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# Industrial Wind Turbine Development and Loss of Social Justice?

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## Abstract

This article explores the loss of social justice reported by individuals living in the environs of industrial wind turbines (IWTs). References indicate that some individuals residing in proximity to IWT facilities experience adverse health effects. These adverse health effects are severe enough that some families have abandoned their homes. Individuals report they welcomed IWTs into their community and the negative consequences were unexpected. Expressions of grief are exacerbated by the emotional and physical toll of individuals' symptoms, loss of enjoyment of homes and property, disturbed living conditions, financial loss, and the lack of society's recognition of their situation. The author has investigated the reported loss of social justice through a review of literature, personal interviews with, and communications from, those reporting adverse health effects. The author's intention is to create awareness that loss of social justice is being associated with IWT development. This loss of justice arises from a number of factors, including the lack of fair process, the loss of rights, and associated disempowerment. These societal themes require further investigation. Research by health professionals and social scientists is urgently needed to address the health and social impacts of IWTs operating near family homes.

## Keywords

wind turbines, adverse health effects, social justice, procedural justice, disempowerment, disturbed living conditions, impact statements, loss of home, societal themes

## Introduction

It is recognized that there are many elements which define human health:

At the Ottawa Conference in 1986, the World Health Organization, along with Health Canada (formerly Health and Welfare Canada) and the Canadian Public Health Association, agreed on the Ottawa Charter for Health Promotion. The Charter sees health in the context of the interaction between the person and the environment. It recognizes the elements of our social environment, including peace, shelter, education, food, income, social justice and equity as prerequisites for health. (Health Canada, 2004, vol. 1, p. 15)

Many articles regarding social justice are available in a variety of psychology and sociology journals and on the Internet; however, a simple definition of social justice seems elusive.

Shain (2011) in a communication with the author comments,

While there is no one account of procedural justice upon which there is consensus, the criteria for what constitutes a fair procedure advanced by Leventhal (1980)

enjoy considerable support and have been used in numerous research studies on the subject (Tyler, Boeckmann, Smith, & Huo, 1997).

Leventhal (1980) proposes six key criteria that people use wittingly or otherwise in judging to what extent a decision-making procedure or process is just or fair:

- *Consistency*: Equal treatment of persons across time and place
- *Bias suppression*: Avoiding self-interest or ideological preconceptions
- *Accuracy*: Using good, accurate information and informed opinions
- *Correctability*: Opportunities for review and amendment
- *Representativeness*: Everyone is involved in decision making who has a material interest in the outcome

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- *Ethicality*: Compatible with fundamental moral and ethical values

These criteria collectively amount to a definition of fair process.

As such, they resonate with Trebilcock's (1993) analysis of what causes breakdowns in contractual relationships: information failure and participation failure. And at a more philosophical level, they resonate with a working definition of fairness given by Shain (2001) following Rawls (2001) in his seminal treatise on *Justice as Fairness* (see also Rawls, 1971).

This definition sees fairness as "the recognition and reasonable accommodation of one another's legitimate interests, claims and rights." As such, fairness calls for a process in which people who are brought into relationships with one another are actively enjoined to make themselves aware of one another's interests, claims, and rights, to understand these as best they can, and to use their knowledge to arrive at best-fit solutions that accommodate all involved. This imperative applies not only to parties involved in personal and domestic relationships but also to those involved in community and commercial undertakings.

While this is a tall order, it is nonetheless the goal of procedural fairness. It also describes the antithesis of the situation we confront in connection with the licensing and siting of industrial wind turbines (IWTs).

These concepts set the stage to raise awareness of the issues associated with social justice and its effects on those living in the environs of IWTs.

Urgent research by health professionals and social scientists is required to further study this social phenomenon.

## The Beginning

In January 2009, I began investigating reports of adverse health effects made by individuals living in the environs of IWTs. Over the course of more than 2 years I have been in communication with many of those experiencing physiological and psychological symptoms in Ontario, Canada and elsewhere globally. The descriptions of reported symptoms are consistent and based on individuals' reports, correlate with the onset of IWT facilities' operations.

An impact statement from early 2009 provoked my awareness that in addition to experiencing adverse health effects, there was evidence of a feeling of disempowerment and lack of process: "I trusted the wind energy companies"—"I can't believe the government is doing this to me." (S. M., personal communications, 2009, Ontario).

Many feel abandoned by the very procedural systems they believed would protect them. Through my research, I observed a progression of impacts starting with the identification of physiological and psychological symptoms and culminating

with frustration, grief and anger, disempowerment, loss of trust, and an overall sense of social injustice.

When the health symptoms became apparent, there was an expectation that authorities and/or the IWT developer would resolve the issues. Individuals report their distress intensified when attempts to obtain recognition of their situation failed. An unexpected lack of response from a cross section of society, including government officials, industry, medical practitioners led to an exacerbation of their situation.

