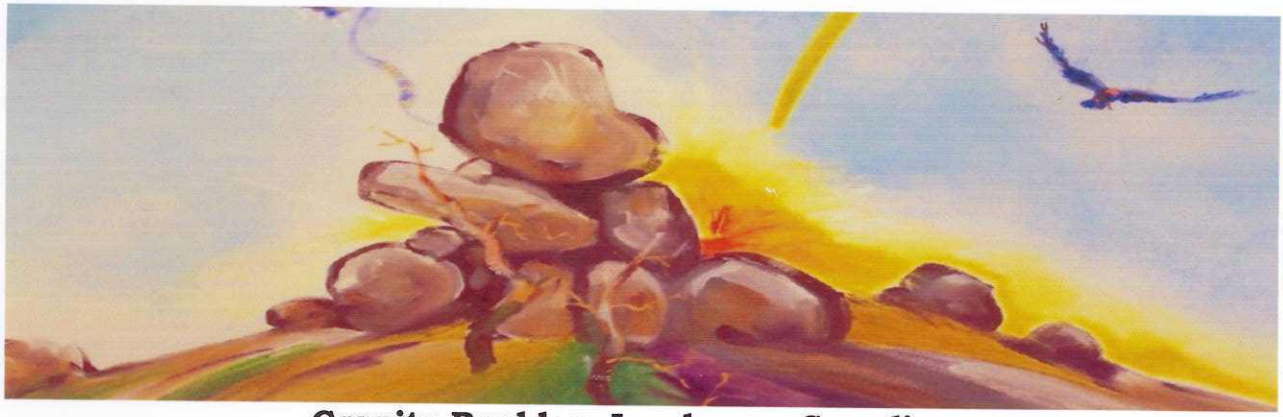


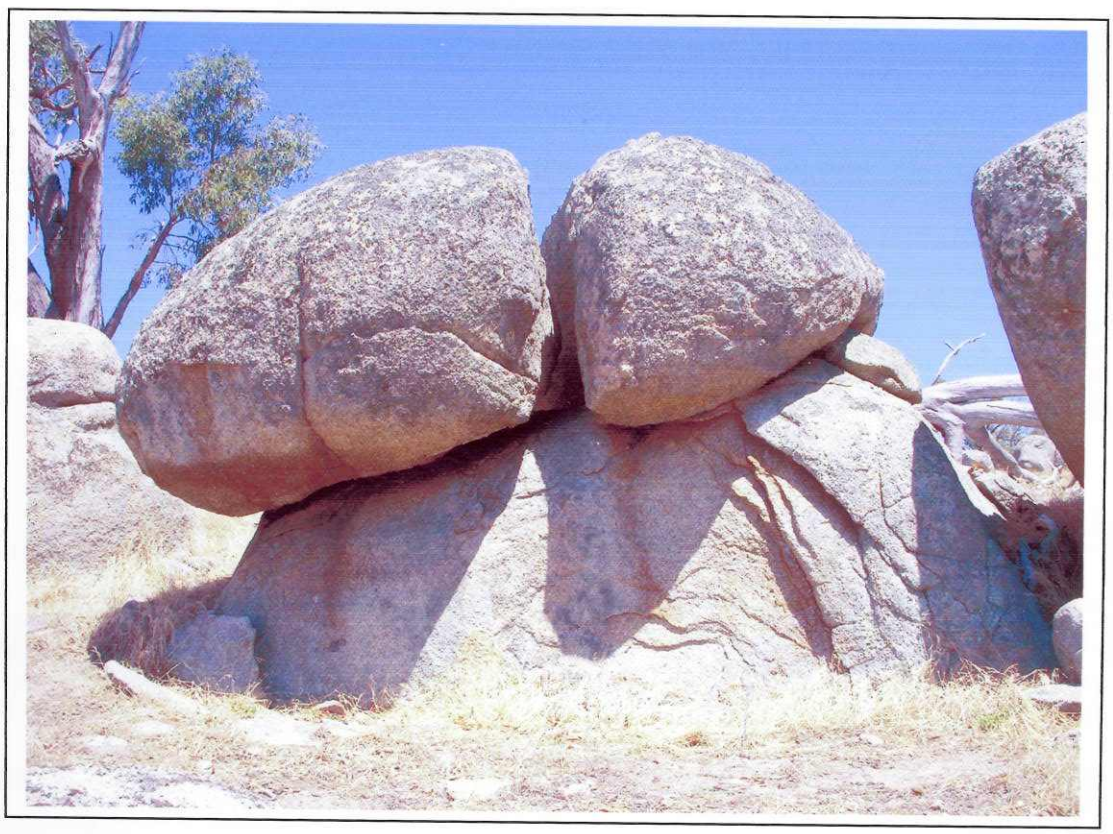
**Granite Boulders Landscape Guardians**

# McHARG RANGES

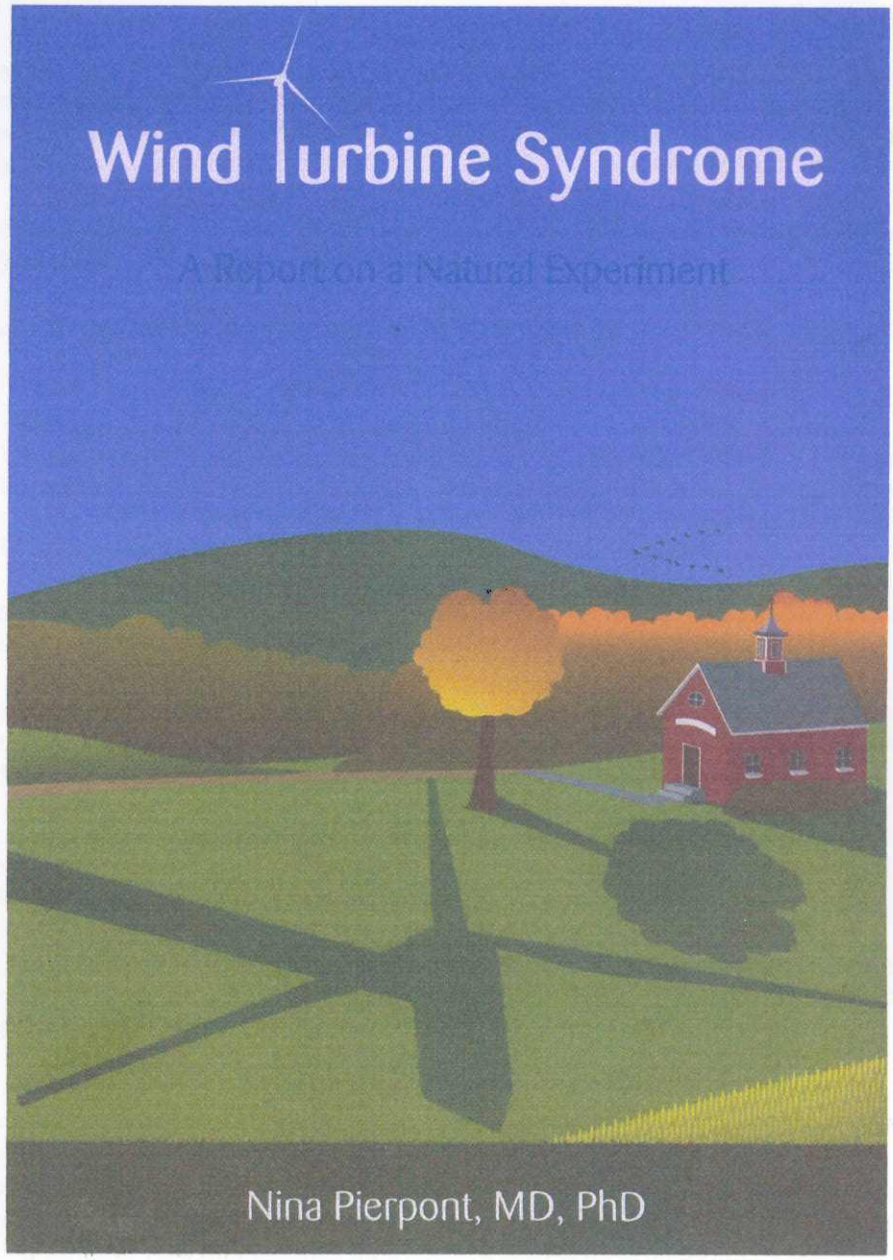
## (BAYNTON WIND FARM)

