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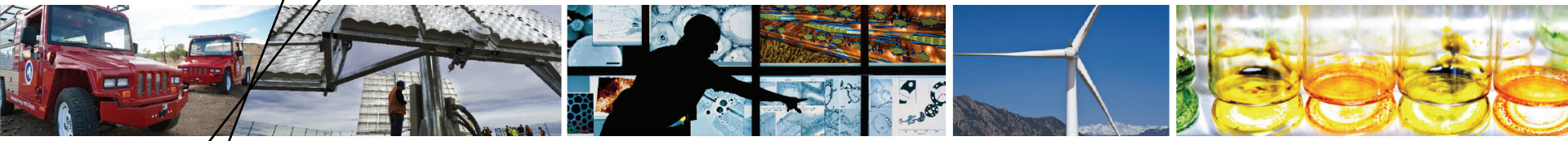
Social Acceptance of Wind: A Brief Overview



AWEA State Wind Energy Forum

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Presentation Overview

1. Concepts – introduction and elements
2. Trends – issues and learning through time
3. Research – profiles from the literature
4. Mitigation – where to from here

Social Acceptance Concepts

- **Social acceptance is multi-faceted, with market, political, and community elements**
- **Understanding social acceptance requires consideration of all elements, but the public dialogue tends to focus on the community**
- **Within the community, concerns often emphasize aesthetics, "nuisance" issues, procedural and distributional dynamics, and property values**
- **Personal values and convictions may play as large a role as any explicitly stated concern**

Source: Wustenhagen et al. 2007

Social acceptance is particularly challenging for wind as its visibility to the public tends to be high, relative to that of other electric generation resources

Trends in Community Acceptance Issues

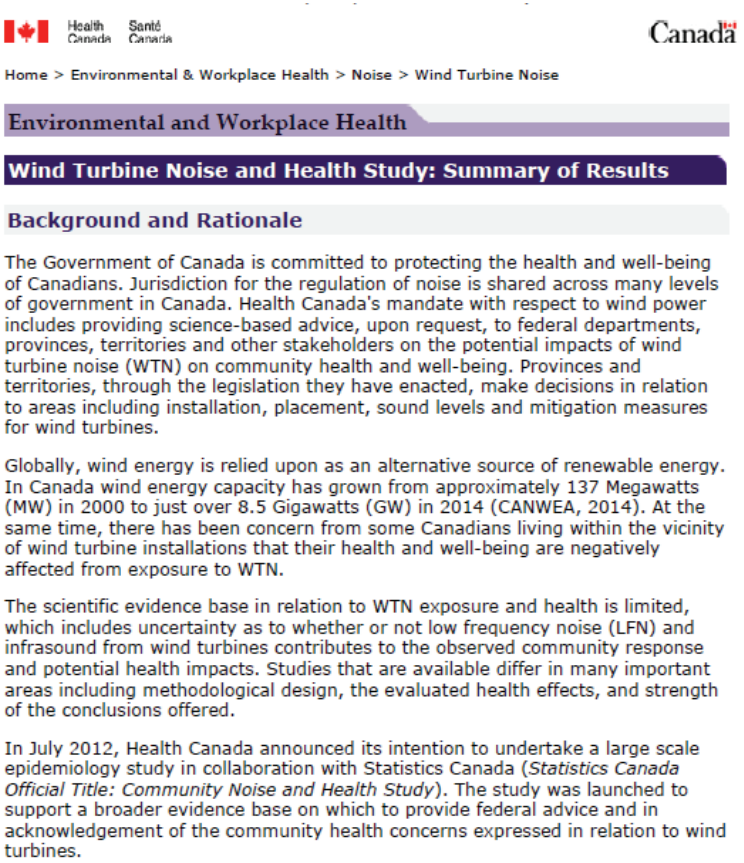
Aesthetics	• Viewshed • Landscape
Ecosystem	• Birds/Bats • Habitat
Procedures	• Participation • Fairness/Equity
Sound and Health	• Audible Sound • Infrasound
Annoyance and Welfare	• Quality of life/Annoyance • Internalization of impacts

- **Focal points in the public, the press, and research communities have evolved, but all issues remain in the discourse**
- **Today, there is growing recognition that wind plants have impacts, but also that their impacts are not unique and are manageable**
- **It may be easier to try to resolve singular issues, but doing so may not fully appreciate the larger context in which acceptance is ultimately created or lost**