Failure to obtain recognition and resolution has resulted in some individuals seeking legal counsel, abandoning their home, or continuing to experience the adverse health effects, which ultimately, heightens the feelings of injustice.

Social well-being is acknowledged to be a determinant of health: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization [WHO], 1948). Many jurisdictions, including the Canadian federal, provincial, and territorial governments and health officials have accepted WHO's definition of health (Health Canada, 2004, vol. 1, p. 1-1).

## Social Justice Violated

The WHO (2008) acknowledges the importance of social justice. It states, "Social justice is a matter of life and death. It affects the way people live, their consequent chance of illness, and their risk of premature death" (p. 3).

This statement set the stage for my presentation on social justice and IWTs (Krogh, 2010) given during the Society for Wind Vigilance, First International Symposium "The Global Wind Industry and Adverse Health Effects: Loss of Social Justice?"

The WHO (2008) final report on social determinants of health identifies three overarching principles:

1. Improve daily living conditions.
2. Tackle the inequitable distribution of power, money, and resources.
3. Measure and understand the problem and assess the impact of action.

## Improve Daily Living Conditions

WHO (2008) states, "Different government policies, depending on their nature, can either improve or worsen health and health equity" (p. 110).

In response to environmental and economic concerns, some governments have adopted wind energy development as an alternative energy source (Green Energy and Economy Act, 2009; VisitDenmark, 2009). In some jurisdictions, implementation of IWTs has resulted in unexpected consequences. There are global reports of adverse health effects correlated with the onset of operations of IWTs (Harry, 2007; Krogh, Gillis, & Kouwen, 2011; Nissenbaum, 2009; Pierpont, 2009; Phipps, Amati, McCoard, & Fisher, 2007).

In several case series, respondents report experiencing a reduced quality of life. WindVOiCe, a self-reporting health survey from Ontario, Canada found that in addition to a plethora of symptoms, 113 of 131 respondents reported altered quality of life (Krogh et al., 2011). Similarly, in the United Kingdom, Harry (2007), 40 of 42 reported this as well.

In my presentation at the Society for Wind Vigilance International Symposium held in Ontario, Canada, I presented impact statements from a number of countries that described disturbed living conditions and adverse health effects (Krogh, 2010). One impact statement from Japan described how family members were sufficiently sleep disturbed by IWT noise they resorted to renting a second home in order to sleep. A family member from Germany described experiencing tachycardia, which intensified as the IWT speed increased.

References, both from peer-reviewed and other literature, acknowledge that IWTs may cause annoyance and/or stress and/or sleep disturbance (Colby et al., 2009; Keith, Michaud, & Bly, 2008; Minnesota Department of Health, 2009; Pedersen & Persson Waye, 2004, 2007; Rideout, Copes, & Bos, 2010; Thorne, 2010).

The Wind Turbine Noise (2011) post-conference report states,

The main effect of daytime wind turbine noise is annoyance. The night time effect is sleep disturbance. These may lead to stress related illness in some people. Work is required in understanding why low levels of wind turbine noise may produce effects which are greater than might be expected from their levels.

Noise from IWTs is found to be more annoying than other sources of noise at comparable sound pressure levels (Pedersen, Bakker, Bouma, & van den Berg, 2009).

In everyday language, the term *annoyance* may be viewed by some as trivial; however, in the context of human health, annoyance is an adverse health effect (Health Canada, 2005). In 1991, Suter commented that

“Annoyance” has been the term used to describe the community’s collective feelings about noise ever since the early noise surveys in the 1950s and 1960s, although some have suggested that this term tends to minimize the impact. While “aversion” or “distress” might be more appropriate descriptors, their use would make comparisons to previous research difficult. It should be clear, however, that annoyance can connote more than a slight irritation; it can mean a significant degradation in the quality of life. This represents a degradation of health in accordance with the WHO’s definition of health, meaning total physical and mental well-being, as well as the absence of disease. (p. 27)

Niemann and Maschke (2004) also comment on the significance of annoyance: “The result confirms the thesis

that for chronically strong annoyance a causal chain exists between the three steps health–strong annoyance–increased morbidity” (p. 18).

The exact cause of IWT-induced adverse health effects is not fully understood. Plausible causes are not limited to but include amplitude modulation, temporal variability, lack of nighttime abatement, shadow flicker, and visual impact. Audible low-frequency noise has also been identified as one of the IWT noise characteristics that can be a contributing factor for annoyance (Minnesota Department of Health, 2009; Møller & Pedersen, 2010).

Reported symptoms associated with human exposure to IWT’s include sleep disturbance, headache, tinnitus, ear pressure, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, and panic episodes associated with sensations of internal pulsation or quivering when awake or asleep (Pierpont, 2009, p. 26).