**The literature enclosed raises many disturbing matters.**

**Residents within range of the proposed wind turbines have many concerns which they would like addressed.**



PO Box 35, Tooborac. Vic. 3522.
Ph: 0409496576 email: granitebоulders@gmail.com




# Letter from Nina Pierpont to Mike Crawley, International Power Canada Inc.

M. Crawley, International Power Canada, Inc.

Mike Crawley, President
International Power Canada Inc.
105 Commerce Valley Drive West, Suite 410
Markham, Ontario L3T 7W3 Canada

May 7,2010

Dear Mr. Crawley,

I am writing on behalf of XX, Harrow, Ontario. Mrs. X informs me that her home has nine (9) 1.65 MW V2

Vestas wind turbines within 2 km of her home. Three of these are within 1 km. Indeed, all 24 turbines (for this project) are within 5 km.

Mrs. X tells me that she and her neighbor are motion sensitive (see below). She likewise tells me that 3 of the neighbors suffer from migraine disorder. Mrs. X's son has a history of ear infections. A second cousin, living 1 km away, has documented tinnitus. Two children in the neighborhood have autism-both living within 1 km of the turbines. One young man (27 years old) living within 2 km of the turbines has epileptic seizures.

Mrs. X and her husband are over 50 years of age (see below), and her in-laws (living immediately across the road) are over 80 years old.

With this as background, permit me to speak plainly. To build these turbines next to these people is a reckless and violent act.

The evidence for turbines producing substantial low frequency noise and, worse, infrasound, is no longer in dispute. I quote from one of numerous studies demonstrating this: *"Wind turbines and wind farms generate strong infrasonic noise which is characterized by their blade passing harmonics (monochromatic signals)"* (Ceranna et al., p. 23). In this instance, the authors are referring to a single 200 kW Vestas V47 at 200 meters-a peashooter compared to the turbines adjacent to Mrs. X's home.'

Second, the clinical evidence is unambiguous that low frequency noise and infrasound profoundly disturb the body's organs of balance, motion, and position sense (called "vestibular organs").2

Third, the case studies performed by me and other medical scientists have demonstrated unequivocally that many people (especially 50 years old and older) living within 2 km of turbines are made seriously ill, often to the point of abandoning their homes.3

Fourth, there is no doubt among otolaryngologists and neuro-otologists who have studied the evidence that wind turbine low frequency noise and infrasound seriously disrupt the body's vestibular organs, resulting in the constellation of illnesses I have called Wind Turbine Syndrome.

The *cure* for Wind Turbine Syndrome is simple: Move away from the turbines or shut them off. The *prevention* of Wind Turbine Syndrome is even simpler: Don't build these low frequency/infrasound-generating machines within 2 km of people's homes.

Governments and corporations who violate this principle are guilty of gross clinical harm. Such governments and corporations should be taken before whatever level of court is necessary to stop this outrage.

These are strong words. They are carefully chosen. They are strong because governments and the wind industry stubbornly-I would now add, criminally-refuse to acknowledge that they are deliberately and aggressively harming people. This must stop. The evidence is overwhelming.

Some weeks ago I was contacted by the editor of a leading peer-reviewed American clinical journal to write a special article on Wind Turbine Syndrome. The journal is published both online and in hard copy and aimed primarily at audiologists, otolaryngologists, and neuro-otologists.

I accepted the invitation. The article will be peer-reviewed before publication and should appear online in the next few months. Following that, it will be published in the hard copy edition of the journal. This means, of course, that my research and my findings are being accepted by the clinical medical community. Wind developers may not take this research seriously-but medical experts are.

So is the international community of otolaryngologists and neuro-otologists. My research was presented in March 2010 in a paper at the annual meeting of the Meniere's Society, in Austria. It was widely praised. The presenter was Professor Alec Salt, PhD, internationally acclaimed neuro-physiologist specializing in inner ear diseases, from the Department of Otolaryngology at the Washington University School of Medicine, St. Louis, Missouri.

I have interrupted my writing the above journal article to compose this letter to you. The handwriting is on the wall for wind developers and their wholly inadequate setbacks. Legal proceedings have begun in several states and nations. You would be unwise to proceed with installation of these turbines if you are planning on setbacks less than 2 km.

I repeat, <2 km setbacks must stop.

**Nina Pierpont,** MD (Johns Hopkins), **PhD** (Population Biology, Princeton)
Fellow of the American Academy of Pediatrics
Former Clinical Assistant Professor of Pediatrics,
College of Physicians & Surgeons,
Columbia University
cc Valerie M Garry, Attorney at Law

**1** Lars Ceranna, Gernot Hartmann, and Manfred Henger, "The Inaudible Noise of Wind Turbines," presented at the Infrasound Workshop, November 28 – December 02, 2005, Tahiti. Federal Institute for Geosciences and Natural Resources (BGR), Section 83.11. Stilleweg 2, 30655 Hannover, Germany. Download PDF copy here: http://www.kselected.com/?p=7589.

**2** For a summary, see Nina Pierpont, "Report for Clinicians," in *Wind Turbine Syndrome: A Reporton a Natural Experiment* (Santa Fe, NM: K-Selected Books, 2009), pp. 26-125. Purchase a copy here: http://www.kselected.com/?pane id=4768.

**3** Pierpont 2009, pp. 31-33, 127-192.

**4** Pierpont 2009, pp. 287-292. See also testimony by F. Owen Black, MD, FACS, found at http://www, kselected.com/?p=4047

# Health warnings

**Ross Annabell**

RESEARCH warning of potential health problems for people living close to wind turbines is worrying rural communities in the shadow of existing and potential installations.

Although power companies claim there are no health dangers, overseas medical researchers say low frequency vibration from turbines can make people sick after long-term exposure. Symptoms vary between individuals and exposure sites.

Dr Ken Mosley, Wellington, a former DSIR mechanical and electrical research engineer, has compiled international medical data for two New Zealand resource consent hearings. He says the ill-effects of exposure occur slowly, but compound over time.

Mosley says the outlook in New Zealand is "serious" and in time could spell the death of some communities, depending on distance from the wind farm, turbine rating, and their number, as property valuations drop and people move away.

His conclusions are based on medical research published by US, UK and Portuguese doctors, including US authority Dr Nina Pierpont, who reports a consistent cluster of symptoms she calls the "Wind Turbine Syndrome".

The scientists recommend homes should not be within 3km of turbines.

Mosley says turbine towers vibrate like a huge tuning fork as the blades pass and the vibrations pass through the ground. These, similar to an earthquake, can travel 15-25km, with little attenuation – 15km has been measured in the Ashhurst area.

"Internal body organs resonate, and this makes people sick," he says.

"Portuguese medical researchers monitoring similar vibration effects on aircraft technicians found serious health deterioration after 12 years."

Early wind turbine syndrome symptoms listed by Pierpont include sleeping disorders, headaches increasing in frequency or severity, nausea, exhaustion, irritability, depression, concentration and learning problems and tinnitus.

Effects were worse for children and the elderly.

Many people have opposed new wind farms at resource consent hearings in Wellington, Hawke's Bay, Manawatu and Wairarapa.

Sue Stewart, president of Tararua-Aokautere Guardian Society, is fighting a resource consent for the proposed Motorimu wind farm of 127 turbines in Manawatu. "People in our area want to sell but can't get buyers at a realistic price."

This was sent 2 me from a Pal in N.Z.

1/JUNE/2010

June 2 – 2010.

