mr. Payam Najafi-Ashtiani's Evidence**
 - ◆ Mr. Ashtiani was qualified to give opinion evidence as a professional engineer with expertise in acoustical engineering.
- ◆ 19. **Dr. Pierre Heraud's Evidence**
 - ◆ Dr. Heraud was qualified to give opinion evidence in the area of wind turbine ice throw risk assessment with knowledge of turbine failure and tower collapse.
- ◆ 20. **Mr. Robin Skinner's Evidence**
 - ◆ Mr. Skinner was qualified to give opinion evidence as a mechanical engineer with specific expertise in wind turbine layout, including application of the MOE Noise Guidelines.
- ◆ 21. **Dr. Geoff Leventhall's Evidence**
 - ◆ Dr. Leventhall was qualified to give opinion evidence as an acoustician with expertise in noise and vibration and subjective response to noise and special expertise in infrasound, low frequency noise and wind turbine noise.
- ◆ 22. **Dr. Kenneth Mundt's Evidence**
 - ◆ Dr. Mundt was qualified to give opinion evidence as an expert in epidemiology.
- ◆ 23. **Dr. Christopher Ollson's Evidence**
 - ◆ Dr. Ollson was qualified to give opinion evidence as an expert in environmental health science, practicing in the evaluation of potential risks and health effects of people and the ecosystem associated with environmental issues.
- ◆ 24. **Dr. William Holley's Evidence**
 - ◆ Dr. Holley was qualified to give opinion evidence as an expert in wind turbine technology and system design. Dr. Holley is the Chief Consulting Engineer, Wind Systems for GE.
- ◆ 25. **Dr. Robert McCunney's Evidence**
 - ◆ Dr. McCunney was qualified to give opinion evidence as a medical doctor, board certified in occupational and environmental medicine, with particular expertise in the health implications of noise exposure.