Leventhall (2009) attributes these reported IWT symptoms as effects of “annoyance by noise” stating, “I am happy to accept these symptoms, as they have been known to me for many years as the symptoms of extreme psychological stress from environmental noise, particularly low frequency noise.”

The effects of low-frequency noise–induced annoyance and stress from various sources have been researched. “Regulatory authorities must accept that annoyance by low frequency noise presents a real problem . . .” and that “The claim that their ‘lives have been ruined’ by the noise is not an exaggeration . . .” (Leventhall, 2004).

DeGagne and Lapka (2008) note, “Unlike higher frequency noise issues, LFN is very difficult to suppress. Closing doors and windows in an attempt to diminish the effects sometimes makes it worse . . .”

Respite from the effects of low-frequency noise can require extreme measures: “Those exposed may adopt protective strategies, such as sleeping in their garage if the noise is less disturbing there. Or they may sleep elsewhere, returning to their own homes only during the day” (Leventhall, 2004).

In Ontario, personal communications with individuals residing in the environs of IWTs report their attempts to mitigate the low-frequency component of the noise by wearing ear protection day and night proved to be ineffective. To escape the noise, some report resorting to sleeping in vehicles, tents, trailers, basements lined with mattresses, garages, and at relatives or friends’ homes. Others have bought or rented a second residence to obtain respite (G. W., personal communications, 2010; T. W., personal communications, 2011) or relocated with friends or family (T. K., personal communications, 2011). Some families have been billeted at the IWT developer’s expense (Hansard, 2009, p. G-547). Others have abandoned their homes or been bought out by wind developers (Braithwaite, 2009a, 2009b). Buyouts by IWT developers have been reported in other parts of the globe (Rolfe, 2011).

An impact statement from Italy conveys the health and economic effects associated with having to leave their home:

“... I had to abandon my home ... because of the terrible symptoms. My house is worth nothing.” (G. A., personal communications, 2010).

An individual representing a group of families testified before the Ontario Standing Committee on Green Energy and Green Economy Act and described how

Each family has incurred additional costs from budgets for food, fuel, laundry and doctor visits while living away from our homes. Family events had to be held in restaurants. There is wear and tear on our vehicles. There is the extra cost of extensive phone bills from trying to get the problems fixed. There is the price of putting isolators on our homes to protect our families from the unfiltered power. There's the cost of going to meetings. There's loss of productivity due to sleep deprivation. A loss of three weeks from work occurred.

Ontario common law and MLS rules and regulations set out for Ontario realtors all require full disclosure of factual information regarding properties offered for sale by owners. This means an owner is legally obligated to disclose any information known or expected about a property that may affect a buyer's decision to purchase a property.

My real estate agent tells me our farm is unsellable. Our homes are unsellable or of zero value. Buying a second home to live in, which I've done—possible lawyer fees, possible appraisal costs. Our lives are upside down for the last 18 months, and how do you put a cost on that? This is like someone committing a crime, going to jail for, say, 10 years and then finding out after DNA tests, “Oh, you're innocent.” How do you get that time back at our ages? (Hansard, 2009, p. G-548)

P. C. from Ontario described the impacts to the family:

Although we did not realize it at the time, November, 2008 was to be the beginning of the worst nightmare to affect our quality of life that we had and still have ever experienced. There was now a total of 33 industrial wind turbines within a 3 km radius of our house. With the whirling of the turbines came the destruction of personal, family and social life as we knew it. I was positive that the wind corporation and our government would fix the problem as soon as I told them that the noise of the turbines was affecting our health and our quality of life. I was wrong! Since May, 2009 I have been communicating with the wind corporation and with various ministries of our Ontario government (mostly MOE) explaining that the noise from the turbines often makes it impossible to sleep thus causing other health problems that are associated with lack of sleep and sleep disturbance. We also started often feel-

ing our bed vibrate, our chest vibrate, our heart racing, headaches, nausea, pounding in the ears. We were told that mitigations are in place, we are still feeling the same ill effects (P. C., personal communications, 2011).

The impacts on P.C.'s family life have extended to an elderly mother who had to leave the affected home and adult children who were unable to visit:

Our lives have been changed drastically ... have been ruined. The building we live in is not a home because the 33 turbines within a 3 km radius have an adverse effect on the health of the people who live in this house and the turbines cause a loss of enjoyment of normal use of our property. The whooshing audible noise of the turbines is torture, it is often a continuous “on/off” whooshing noise often both inside and outside our house. In my opinion, our government pretends we do not exist. Our government caused this problem, we did not ask for it yet we suffer. We are moms, dads, grandpas, grandmas, children, babies, pregnant mothers ... why have we become insignificant to the turbine corporations and to our provincial government? (P. C., personal communications, 2011)

Additional testimony has described negative health and societal impacts:

We are quizzed or defending our health problems at community events such as hockey games, shopping or church. Dysfunctional community relations have been created by the wind project representatives and some community members trying to discredit the validity of our problems.