# Turbine illness claims

By PAUL SELLARS

TED Baillieu last week presented what he said was living proof of the inadequacy of Victoria's approach to wind farms.

On the steps of Parliament House, the Victorian Opposition Leader introduced the people known as Waubra's "wind farm refugees" to a group of journalists.

Farmers whose families have lived in this hilly part of central Victoria for generations had come to Melbourne to tell the media they'd been forced off their land.

Spanish company Acciona's wind farm, they said, was making them so sick they had to leave their homes.

"Like being in bloody hell" was how Waubra farmer Noel Dean described living next door to the wind farm.

Mr Dean said he had moved to Ballarat a year ago because of the severe headaches and chronic leg and neck pain he'd been suffering since the wind farm had been built.

"I come home now (to the farm) and I get ill," Mr Dean said. "All my neighbours are ill. Most of them have pains in their bodies that won't go away."

Another local farmer, Donald Thomas, said he hadn't yet moved away from his farm, but complained of "headaches, heart palpitations and high blood pressure" ever since the turbines were erected.

"When the turbines don't run, the symptoms go away," Mr Thomas said.

"It's torn the community apart."

Mr Baillieu said such stories showed the Victorian Government's wind-farm planning guidelines were flawed.

He said the wind-farm policy the Coalition announced last month would protect landowners and give communities a say in wind-farm proposals.

Under the policy, turbines would have to be least 2km from the nearest home and local councils, rather than Planning Minister Justin Madden, would decide wind-farm applications.

"We want to see clear guidelines that give local communities the capacity to have their say and confidence they won't be poorly impacted on," Mr Baillieu said.

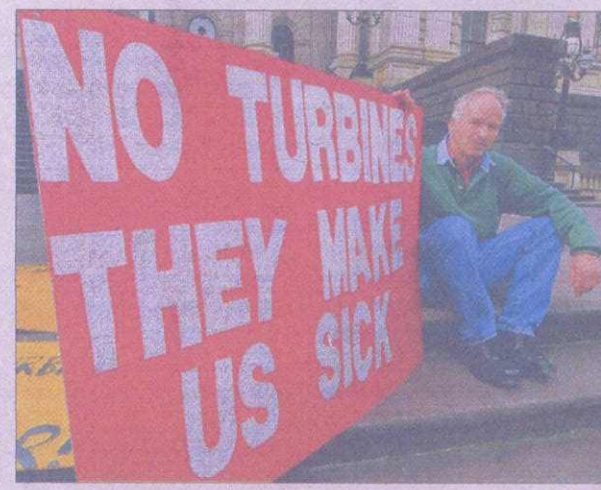
Environment Minister Gavin Jennings said the Coalition's policy "removes any investment certainty for the industry and would mean less wind farms and less renewable energy in Victoria".

Wind energy companies last week advertised in Melbourne newspapers warning of the threat the Coalition policy posed to investment in the renewable energy sector.

The chief executive of Acciona's Australian division, Brett Thomas, denied claims the Waubra Wind Farm was causing health problems.

"All the key senior health officials in the state have stated independently that they do not see a link between wind farms and health issues," Mr Thomas said.

"We stand by our position that wind farms do not cause health problems."