Continued research is needed to develop a broad-based understanding of how welfare is affected and to understand the specific measures that are successful in balancing welfare; stronger positive narratives are also important

Health Canada 2014 (Preliminary Research Findings)

- ***Wind Turbine Noise and Health Study*:**
  - Goal: "Provide science based advice…on the potential impacts of wind turbine noise on community health and well-being"
- **Objective: Investigate health effects among a sample of Canadians exposed to wind turbine sound using**
  - Self-reported data
  - Quantitatively measured health outcomes
  - Empirical sound measurements
- **Methods**
  - In-person questionnaire
  - Evaluation of cortisol levels, blood pressure, and sleep quality
  - 4,000 hours of wind turbine sound recordings
- **Study locations in Ontario (12) and Prince Edward Island (6)**
  - Focus on homes within 600 m of a wind turbine; random selection of homes between 600 m and 10 km
  - Final participating sample: 1,238 households
  - Participation rate: 78.9%



Health Canada Santé Canada

Canada

Home > Environmental & Workplace Health > Noise > Wind Turbine Noise

Environmental and Workplace Health

Wind Turbine Noise and Health Study: Summary of Results

Background and Rationale

The Government of Canada is committed to protecting the health and well-being of Canadians. Jurisdiction for the regulation of noise is shared across many levels of government in Canada. Health Canada's mandate with respect to wind power includes providing science-based advice, upon request, to federal departments, provinces, territories and other stakeholders on the potential impacts of wind turbine noise (WTN) on community health and well-being. Provinces and territories, through the legislation they have enacted, make decisions in relation to areas including installation, placement, sound levels and mitigation measures for wind turbines.

Globally, wind energy is relied upon as an alternative source of renewable energy. In Canada wind energy capacity has grown from approximately 137 Megawatts (MW) in 2000 to just over 8.5 Gigawatts (GW) in 2014 (CANWEA, 2014). At the same time, there has been concern from some Canadians living within the vicinity of wind turbine installations that their health and well-being are negatively affected from exposure to WTN.

The scientific evidence base in relation to WTN exposure and health is limited, which includes uncertainty as to whether or not low frequency noise (LFN) and infrasound from wind turbines contributes to the observed community response and potential health impacts. Studies that are available differ in many important areas including methodological design, the evaluated health effects, and strength of the conclusions offered.

In July 2012, Health Canada announced its intention to undertake a large scale epidemiology study in collaboration with Statistics Canada (*Statistics Canada Official Title: Community Noise and Health Study*). The study was launched to support a broader evidence base on which to provide federal advice and in acknowledgement of the community health concerns expressed in relation to wind turbines.

Image Source: http://www.hc-sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/summary-resume-eng.php

Health Canada 2014 (Preliminary Research Findings)

- **Data analysis:**
  - Wind turbine sound (and distance) was not associated with sleep, illness, stress, or quality of life metrics
  - Wind turbine sound was associated with self-reported annoyance
  - Annoyance was associated with health metrics (e.g., long-term cortisol level and blood pressure)
- **Annoyance details:**
  - 16.5% of Ontario and 6.3% of Prince Edward Island sample reported being "highly annoyed" by wind turbine sound
    - Annoyance significantly increased at levels above 35 dBA
    - Annoyance falls off at distances of 1-2 km in Ontario
    - "Highly annoyed" respondents on Prince Edward Island were concentrated within 550 m
    - Annoyance was significantly decreased in locations where estimated night-time background noise was greater than wind turbine sound by 10 dB
  - Although other variables (e.g., visual appearance, concern for safety, and noise sensitivity) are more strongly correlated, annoyance is significantly lower for those participants that received a personal benefit, either directly or indirectly

Health Canada 2014 (Preliminary Research Findings)

- **Wind turbine sound measurements**
  - Peak outdoor A-weighted sound levels at homes were 46 dBA at wind speeds of 8 m/s
    - WHO observes that an annual night-time average below 40 dBA should have no health effects from sleep disturbance, even among the most vulnerable
  - Calculated outdoor dBC levels ranged from 24 dBC to 63 dBC with 3% of homes exceeding 60 dBC
    - Night-time sound levels below 60-65 dBC have been suggested, to minimize complaints and annoyance, in the literature
  - dBA and dBC levels were highly correlated (r=0.94) and resulted in the same relationship to annoyance
  - Infrasound was measured up to 10 km from wind turbines with a decay rate of about 3 dB per doubling of distance, outside of 1 km
  - Infrasound levels were close to the threshold of audibility for the 99th percentile of persons (i.e., those persons with the most sensitive hearing)
- ***Conclusion:*** **Health impacts appear to be related to community annoyance, of which wind turbine noise may contribute, but health outcomes are not dependent on wind turbine noise levels or distances from turbines**