The family unit for each family has deteriorated and has been torn apart. We begged for sleep, and four families were billeted by the wind company from their homes for 90 to 180 days in motels, hotels and a rooming house. The consistent stress has broken apart the family unit—no gatherings, few or no celebrations at home. At present, one family has purchased a separate residence to live in, and two others had to, at the expense of thousands of dollars, modify their hydro connection to try and live in their homes that they've lived in for 19 to 35 years.

Due to concerns for the health of grandchildren, grandparents, older children, extended family members and friends, we all strongly discourage extended visits to our homes. We had to meet somewhere else other than our homes for celebrations. (Hansard, 2009, p. G-547)

While the data base of youth impact statements is limited, some young people are also negatively affected. A teenager

reports having to leave home prematurely. This displacement and separation of family was destructive. The outcome is isolation from friends and family: "I am forced to sit back and say nothing as my own teachers teaches my classmates and peers that wind energy is flawless . . . I am forced to live away from home with my grandmother . . . I can never go home" (J. K., personal communications, 2010).

### *Tackle the Inequitable Distribution of Power, Money, and Resources*

WHO (2008) states, "Empower all groups in society through fair representation in decision-making about how society operates, particularly in relation to its effect on health equity, and create and maintain a socially inclusive framework for policy-making" (p. 158).

Absence of fairness has been raised globally by individuals who are disturbed by some governments' procedures for implementing a renewable energy policy. Rapid introduction of IWTs into rural communities has resulted in negative social impacts.

For example, in Ontario, the Green Energy and Economy Act (2009) was passed with the intention of streamlining the approval process for thousands of IWTs. The Act legislated a centralized decision-making process and removed jurisdictional authority from local municipalities (Gallant, 2011). The domino effect is that those living in the affected communities are unable to participate in meaningful consultation.

In Ontario, local communities no longer have planning authority to determine how or if renewable energy projects will be incorporated. As result, a significant number of local municipalities and counties have expressed concern and have requested that planning authority be restored to local governments. At the time of this article, 76 municipalities have expressed concerns regarding the development of renewable energy projects (Wind Concerns Ontario, 2011). The disempowerment of local councils and residents is perceived as a loss of democratic rights and social justice.

Section 2 of the Green Energy and Economy Act (2009) states, "This Act shall be administered in a manner that promotes community consultation." However, in practice, the community consultation process does not include the right to approve or not approve IWTs in individual communities.

In a reported statement by former Minister of Energy and Infrastructure, George Smitherman: "We passed a law, and the law does not create an opportunity for municipalities to resist these projects just because they may have a concern" (Hendry, 2009).

Impact statements from other parts of the globe report concerns regarding IWT development and social impacts to the local community:

We are Japanese concerning about wind farm developments. Big wind is destroying nature and local

communities in Japan too. People near wind farms are suffering from low-frequency noise from the turbines. (Y. T. O., personal communications, 2010)

M. R. from Australia notes,

. . . the social division; the slander, lies and intimidation; the anxiety that is caused by the health problems whether they are real or imagined. Again it is how dismissive the neighbours, authorities etc are, of the claims of people who have been affected. Then there is just the total destruction of small communities—pitching one faction against another; appearing to spread largesse when it is a farce; interference with the normal political processes in a small country town. (M. R., personal communications, 2010)

Another individual comments,

Besides all the health problems, friendships, families and local communities have been destroyed forever. It's so sad. Has the government stopped to think of the real cost in all this so called green energy. (M. O., personal communications, 2010)

A. R. reports,

. . . the social dislocation that the wind farm has caused. There seems to be dismissal of any opinion that is contrary to the wind company, the government. . . . As dissenters, our rights as citizens of Australia have been eroded—they being the right to free speech and opinion, the right of association and thirdly the right to the benefits of our property's that were meant to be protected under planning laws. This community is forever divided and mentally the wounds are incurable. (A. R., personal communications, 2010)

These sentiments reflect a perceived erosion of local democratic rights and loss of procedural justice.

During the course of several years, over 600 IWTs were commissioned in Ontario, Canada. Coinciding with these IWT developments were increasing reports of adverse health effects. After several years of IWT operations, correspondence from the Ministry of Environment, Ontario (2009) stated, "There is currently no scientifically accepted field methodology to measure wind turbine noise to determine compliance or non compliance with a Certificate of Approval limits."

This lack of measurement and enforceability explained in part, why in spite of a growing number of complaints and requests for help, mitigation and resolution for those experiencing adverse health effects was elusive. Ontario,

Canada residents' impact statements reflect frustration and disappointment:

The wind developers get free access to all levels of the Ministry of Environment—when there are discussions about our noise study, we are excluded from the meeting.