**Wind 'hell':** Waubra farmers Noel Dean (left) and Donald Thomas (below).

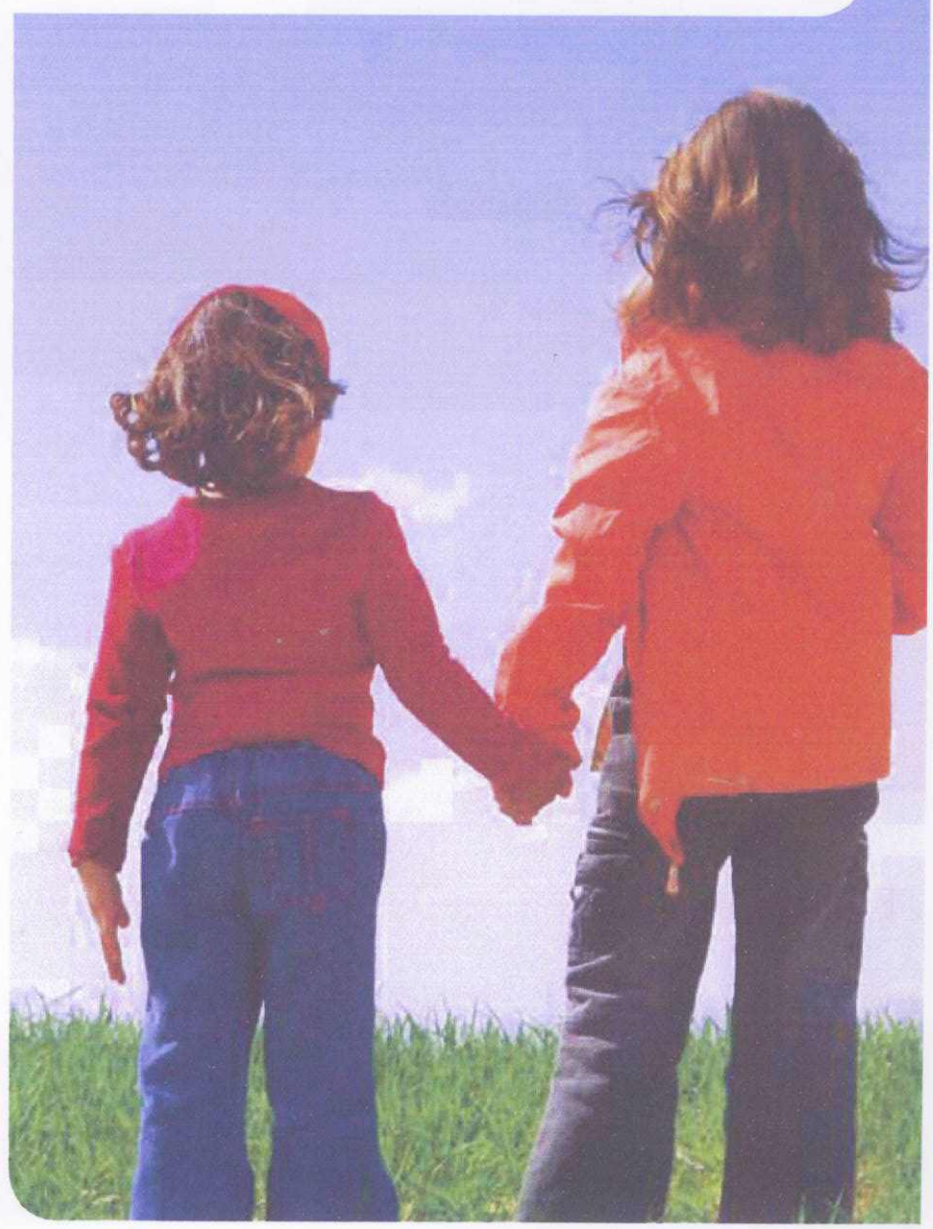
Pictures: MARK GRIFFIN

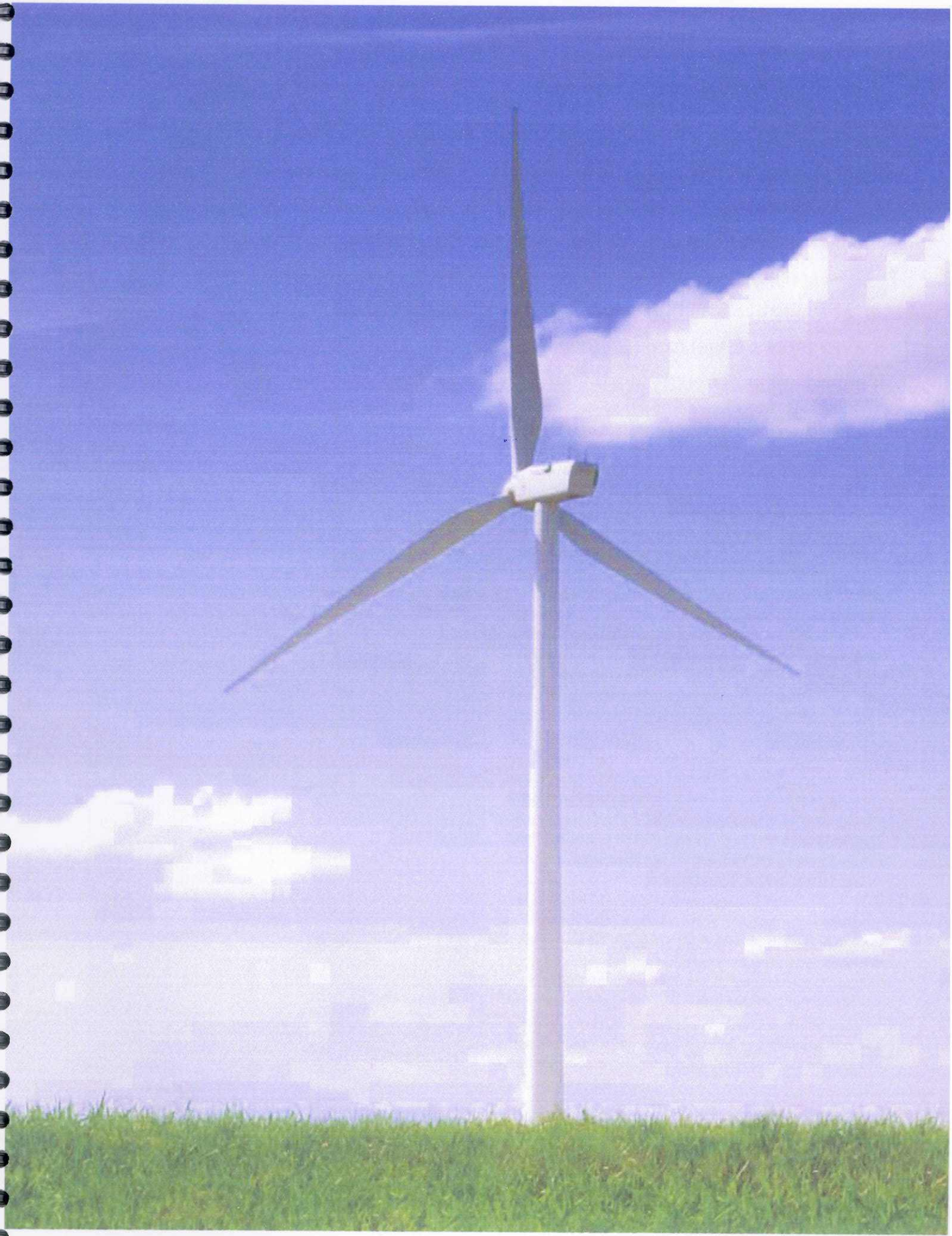
# Wind-Turbine NOISE

## What Audiologists Should Know

BY JERRY PUNCH, RICHARD JAMES, AND DAN PABST

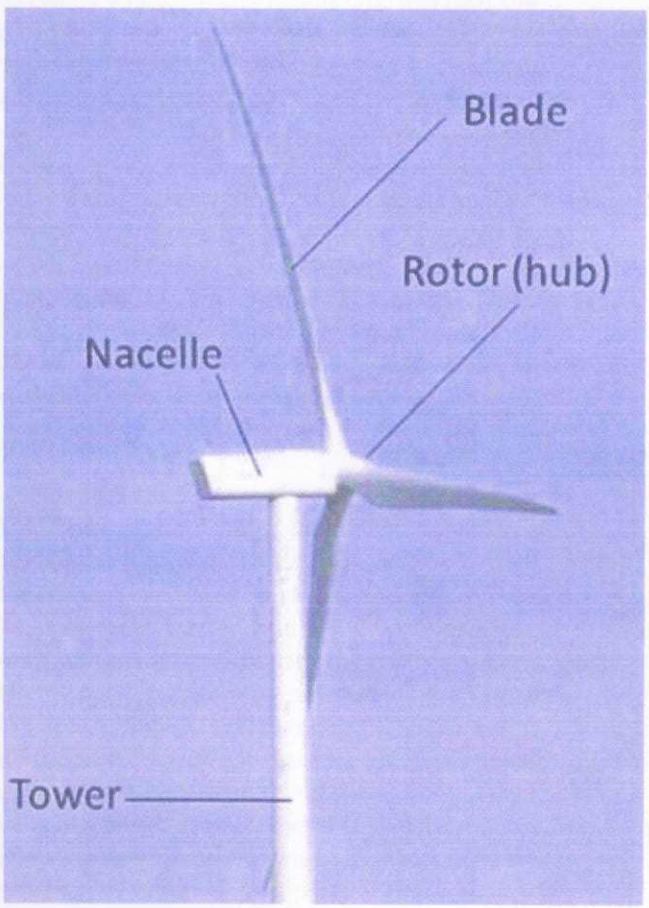
Noise from modern wind turbines is not known to cause hearing loss, but the low-frequency noise and vibration emitted by wind turbines may have adverse health effects on humans and may become an important community noise concern.





Most of us would agree that the modern wind turbine is a desirable alternative for producing electrical energy. One of the most highly touted ways to meet a federal mandate that 20 percent of all energy must come from renewable sources by 2020 is to install large numbers of utility-scale wind turbines. Evidence has been mounting over the past decade, however, that these utility-scale wind turbines produce significant levels of low-frequency noise and vibration that can be highly disturbing to nearby residents.

None of these unwanted emissions, whether audible or inaudible, are believed to cause hearing loss, but they are widely known to cause sleep disturbances. Inaudible components can induce resonant vibration in solids, liquids, and gases—including the ground, houses, and other building structures, spaces within those structures, and bodily tissues and cavities—that is potentially harmful to humans. The most extreme of these low-frequency (infrasonic) emissions, at frequencies under about 16 Hz, can easily penetrate homes. Some residents perceive the energy as sound, others experience it as vibration, and others are not aware of it at all. Research is beginning to show that, in addition to sleep disturbances, these emissions may have other deleterious consequences on health. It is for these reasons that wind turbines are becoming an important community health issue, especially when hosted in quiet rural communities that have no prior experience with industrial noise or urban hum.



Major components of a modern wind turbine.

The people most susceptible to disturbances caused by wind turbines may be a small percentage of the total exposed population, but for them the introduction of wind turbines in their communities is not something to which they can easily become acclimated. Instead, they become annoyed, uncomfortable, distressed, or ill. This problem is increasing as newer utility-scale wind turbines capable of generating 1.5-5 MWatts of electricity or more replace the older turbines used over the past 30 years, which produced less than 1 MWatt of power. These large wind turbines can have hub heights that span the length of a football field and blade lengths that span half that distance. The increased size of these multi-MWatt turbines, especially the blades, has been associated with complaints of adverse health effects (AHEs) that cannot be explained by auditory responses alone.

For this article, we reviewed the English-language, peer-reviewed literature from around the world on the topic of wind-turbine noise and vibration and their effects on humans. In addition, we used popular search engines to locate relevant online trade journals, books, reference sources, government regulations, and acoustic and vibration standards. We also consulted professional engineers and psychoacousticians regarding their unpublished ideas and research.

## Sources of Wind-Turbine Noise and Vibration

Physically, a modern wind turbine consists of a tower; a rotor (or hub); a set of rotating blades—usually three, located upwind to the tower; and a nacelle, which is an enclosure containing a gearbox, a generator, and

computerized controls that monitor and regulate operations (FIGURE 1). Wind speed can be much greater at hub level than at ground level, so taller wind towers are used to take advantage of these higher wind speeds. Calculators are available for predicting wind speed at hub height, based on wind speeds at 10 meter weather towers, which can easily be measured directly.