Crichton et al. 2013 (Frontiers in Public Health)

- **The link between health complaints and wind turbines: support for the nocebo expectations hypothesis**
  - Definition: in contrast to a placebo, a nocebo is an inert substance that creates harmful effects
  - Theory: "…symptom reporting can be explained by negative expectations, rather than any pathophysiological link..."
  - Evidence:
    - Audible sound levels typically fall within the regulated standards
    - Biological or physiological explanations for symptoms are lacking
    - There is nothing particularly remarkable in the sound emissions from wind turbines, relative to other man-made and natural sources
    - People routinely report symptoms when they expect negative outcomes, both in the field and in the laboratory, even when there is no actual change in external conditions
    - Reporting of symptoms from wind turbine sound correlates with increased press coverage of potential issues and with the advocacy of opponents
    - Symptoms reported are also characteristic of stress and anxiety
    - Symptom reporting is consistent with patterns observed elsewhere from benign environmental exposures
  - Conclusion:
    - "…successful strategies to address health complaints are likely to involve changing the narrative about wind farms, to create more positive expectations."

Ellis et al. 2007 (Environmental Planning and Management)

Image Source: Taylor and Francis Group http://www.tandfonline.com/

- **Many Ways to Say 'No', Different Ways to Say 'Yes'…**
  - "…positions of support and objection are not constructed just from lack of awareness of the benefits of wind power, scepticism of the technology or the location of specific proposals, but also reflect deeper values, wider cultural and institutional contexts and claims over objectivity and truth…"
  - "Recurring patterns…at the heart of objections" include:
    - 'Proper' use and relationship to the landscapes
    - The rights of local communities and 'outsiders' to decide landscape use
    - Identification of the legitimate 'voice' of a local community
    - Lack of trust between local citizens and non-local institutions
    - Different perceptions of the local impact of, and response to, national and global phenomena
    - The relationship between expert and lay knowledge
  - Subjective context-dependent understandings and strategic engagement are essential
  - Dialogue should emphasize settlement rather than persuasion

Mitigation

- **Seek support from across stakeholders, with strategies tailored to the concerns and values of the respective individuals and groups operating in the market, political, and community domains**
- **Seek to increase welfare and appreciate that infrastructure projects, including wind, represent non-trivial change, with the potential for winners and losers**
- **Study and get to know the communities where you hope to build, in a deliberate manner**
- **Utilize intermediaries where available and applicable, the need to leverage local assets or to develop a honed outreach strategy is not a weakness**
- **Engage in dialogue early and often, keep the discourse focused on settlement**

References and Additional Resources

- **Health Canada (2014). Wind Turbine Noise and Health Study: Summary of Results. http://www.hc-sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/summary-resume-eng.php**

- **Crichton F, Chapman S, Cundy T and Petrie KJ. (2014). The link between health complaints and wind turbines: support for the nocebo expectations hypothesis. *Front. Public Health* 2:220. http://journal.frontiersin.org/Journal/10.3389/fpubh.2014.00220/abstract**

- **Ellis G, Barry J, and Robinson C. (2016). Many ways to say 'no', different ways to say 'yes': Applying Q-Methodology to understand public acceptance of wind farm proposals. *Journal of Environmental Planning and Management.* 50.4:517. http://www.tandfonline.com/doi/abs/10.1080/09640560701402075#.VLliT0dzTgg**

- **IEA Wind Task 28. Social Acceptance of Wind Energy: http://www.socialacceptance.ch/**
  - IEA Wind State of the Art Report (2010). http://www.socialacceptance.ch/images/IEA_Wind_Task_28_technical_report_final_20110421.pdf

- **Property Values Research:**
  - Hoen et al. 2013: http://emp.lbl.gov/sites/all/files/lbnl-6362e.pdf
  - Atkinson-Palombo and Hoen 2013: http://emp.lbl.gov/sites/all/files/lbnl-6371e_0.pdf

- **U.S. DOE Wind Exchange: http://energy.gov/eere/wind/windexchange**

- **U.S. DOE Midwest Regional Resource Center: www.windustry.org**

- **U.S. DOE Northeast Wind Resource Center: www.northeastwindcenter.org**

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