Who do you go to for help?—the government says it's ok—the industry says it's ok—society says it's ok. I follow all the rules—they call me a NIMBY. What can I do—the developer says it has a license and a right to put the turbines there.

When people can't sleep, the developer always wins. The Ministry of Environment says they're in compliance, even when they aren't. It's not about justice—it's about procedures. (Personal group interviews by the author, 2010)

In Ontario, the Renewable Energy Approval (REA, 2009) process came into effect with the passing of the Green Energy and Economy Act. The REA is a fast tracking system with the intention to streamline the approval of renewable energy projects.

An individual may appeal a REA if they provide

- (d) a description of how engaging in the renewable energy project in accordance with the renewable energy approval will cause,
  - (i) serious harm to human health, or
  - (ii) serious and irreversible harm to plant life, animal life or the natural environment. . .”
 (Rules of Practice and Practice Directions of the Environmental Review Tribunal, (July 9, 2010), section 142.1 (s. d. ss. i, ii).

Originally, the Government of Ontario had proposed an even more onerous legal test in that the serious harm to human health would also have to be “irreversible” (Bill 150, 2009, Section 142.1 (3)).

Concern has been raised that the process for filing an REA appeal is daunting for the average Ontarian. Those who wish to appeal an REA, must file one within 15 days. This time limit provides little time to organize an appeal. The appeal process has a number of steps with which an environmental lawyer might be familiar, but most residents would not. The legal requirement to prove that the renewable energy project will cause serious harm requires a comprehensive inventory of evidence, including testimony from expert witnesses.

Typically, an REA appellant would face the well-funded legal resources of the government and the project developer. The associated financial costs are a significant deterrent, which would discourage most individuals from filing an appeal.

In spite of these challenges, an appeal has been launched in Ontario, Canada, regarding the Kent Breeze project in Chatham Kent (The Canadian Press, 2011). At the time of writing this article, testimony by 26 appellant and respondent witnesses has been completed. The appeal hearing started February 1, 2011 and final submissions are scheduled for the end of May 2011.

People expressing legitimate concerns that IWT be sited to protect people from harm have been negatively characterized using preemptive stereotyping such as “those opposed to wind,” “anti-wind farm activists,” “detractors,” “opponents,” “beyond NIMBY” (Not In My Back Yard), and “BANANAS” (Build Absolutely Nothing Anywhere Near Anything), (Chatham Kent Public Health Unit, 2008; Colby, 2010; Colby et al, 2009; Kelahan & Purslane, 2009).

Martin (2009) reports on comments by the Premier of Ontario, Canada stating,

He said the new Green Energy Act his government will enact is intended to prevent such barriers to green energy projects and the 50,000 jobs they bring. “We are going to find a way, through this new legislation, to make it perfectly clear that NIMBYism will no longer prevail,” he told reporters at a luncheon gathering of the London chamber of commerce.

An impact statement in response to the Premier of Ontario's allegations of NIMBYism expressed an absence of fairness and stated, “. . . it lowered my sense of value and insulted my personal integrity—and it was coming from the highest office of my provincial government (S. M., personal communications, 2011). This individual's family was billeted by the IWT developer for months and ultimately has left their home of decades to live elsewhere.

The practice of using preemptive stereotyping labels such as NIMBYs demonstrates a lack of understanding of the health and social issues faced by individuals and their families. This lack of understanding results in increased feelings of injustice.

Based on my research, people initially welcomed IWTs into their communities and the adverse impacts were unexpected. Impact testimony reveals

You need to know the problems with wind turbines and people living with them. I know you probably know me. You've probably seen my letters. When the wind turbines started up in early December, we had terrible noise issues, and it was pretty much instant. There were three nights straight we didn't sleep at all. . . . We had no thoughts that we were going to have problems. When the wind turbines were actually going up at our place in the summer, we were putting a double-car garage up at the same time. We had put in a new fence, a new deck, everything. We weren't

expecting anything. We're not anti-wind, we're not anti-green. . . . When I hear people say, "There aren't problems," and "It's all in their heads," and "They're just unhappy because they don't have a turbine," I don't even know what to do. My government has not been helping. If you guys are going to go push more through—and then, because I came out and starting speaking, I've got people all over the province phoning me and saying, "Help us. We're not getting anywhere with our MPP. Nobody's listening to us." (Hansard, 2009, p. G-517)

Inconsistent government decisions can undermine Leventhal's (1980) criteria of equal treatment of persons resulting in a perceived discrimination.

For example, the Ontario, Canada, government has been inconsistent in its application of setback distances for IWTs. Currently, the on shore setback distances are 550 meters; however, it was proposed that off shore setbacks would be 5 kilometers (Ministry of Environment, Ontario, 2010). Spears (2010) reports regarding the Minister of Energy (Ontario):

Minister Brad Duguid said the proposed guideline provides clarity to proponents of wind power projects and to people who may be affected by them. "I think it sets to rest the concerns of some moderate people who were concerned that if they go to the beach, they could be looking up at a huge wind turbine," he said in an interview.