Mechanical equipment inside the nacelle generates some noise, but at quieter levels than older turbines. This mechanical sound is usually considered of secondary importance in discussions of annoyance from today's turbines. The main cause of annoyance is an aerodynamic source created by interaction of the turning blades with the wind. With optimal wind conditions, this aerodynamic noise is steady and commonly described as an airplane overhead that never leaves.

When wind conditions are not optimal, such as during turbulence caused by a storm, the steady sounds are augmented by fluctuating aerodynamic sounds. Under steady wind conditions, this interaction generates a broadband whooshing sound that repeats itself about once a second and is clearly audible. Many people who live near the wind turbine find this condition to be very disturbing.

The whooshing sound comes from variations of air turbulence from hub to blade tip and the inability of the turbine to keep the blades adjusted at an optimal angle as wind direction varies. The audible portion of the whoosh is around 300 Hz, which can easily penetrate walls of homes and other buildings. In addition, the rotating blades create energy at frequencies as low as 1–2 Hz (the blade-passage frequency), with overtones of up to about 20 Hz. Although some of this low-frequency energy is audible to some people with sensitive hearing, the energy is mostly vibratory to people who react negatively to it.

## Adverse Health Effects of Wind-Turbine Noise

Hubbard and Shepherd (1990), in a technical paper written for the National Aeronautics and Space Administration (NASA), were the first to report in depth on the noise and vibration from wind turbines. Most of the relevant research since that time has been conducted by European investigators, as commercial-grade (utility-scale) wind turbines have existed in Europe for many decades. Unfortunately, the research and development done by wind-turbine manufacturers is proprietary and typically has not been shared with the public, but reports of the distressing effects on people living near utility-scale wind turbines in various parts of the world are becoming more common.

Studies carried out in Denmark, The Netherlands, and Germany (Wolsink and Sprengers, 1993; Wolsink et al, 1993), a Danish study (Pedersen and Nielsen, 1994), and two Swedish studies (Pedersen and Persson Waye, 2004, 2007) collectively indicate that wind turbines differ from other sources of community noise in several respects. These investigators confirm the findings of earlier research that amplitude-modulated sound is more easily perceived and more annoying than constant-level sounds (Bradley, 1994; Bengtsson et al, 2004) and that sounds that are unpredictable and uncontrollable are more annoying than other sounds (Geen and McCown, 1984; Hatfield et al, 2002).

Annoyance from wind-turbine noise has been difficult to characterize by the use of such psychoacoustic parameters as sharpness, loudness, roughness, or modulation (Persson Waye and Öhrström, 2002). The extremely low-frequency nature of wind-turbine noise, in combination with the fluctuating blade sounds, also means that the noise is not easily masked by other environmental sounds.

Pedersen et al (2009), in a survey conducted in The Netherlands on 725 respondents, found that noise from

wind turbines is more annoying than transportation or industrial noises at comparable levels, measured in dBA. They noted that annoyance from turbine sounds at 35 dBA corresponds to the annoyance reported for other common community-noise sources at 45 dBA. Higher visibility of the turbines was associated with higher levels of annoyance, and annoyance was greater when attitudes toward the visual impact of the turbines on the landscape were negative. However, the height of wind turbines means that they are also most clearly visible to the people closest to them and those who also receive the highest sound levels. Thus, proximity of the receiver to wind turbines makes it difficult to determine whether annoyance to the noise is independent of annoyance to the visual impact. Pedersen et al (2009) also found that annoyance was substantially lower in people who benefitted economically from having wind turbines located on their property.

Among audiologists and acousticians, it has been understood for many decades that sufficiently intense and prolonged exposure to environmental noise can cause hearing impairment, annoyance, or both. In essence, the view has been *what* you can hear can hurt you. In the case of wind turbines, it seems that *what* you can't hear can also hurt you. Again, there is no evidence that noise generated by wind turbines, even the largest utility-scale turbines, causes hearing loss. But there is increasingly clear evidence that audible and low-frequency acoustic energy from these turbines is sufficiently intense to cause extreme annoyance and inability to sleep, or disturbed sleep, in individuals living near them.

**Table 1. Core Symptoms of Wind-Turbine Syndrome**

| | |
|---|---|
| 1 | Sleep disturbance |
| 2 | Headache |
| 3 | Visceral Vibratory Vestibular Disturbance (VVVD) |
| 4 | Dizziness, vertigo, unsteadiness |
| 5 | Tinnitus |
| 6 | Ear pressure or pain |
| 7 | External auditory canal sensation |
| 8 | Memory and concentration deficits |
| 9 | Irritability, anger |
| 10 | Fatigue, loss of motivation |

Source: Pierpont, 2009

Jung and colleagues (2008), in a Korean study, concluded that low-frequency noise in the frequency range above 30 Hz can lead to psychological complaints and that infrasound in the frequency range of 5–8 Hz can cause complaints due to rattling doors and windows in homes.

The energy generated by large wind turbines can be especially disturbing to the vestibular systems of some people, as well as cause other troubling sensations of the head, chest, or other parts of the body. Dr. Nina Pierpont (2009), in her definitive natural experiment on the subject, refers to these effects as Wind-Turbine Syndrome (WTS). TABLE 1 lists the symptoms that, in various combinations, characterize WTS. Although hearing impairment is not one of the symptoms of WTS, audiologists whose patients report these symptoms should ask them if they live near a wind turbine.

It is well known that sleep deprivation has serious consequences, and we know that noncontinuous sounds and nighttime sounds are less tolerable than continuous and daytime sounds. Somewhat related effects, such as cardiac arrhythmias, stress, hypertension, and headaches have also been attributed to noise or vibration from wind turbines, and some researchers are referring to these effects as Vibroacoustic Disease, or VAD (Castelo Branco, 1999; Castelo Branco and Alves-Pereira, 2004). VAD is described as occurring in persons who are exposed to high-level (>90 dB SPL) infra- and low-frequency noise (ILFN), under 500 Hz, for periods of 10 years or more. It is believed to be a systemic pathology characterized by direct tissue damage to a variety of bodily organs and may involve abnormal proliferation of extracellular matrices.

Alves-Pereira and Castelo Branco (2007) reported on a family who lived near wind turbines and showed signs of VAD. The sound levels in the home were less than 60 dB SPL in each 1/3–octave band below 100 Hz. We have measured unweighted sound levels ranging from 60 to 70 dB Leq (averaged over 1 minute) in these low-frequency bands in Ontario homes of people reporting AHEs from wind turbines. A spectral analysis of sounds emitted at a Michigan site revealed that unweighted peak levels at frequencies under 5 Hz exceeded 90 dB SPL (Wade Bray, pers. comm., 2009).

Similar observations have been made in studies of people who live near busy highways and airports, which also expose people to low-frequency sounds, both outdoors and in their homes. Evidence is insufficient to substantiate that typical exposures to wind-turbine noise, even in residents who live nearby, can lead to VAD, but early indications are that there are some more-vulnerable people who may be susceptible. Because ILFN is not yet recognized as a disease agent, it is not covered by legislation, permissible exposure levels have not yet been established, and dose-response relationships are unknown (Alves-Pereira, 2007).

As distinguished from VAD, Pierpont's (2009) use of the term Wind-Turbine Syndrome appears to emphasize a constellation of symptoms due to stimulation, or overstimulation, of the vestibular organs of balance due to ILFN from wind turbines (see TABLE 1). One of the most distinctive symptoms she lists in the constellation of symptoms comprising WTS is Visceral Vibratory Vestibular Disturbance (VVVD), which she defines as "a sensation of internal quivering, vibration, or pulsation accompanied by agitation, anxiety, alarm, irritability, rapid heartbeat, nausea, and sleep disturbance" (p. 270).

Drawing on the recent work of Balaban and colleagues (i.e., Balaban and Yates, 2004), Pierpont describes the close association between the vestibular system and its neural connections to brain nuclei involved with balance processing, autonomic and somatic sensory inflow and outflow, the fear and anxiety associated with vertigo or a sudden feeling of postural instability, and aversive learning. These neurological relationships give credence to Pierpont's linkage of the symptoms of VVVD to the vestibular system.

Todd et al (2008) demonstrated that the resonant frequency of the human vestibular system is 100 Hz, concluding that the mechano-receptive hair cells of the vestibular structures of the inner ear are remarkably sensitive to low-frequency vibration and that this sensitivity to vibration exceeds that of the cochlea. Not only is 100 Hz the frequency of the peak response of the vestibular system to vibration, but it is also a frequency at which a substantial amount of acoustic energy is produced by wind turbines. Symptoms of both VAD and VVVD can presumably occur in the presence of ILFN as a result of disruptions of normal paths or structures that mediate the fine coordination between living tissue deformation and activation of signal transducers; these disruptions can lead to aberrant mechano-electrical coupling that can, in turn, lead to conditions such as heart arrhythmias (Ingber, 2008). Ultimately, further research will be needed to sort out the commonalities and differences among the symptoms variously described in the literature as VAD, VVVD, and WTS.

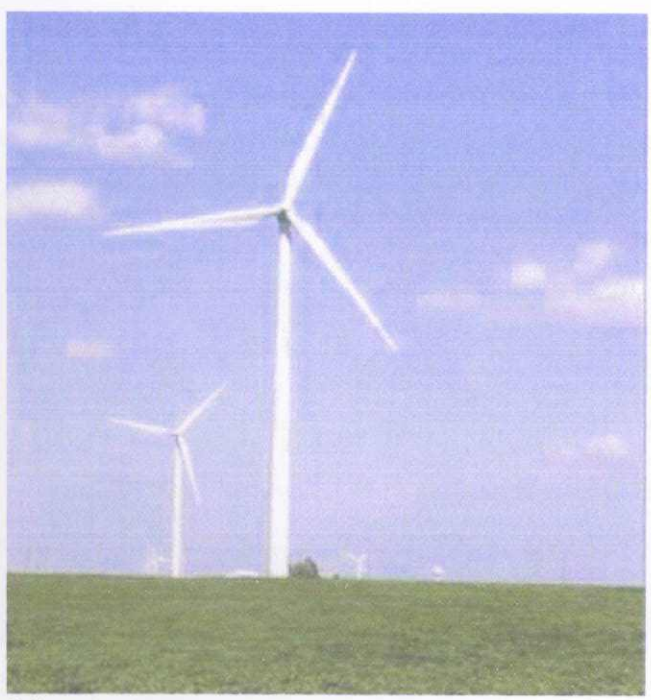
Dr. Geoff Leventhall, a British scientist, and his colleagues (Waye et al, 1997; Leventhall, 2003, 2004) have documented the detrimental effects of low-frequency noise exposure. They consider it to be a special environmental noise, particularly to sensitive people in their homes. Waye et al (1997) found that exposure to dynamically modulated low-frequency ventilation noise (20–200 Hz)—as opposed to midfrequency noise exposure—was more bothersome, less pleasant, impacted work performance more negatively, and led to lower social orientation.

Leventhall (2003), in reviewing the literature on the effects of exposure to low-frequency noise, found no evidence of hearing loss but substantial evidence of vibration of bodily structures (chest vibration), annoyance (especially in homes), perceptions of unpleasantness (pressure on the eardrum, unpleasant perception within the chest area, and a general feeling of vibration), sleep disturbance (reduced wakefulness), stress, reduced performance on demanding

verbal tasks, and negative biological effects that included quantitative measurements of EEG activity, blood pressure, respiration, hormone production, and heart rate.

Regarding work performance, reviewed studies indicated that dynamically modulated low-frequency noise, even when inaudible to most individuals, is more difficult to ignore than mid- or high-frequency noise and that its imperviousness to habituation leads to reduced available information-processing resources. Leventhall hypothesized that low-frequency noise, therefore, may impair work performance. More recently, as a consultant on behalf of the British Wind Energy Association (BWEA), the American Wind Energy Association (AWEA), and the Canadian Wind Energy Association (CANWEA), Leventhall (2006) changed his position, stating that although wind turbines do produce significant levels of low-frequency sound, they do not pose a threat to humans—in effect reverting to the notion that *what* you can't hear can't hurt you.

According to the World Health Organization guidelines (WHO, 2007), observable effects of nighttime, outdoor wind-turbine noise do not occur at levels of 30 dBA or lower. Many rural communities have ambient, nighttime sound levels that do not exceed 25 dBA. As outdoor sound levels increase, the risk of AHEs also increases, with the most vulnerable being the first to show its effects. Vulnerable populations include elderly persons; children, especially those younger than age six; and people with pre-existing medical conditions, especially if sleep is affected. For outdoor sound levels of 40 dBA or higher, the WHO states that there is sufficient evidence to link prolonged exposure to AHEs. While the WHO identifies long-term, nighttime audible sounds over 40 dBA outside one's home as a cause of AHEs, the wind industry commonly promotes 50 dBA as a safe limit for nearby homes and properties. Recently, a limit of 45 dBA has been proposed for new wind projects in Canada (Keith et al, 2008).



Utility-scale wind turbines located in Huron County, Michigan.

Much of the answer as to why the wind industry denies that noise is a serious problem with its wind turbines is because holding the noise to 30 dBA at night has serious economic consequences. The following quotation by Upton Sinclair seems relevant here: "It is difficult to get a man to understand something when his salary depends upon his not understanding it" (Sinclair, 1935, reprinted 1994, p. 109).

In recent years, the wind industry has denied the validity of any noise complaints by people who live near its utility-scale wind turbines. Residents who are leasing their properties for the siting of turbines are generally so pleased to receive the lease payments that they seldom complain. In fact, they normally are required to sign a leasing agreement, or gag clause, stating they will not speak or write anything unfavorable about the turbines. Consequently, complaints, and sometimes lawsuits, tend to be initiated by individuals who live near property on which wind turbines are sited, and not by those who are leasing their own property. This situation pits neighbor against neighbor, which leads to antagonistic divisions within communities.

## Measurement of Wind-Turbine Noise

It is important to point out that the continued use of the A-weighting scale in sound-level meters is the basis for misunderstandings that have led to acrimony between advocates and opponents of locating wind turbines in residential areas. The dBA scale grew out of the desire to incorporate a function into the measurement of sound pressure levels of environmental and industrial noise that is the inverse of the minimum audibility curve (Fletcher and Munson, 1933) at the 40-phon level. It is typically used, though, to specify the levels of noises that are more intense, where the audibility curve becomes considerably flattened, obviating the need for A-weighting. It is mandated in various national and international standards for measurements that are compared to damage-risk criteria for hearing loss and other health effects. The A-weighted scale in sound-level meters drastically reduces

sound-level readings in the lower frequencies, beginning at 1000 Hz, and reduces sounds at 20 Hz by 50 dB.

For wind-turbine noise, the A-weighting scale is especially ill-suited because of its devaluation of the effects of low-frequency noise. This is why it is important to make C-weighted measurements, as well as A-weighted measurements, when considering the impact of sound from wind turbines. Theoretically, linear-scale measurements would seem superior to C-scale measurements in wind-turbine applications, but linear-scale measurements lack standardization due to failure on the part of manufacturers of sound-level meters to agree on such factors as low-frequency cutoff and response tolerance limits. The Z-scale, or zero-frequency weighting, was introduced in 2003 by the International Electro-technical Commission (IEC) in its Standard 61672 to replace the flat, or linear, weighting used by manufacturers in the past.

## State of Michigan Siting Guidelines

Michigan's siting guidelines (State of Michigan, 2008) will be used as an example of guidelines that deal only in a limited way with sound. These guidelines refer to earlier, now outdated, WHO and Environmental Protection Agency (EPA) guidelines to support a noise criterion that SPLs cannot exceed 55 dBA at the adjacent property line. This level is allowed to be exceeded during severe weather or power outages, and when the ambient sound level is greater than 55 dBA, the turbine noise can exceed that higher background sound level by 5 dB. These levels are about 30 dB above the nighttime levels of most rural communities. When utility-scale turbines were installed in Huron County, Michigan, in May 2008, the WHO's 2007 guidelines that call for nighttime, outside levels not to exceed 30 dBA were already in place. Based on measurements made by the authors, these turbines produce 40–45 dBA sound levels at the perimeter of a 1,000 ft radius under typical weather conditions, and the additive effects of multiple turbines produce higher levels. Many of the turbines have been located close enough to homes to produce very noticeable noise and vibration.