Many Ontario rural residents were disturbed by the government's discrimination between the two groups—those living along a shore line and those living inland.

### *Measure and Understand the Problem and Assess the Impact of Action*

WHO (2008) notes, "society must acknowledge when there is a problem monitor and initiate surveillance, then once the problem is identified, conduct research, and finally, take action" (chap. 16, p. 178).

Inconsistent information, including competing claims and denial of IWT adverse health effects has suppressed the stimulus to investigate the reports of those experiencing negative health and other negative impacts.

The Canadian Wind Energy Association's (CanWEA, 2008) website informs visitors: "Scientists conclude that there is no evidence that wind turbines have an adverse impact on human health."

The tactic of denying of health risks by industry has been employed in the past:

In 1954, the industry established the Tobacco Industry Research Council. Its task was to reassure the public that the industry could responsibly investigate the

smoking and health issue and that it could resolve any problems that were uncovered. The Council's real role, however, was "to stamp out bush fires as they arose." Instead of supporting genuine scientific research into the problems, it spent millions of dollars publicizing research purporting to prove that tobacco did not cause cancer. Its true purpose was to deliberately confuse the public about the risks of smoking. "Doubt is our product," proclaimed an internal tobacco industry document in 1969. "Spread doubt over strong scientific evidence and the public won't know what to believe." (Saloojee & Dagli, 2000)

The American and Canadian Wind Energy Association commissioned and funded panel report acknowledges that IWT noise may cause annoyance, stress, and sleep disturbance, which may have other consequences but then inexplicably states in the conclusion: "Sound from wind turbines does not pose a risk of hearing loss or any other adverse health effect in humans." (Colby et al., 2009, p. 5-2)

A draft final report prepared for the Ontario Ministry of Environment states,

The audible sound from wind turbines, at the levels experienced at typical receptor distances in Ontario, is nonetheless expected to result in a non-trivial percentage of persons being highly annoyed. As with sounds from many sources, research has shown that annoyance associated with sound from wind turbines can be expected to contribute to stress related health impacts in some persons. (Howe Gastmeier Chapnik Limited, 2010, p. 39)

The WHO (1999, p. xiii, 32) recognizes annoyance as a health effect. In terms of annoyance and stress from low-frequency noise in general it has been noted, "The noise, typically classed as 'not a Statutory Nuisance,' causes immense suffering to those who are unfortunate to be sensitive to low frequency noise and who plead for recognition of their circumstances" (Leventhal, 2003, p. 5).

An impact statement from Ontario reveals,

This hum and vibration is not covered in the guidelines. There are no guidelines for interior noise in our house. When the winds are whipping up, and we can't sleep for days and days at a time, there's nothing. You phone the MOE and I cannot tell you how many times I heard, "We're in compliance. We're in compliance." They're in compliance. They're in compliance. In fact, they weren't in compliance. Finally, we dragged it out and got the acoustics study back. It's just been such a fight to get information. (Hansard, 2009, p. G-517)

In response to proposed Ontario requirements that IWT proponents ". . . be required to monitor and address any



perceptible infrasound (vibration) or low frequency noise as a condition of the Renewable Energy Approval” (Renewable Energy Approval Regulation, June 9, 2009, p. 15), the CanWEA (2009b) stated, “. . . CanWEA submits that the proposed requirement for infrasound or low frequency noise monitoring as a condition of the REA be removed” (EBR Posting).

Individuals experiencing symptoms report the lack of recognition of their circumstances. An impact statement from G. M. (personal communications, 2010) in the United States reveals, “I am a victim of large IWTs . . . it is time that legislators and public health officials learn about and are held accountable for the terrible health affects inflicted on nearby residents . . .”

In the meantime, a local public health unit responded to an individual reporting IWT adverse health effects: “Our public health unit does not have the recourse, resources or expertise to monitor the health effects of turbines . . . To stray from this course, by pursuing such avenues, would be highly problematic” (B. A., personal e-mail communication, 2009). Ultimately, this individual’s family home was purchased by the IWT developer. A nondisclosure clause prevents the family members from discussing specific details of their experience.

The Ontario Chief Medical Officer of Health’s (2010) literature review states, “While some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects” (p. 10). However, the literature review does not adequately address effects of noise regarding the indirect pathway, which includes annoyance, sleep disturbance, cognitive and emotional response, and stress (WHO, 2009, p. 62, figure 4).

The health outcomes associated with the indirect pathway are significant:

Physiological experiments on humans have shown that noise of a moderate level acts via an indirect pathway and has health outcomes similar to those caused by high noise exposures on the direct pathway. The indirect pathway starts with noise-induced disturbances of activities such as communication or sleep. (WHO, 2009, p.138)

The lack of evidence of IWT adverse health effects is cited as the rationale for not conducting health studies.