Kamperman and James (2009) have offered recommendations for change in the State of Michigan guidelines (2008) for wind turbines. Some of the more pertinent details of the Michigan siting guidelines are shown in the left-hand column of TABLE 2. The state of Michigan permits sound levels that do not exceed 55 dBA or L90 + 5 dBA, whichever is greater, measured at the property line closest to the wind-energy system. These guidelines make no provisions to limit low-frequency sounds from wind-turbine operations.

In consideration of the current WHO guidelines (2007), measurements made by the authors in Huron County, Michigan, indicate that the current Michigan guidelines do not appear adequate to protect the public from the nuisances and known health risks of wind-turbine noise. In fact, these guidelines appear to be especially lenient

**Table 2. Current and Proposed Wind-Turbine Siting Guidelines**

| Current Michigan Guidelines* | Alternative Proposed Guidelines** |
|---|---|
| Sound level cannot exceed 55 dBA or L90 + 5 dBA, whichever is greater. | Operating LAeq is not to exceed the background LA90 +5 dBA, where LA90 is measured during a preconstruction noise study at the quietest time of night. Similar dBC limits should also be applied. |
| Limits apply to sound levels measured at homes (as stated in Huron County Ordinance). | Limits apply to sound levels measured at property lines, except that turbine sounds cannot exceed 35 dBA at any home. |
| No provisions are made for limiting low-frequency sounds from wind-turbine operations. | LCeq-LA90 cannot exceed 20 dB at receiving property, e.g., LCeq (from turbines) minus (LA90 [background] + 5) < 20 dB, and is not to exceed 55 LCeq from wind turbines (60 LCeq for properties within one mile of major heavily trafficked roads). |

*Source: State of Michigan, 2008

**Source: Kamperman and James, 2009

in terms of tolerable sound levels. Sound levels that approach 20 dBA higher than natural ambient levels are considered unacceptable in most countries; Michigan permits 30 dBA increases.

In considering the health and well-being of people living near wind-turbine projects, the changes recommended by Kamperman and James (2009) would abandon the 55 dBA limit in favor of the commonly accepted criteria of L90 + 5 dBA, for both A- and C-scale readings, where L90 is the preconstruction ambient level. These recommendations also include a prohibition against any wind-turbine-related sound levels exceeding 35 dBA on receiving properties that include homes or other structures in which people sleep. Additional protections against low-frequency sound are given in the right-hand column of TABLE 2. These recommended provisions would protect residents by limiting the difference between C-weighted Leq during turbine operation and the quietest A-weighted pre-operation background sound levels, plus 5 dB, to no more than 20 dB at the property line. This level should not exceed 55 dB Leq on the C scale, or 60 dB Leq for properties within one mile of major heavily trafficked roads, which sets a higher tolerance for communities that tend to experience slightly noisier conditions.

**People living near wind turbines may experience sleep disturbance.**

Implementation of the recommendations of Kamperman and James would result in siting wind turbines differently than what is currently planned for future wind-turbine projects in Michigan. This change would result in sound levels at nearby properties that are much less noticeable, and much less likely to cause sleep deprivation, annoyance, and related health risks. These sound-level measurements should be made by independent acoustical engineers or knowledgeable audiologists who follow ANSI guidelines (1993, 1994) to ensure fair and accurate readings, and not by representatives of the wind industry.

People living within a mile of one or more wind turbines, and especially those living within a half mile, have frequent sleep disturbance leading to sleep deprivation, and sleep disturbances are common in people who live up to about 1.25 miles away. This is the setback distance at which a group of turbines would need to be in order not to be a nighttime noise disturbance (Kamperman and James, 2009). It is also the setback distance used in several other countries that have substantial experience with wind turbines, and is the distance at which Pierpont (2009) found very few people reporting AHEs.

A study conducted by van den Berg (2003) in The Netherlands demonstrated that daytime levels cannot be used to predict nighttime levels and that residents within 1900 mile (1.18 mile) of a wind-turbine project expressed annoyance from the noise. Pierpont (2009) recommends baseline minimum setbacks of 2 kilometers (1.24 mile) from residences and other buildings such as hospitals, schools, and nursing homes, and longer setbacks in mountainous terrain and when necessary to meet the noise criteria developed by Kamperman and James (2009).

In a panel review report, the American Wind Energy Association (AWEA) and Canadian Wind Energy Association (CANWEA) have objected to setbacks that exceed 1 mile (Colby et al, 2009). A coalition of independent medical and acoustical experts, the Society for Wind Vigilance (2010), has provided a recent rebuttal to that report. The society has described the panel review as a typical product of industry-funded white papers, being neither authoritative nor convincing. The society accepts as a medical fact that sleep disturbance, physiological stress, and psychological distress can result from exposure to wind-turbine noise.

Wind turbines have different effects on different people. Some of these effects are somewhat predictable based on financial compensation, legal restrictions on free speech included in the lease contracts with hosting landowners, and distance of the residence from wind projects, but they are sometimes totally unpredictable. Planning for wind projects needs to be directed not only toward benefitting society at large but also toward protecting the individuals living near them. We believe that the state of Michigan, and other states that have adopted similar siting guidelines for wind turbines, are not acting in the best interest of all their citizens and need to revise their siting guidelines to protect the public from possible health risks and loss of property values, as well as reduce complaints about noise annoyance.

Wind-utility developers proposing new projects to a potential host community are often asked if their projects will cause the same negative community responses that are heard from people living in the footprint of operating projects. They often respond that they will use a different

type of wind turbine or that reports of complaints refer to older-style turbines that they do not use. In our opinion, these statements should usually be viewed as diversionary.

Finally, it is important to note that there is little difference in noise generated across makes and models of modern utility-scale, upwind wind turbines once their power outputs are normalized. Kamperman (pers. comm., 2009), after analyzing data from a project funded by the Danish Energy Authority (Søndergaard and Madsen, 2008), has indicated that when the A-weighted sound levels are converted to unweighted levels, the low-frequency energy from industrial wind turbines increases inversely with frequency at a rate of approximately 3 dB per octave to below 10 Hz (the lowest reported frequency). Kamperman has concluded that the amount of noise generated at low frequencies increases by 3–5 dB for every MW of electrical power generated. Because turbines are getting larger, this means that future noise problems are likely to get worse if siting guidelines are not changed.

## Conclusion

Our purpose in this article has been to provide audiologists with a better understanding of the types of noise generated by wind turbines, some basic considerations underlying sound-level measurements of wind-turbine noise, and the adverse health effects on people who live near these turbines. In future years, we expect that audiologists will be called upon to make noise measurements in communities that have acquired wind turbines, or are considering them. Some of us, along with members of the medical profession, will be asked to provide legal testimony regarding our opinions on the effects of such noise on people. Many of us will likely see clinical patients who are experiencing some of the adverse health effects described in this article.

As a professional community, audiologists should become involved not only in making these measurements to corroborate the complaints of residents living near wind-turbine projects but also in developing and shaping siting guidelines that minimize the potentially adverse health effects of the noise and vibration they generate. In these ways, we can promote public health interests without opposing the use of wind turbines as a desirable and viable alternative energy source.