The industry trade association–sponsored panel report stated: “Panel members agree that the number and uncontrolled nature of existing case reports of adverse health effects alleged to be associated with wind turbines are insufficient to advocate for funding further studies” (Colby et al., 2009 p. 5-2). The president of CanWEA reportedly stated, “We don’t support the implementation of an epidemiological study” (Avery, 2010).

At the same time, peer-reviewed scientific articles have identified the urgent need for research on human response to IWT sound (Pedersen, Bakker, Bouma, & van den Berg, 2009; Salt & Hullar, 2010).

In testimony at the Green Energy and Economy Act Standing Committee, Ontarians living in the environs of IWTs asked elected officials for understanding:

I want everybody to live in my house. Nobody will live in it. I offer to everybody here: Come and live in my house, free.

A government should take all the money we’ve given in taxes, use some of it to get the science people out there with no association with the wind industry at all—get out there and study this, and don’t put up another wind tower or another wind project until you fix the problems. That’s what good government does. Good government looks after its people. (Hansard, 2009, p. G-549)

It is expected that “Government’s job is to provide citizens with accurate and appropriate information so that they can protect themselves” (Health Canada, 2004, p. 1-1).

A media report from the United Kingdom discussed the suppression of information regarding IWT health concerns: “Civil servants have suppressed warnings that wind turbines can generate noise damaging people’s health for several square miles around.” The media report cites a U.K. resident: “We abandoned our home. We rent a house about five miles away—this is our fourth Christmas out of our own home. We couldn’t sleep. It is torture—my GP describes it as torture. Three hours of sleep a night is torture” (Leake & Byford, 2009).

The CanWEA states: “. . .findings clearly show there is no peer-reviewed scientific evidence indicating that wind turbines have an adverse impact on human health.” (CanWEA, Revised: April 2009, p.3), However, Health Canada states “In fact, there are peer-reviewed scientific articles indicating that wind turbines may have an adverse impact on human health”. (Health Canada, 2009)

It was reported,

Minister of Health Matthews also took on the question of whether the province will undertake a comprehensive health study on industrial wind turbines now that wind farms are becoming more abundant in Ontario thanks to the province’s Green Energy Act.

The short answer to the question of the possibility of a full-scale study is no.

“There is no evidence, whatsoever, that there is an issue related to turbines,” says Matthews, noting Ontario’s Chief Medical Officer of Health completed

a report, *The Potential Health Impact of Wind Turbines*, which shows there is no correlation between wind projects and ill health effects. (Heath, 2010)

In an apparent contradiction, the Premier of Ontario, Canada stated in the legislature:

... we're now funding a research chair devoted to putting in place a longitudinal study so we can ensure that we are in fact not compromising the health of Ontarians. I think we're doing exactly what we need to do at this point in our history. (Hansard, 2010, p. 1032).

The \$1.5 million in total funding for the research chair is distributed over a 5-year term (Council of Ontario Universities, 2010). In the meantime, IWT projects continue to be approved (Kent Breeze, 2010) and by the time the health research has been completed; more people are expected to be adversely affected.

Meanwhile, impact statements from existing IWT installations reveal chronic distress:

I begged the Premier to help me, please help me.

It's mental abuse—I will never be the same . . . I have lost all hope.

We wait and wait for help—our hopes are dashed over and over—the problem is never solved.

I write letters and keep hoping the next one will get us out of this. (Personal group interviews by author, 2010)

Similar comments are expressed in other parts of the globe:

We still have the noise 4 years later and no one has done anything . . . No one came. No one rang, no one wrote. I am still waiting for someone to take some interest. They don't know the impact on our life. . . . They don't care. (L. C., personal communication, 2010)

Other impact statements describe additional negative social impacts, including the inability to earn a living:

We have lost our health, our home, and no one cares . . . I had to quit my job, a job I dearly loved. (N. S., personal interview, 2010)

I am a teacher, we are driven from our home of 31 years and I have to teach the social marketing about wind turbines to our youth. (S. M., personal interview, 2010)

G. W. from Australian reports a similar issue about livelihood:

I've been living in [city y] for 25 years. I live and work from home. The nearest cluster of turbines is approximately 3.25 kilometres from my home. Since the operation of the . . . Windfarm I have suffered headaches, ear aches, ear pressure, head pressure, tinnitus, severe sleep disturbance and mood swings. All of which living in a tranquil bush environment I had never experienced before. These symptoms disappear when I am away from home. The symptoms present themselves again on my return home. These health issues have had a significant detrimental effect on my capacity to work as an artist. (G. W., personal communications, 2010).

In 2009, an increasing number of media reports documented some individuals in Ontario were experiencing adverse health effects from IWTs. In response to the lack of IWT vigilance monitoring in Ontario, volunteers established a self reporting health survey in March 2009. WindVOiCe (Krogh et al., 2011) follows the principles of Health Canada's *Canada Vigilance Programs* for reporting adverse events for prescription and nonprescription products, vaccines and other. Individuals do not have to prove the effect, only perceive it. Under Canada Vigilance, the pharmaceutical industry is obligated by law to submit any reported adverse health effects it receives to Health Canada (Health Canada, n.d.). This obligation to report adverse effects does not apply to wind energy development in Ontario.

The lack of a post-market monitoring methodology to measure wind turbine noise and its compliance with the Ontario IWT noise guidelines is a serious lapse in responsible and fair policy making.

In Ontario, the inability to measure IWT noise for compliance has resulted in a lack of mitigation and resolution for those reporting IWT adverse health effects and other associated societal impacts.

In 2010, after several years of IWT development and operation, the Ministry of Environment, Ontario, released a request for proposal (RFP):

The Ministry requires a consultant to assist in the development of a measurement procedure to assess noise compliance of existing wind farms with the applicable SOUND level limits. The resulting procedure can be used both by operators of existing wind farms to assess compliance and by Ministry abatement staff in assessing compliance with noise limits. The measurement procedure must address two scenarios.

- Assessment of compliance in a noise complaint situation
- Assessment of compliance in the context of an acoustic audit. (MERX# 189608, 2010)

At the time of authoring this article, the protocol is still under development. In the meantime, individuals continue to report IWT adverse health effects which are not resolved.

## Discussion

The impact statements in this article represent a small sample of a larger body of data acquired through the WindVOiCe health survey, official reports of debates, personal interviews, and other communication.

It is acknowledged that IWTs, if not sited properly, can adversely affect the health of exposed individuals. In addition to physiological and psychological symptoms there are individuals reporting adverse impacts, including reduced well-being, degraded living conditions, and adverse societal and economic impacts. These adverse impacts culminate in expressions of a loss of fairness and social justice.

The above impacts represent a serious degradation of health in accordance with commonly accepted definitions of health as defined by the WHO and the Ottawa Charter for Health Promotion.

Wind turbines are a new source of community noise to which relatively few people have yet been exposed (Pedersen et al., 2009). Public policy to adopt renewable energy as an alternative energy source has inspired governments to introduce measures to encourage rapid development. This has resulted in many IWTs being sited in close proximity to human habitation.

Ontario's Green Energy and Economy Act (2009) is reported to be designed to remove barriers to renewable energy development such as removal of local planning authority. The Act arguably erodes individual human and environmental rights. The Act is written such that a renewable energy development can be approved even if it will cause harm to human health and serious harm to plant life, animal life or the natural environment.

As discussed in the introduction, fairness can be defined as "the recognition and reasonable accommodation of one another's legitimate interests, claims and rights" (Shain, personal communication, 2011). Evidence indicates the rapid implementation of IWTs has circumvented fairness. My research demonstrates that IWTs were initially welcomed into communities. The reported adverse impacts were unexpected. Individuals initially believed there were systems in place that would resolve the problems. Instead, those adversely affected report receiving little if any recognition or reasonable accommodation of their legitimate interests, claims, and rights. A review of IWT development in Ontario indicates that the application of fair process and social justice criteria as proposed by Leventhal (1980) and WHO (2008) are not being achieved.

This subject provides research opportunities for clinicians and social scientists. There are unanswered questions about the risk of short and long term exposure to IWTs. The long-term health impacts to infants, children, and the unborn, family members, and workers such as farmers and technicians who live and work in close proximity to IWTs are unknown.

The long-term psychological, economic, and social impacts on families who have abandoned their homes or been bought

out by IWT developers but are silenced by nondisclosure clauses are also unknown.

## Conclusions

In Ontario, Canada, there is a suspension of critical appraisal and due process regarding IWTs. The lack of confidence in the political and regulatory systems will persist if governments and industry continue to deny the existence of adverse impacts from human exposure to IWTs.

Societies concerned with health place value on the individual: "A society that is concerned with health and health equity acknowledges the existence of all its citizens and the importance of their well-being" (WHO, 2008, p. 177).

Good governance implies that governments have a responsibility to correct policies that result in harm. Governments have the power to halt development of IWTs in close proximity to humans until authoritative human health research has been completed. Facilities where there are reports of adverse health effects should be decommissioned and health and quality of life restored.

The negative psychological effect of disempowerment interacting with the adverse health effects attributed to IWTs has intensified the negative synergy of justice lost. Impact statements indicate that the violation of procedural justice will not be easily forgotten.

It is expected that this topic will be explored by health care professionals, psychologists, and social scientists for decades to come.

## Author's Note

I would like to express my appreciation to the many who have shared their experiences with me. Most of the author's research has been conducted in Ontario, Canada; however, effort has been made to include an international perspective.

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