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*Portions of this work were presented at the Annual Convention of the American Speech-Language-Hearing Association (ASHA), November 2009, New Orleans, LA.*

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QUADRANT JULY AUGUST 2010

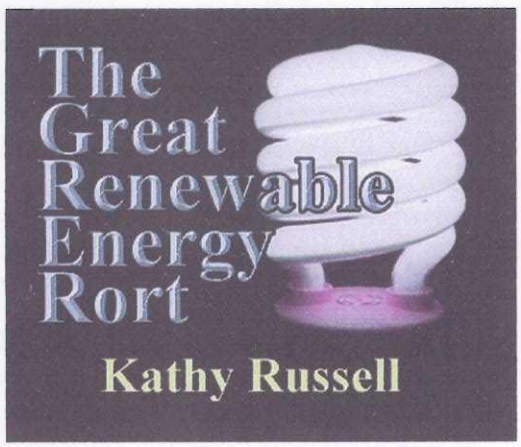
ENVIRONMENT

# The Great Renewable Energy Rort

Kathy Russell

I thought the message was loud and clear on the Emissions Trading Scheme (ETS) decision: we don't want one! So why is this same logic not being applied to the Renewable Energy Target (RET) legislation? The proposed Carbon Pollution Reduction Scheme (CPRS) legislation (which incorporated the ETS) was defeated twice in federal parliament, on August 13 and December 2, 2009. After the Opposition blocked attempts to further debate the legislation in February this year, the government announced on April 27 that the implementation of its proposed CPRS would be delayed until at least 2013.

The ETS aimed to create a price penalty for carbon with the overriding objective being to promote carbon abatement. It was effectively a new tax which would artificially inflate our cost of living and most importantly our manufacturing cost base, reduce any shred of international competitive advantage any industry had in this country and essentially ruin a perfectly good economy for no real gain.




On August 20, 2009, the Renewable Energy Target (RET) legislation was passed, requiring electricity retailers and large industrial users to purchase at least 20 per cent of their electricity from renewable energy sources by 2020.

In much the same way as the ETS created a price penalty for carbon, the RET creates a price penalty for electricity in the form of Renewable Energy Certificates (RECs) with the same overriding objective being to promote carbon abatement. The RET is effectively a tax, as was the proposed ETS. By creating a political environment which guarantees uptake of inefficient and very expensive energy forms—for example wind energy—again it artificially inflates our cost of living and most importantly our manufacturing cost base and reduces significantly the international competitive advantage any industry has in this country and essentially ruins a perfectly good economy for no real gain.

Worse still, unlike a normal tax which provides revenue into government coffers for the general provision of infrastructure and welfare to the country as a whole, the RET singularly provides benefit to a select few—renewable energy companies. There is no offset for those forced to bear the cost.

So why the "disconnect" between the ETS and the RET? Aren't they the same thing? They both have similar objectives with questionable outcomes. Both create artificial markets and costs. Why does the Opposition reject the ETS yet support the RET?

There was a huge public outcry during the ETS debate which motivated the Opposition to act and block the government's proposed legislation. Is it a lack of public understanding which is allowing the amended RET legislation introduced into parliament in May this year to proceed unhindered? In the interest of greater public awareness, let me expand the concept further with my wind energy example and demonstrate what damage the RET is actually doing in real terms.

Of intermittent nature, wind energy needs 100 per cent backup capacity and the requirement for the market to purchase substitute power when this energy form needs to be shut down due to excessive wind speeds or when the wind dies down. This happens regularly, and details within the live generation data prove it[1]. These "loss of load" incidents have the ability to occur on a grand scale and require intervention from backup facilities at a premium—up to the current market cap of $10,000/MW. Who pays for the added cost of this unnecessary electricity spot market volatility? Yes—you guessed it—individuals (that is, voters) and industry.

In addition, wind energy cannot be substituted for base load, nor can it be relied upon for peak requirements and is classified as self-dispatching. This wind energy supply has a zero bid price into the market, unlike other generators who must compete via price nomination for the opportunity to supply their product. Wind energy drives out the highest price generators first and, as it doesn't bid into the market, receives the next highest generator's bid. During periods of low demand, some generators bid a negative price in order to guarantee the uptake of their supply (some energy generators can't just be switched off). The Australian Energy Market Operator (AEMO) is looking to introduce a floor price into the market in order to accommodate wind energy in this mix. Wind energy does not compete in a free market environment. Its sale and revenue are guaranteed. Who pays for this artificially high price acting over and above normal market forces? Yes—you guessed it—individuals (that is, voters) and industry.

But wait, there's more. The Renewable Energy Certificates (RECs) which go with the RET are like gold. From a high of approximately $46/MW in March this year, wholesale certificate prices were trading at $38/MW at the end of May[2]. This is the subsidy component which makes the business plan viable and is received *on top* of the price paid per MW in the dispatch market. Current planning approvals and applications for over 2000MW in western Victoria alone attest to the bonanza to be had. Foreign companies are leading the charge. Profits shift offshore and the underlying cost of the RECs are born by whom? Yes—you guessed it again—individuals (that is, voters) and industry.

Then there are the newly created opportunities to manipulate the electricity market. Destabilise the grid with wind energy and then compensate with fast-acting gas generation at peak prices. Now here's one for the ACCC to watch. Did anyone notice the most recent capital investments of Origin and AGL to place Open Cycle Gas Turbines (OCGT) in strategic alignment with wind energy investment? Take note of the choice of generator. Combined Cycle Gas Turbines (CCGT—0.4 tCO2/MW) are much more efficient than OCGTs (0.7 tCO2/MW) from an emissions perspective, but unlike OCGTs, they do not have the ability to ramp up and down as quickly. If their investment strategy was to produce gas-generated electricity with the lowest carbon emissions possible, then CCGT would be the choice. If their investment strategy was to produce gas-generated electricity which could take advantage of opportunities in the market via its flexibility in ramping up and down on demand to satisfy grid instability issues, then OCGT would be the choice. Who pays for this fast-acting, shadowing capacity at peak prices? Yes—you guessed it again—individuals (that is, voters) and industry.

And what about the claim of jobs? Australia's economic recovery on the back of a brave new environmentally friendly world? Construction jobs at the start-up of a wind farm are a given—this is so with the construction of any new plant or industrial facility (including a gas-

generating plant) or public infrastructure project. The number of jobs long-term in the wind industry is rather less than ideal. Wind farm control is both electronic/automatic and remotely monitored. Maintenance positions are highly specialised and are not generally filled by local regional communities. Families attached to these specialised technicians don't tend to relocate to these regional communities as they are moved around different wind farm locations on a rotational basis. The Spanish experience has been that each new green job created cost one million euros and caused 2.2 jobs to be lost in power-consuming industries[3]. Net job losses on the back of reduced economic activity from cost increases in the electricity market—no surprise on this one. Who pays for this unnecessary burden to Australia's welfare obligations? Right again—individuals (that is, voters) and industry.

And all this for no tangible benefit. Emissions will not be reduced. Not one coal-fired power station will be switched off. Additional back-up capacity will have to be built. Artificially-based capital development of this scale and nature also has the effect of pushing up the cost of borrowing money. An increase in the cost of living and of the manufacturing cost base sends jobs offshore—to the smart countries who don't entertain fantasies such as RETs and ETSs. Not to mention the vast tracts of land occupied by wind turbines and the destructive effect they have on communities forced to reside with them. This technology type is far from benign. Just ask the communities at Waubra, near Ballarat (and those at Toora, Cape Bridgewater, Capital, Cullerin, Hallet and Crookwell) who are suffering health effects and have started abandoning their homes, creating a new form of epidemic to add to the already struggling health and community support infrastructure. All of this would not be happening if it weren't for the RET.

But don't take my word for it. Take the time to listen to other market participants and commentators.

Origin Energy has been doing its best to blow the whistle on the same issues for years. But at what point do they join the rort, given that no one is listening?

In an important speech to the Committee for Economic Development of Australia (CEDA) in Sydney on April 13, Grant King, the CEO of Origin Energy, predicted massive increases in electricity prices driven

> *largely by the current policy environment, large amounts of renewables being forced into the system, uncosted charges for those renewables given current policy settings and substantial increases in transmission and distribution costs.*[4]

In February 2006, Origin Energy submitted a technical paper to the Victorian government entitled "Driving Investment in Renewable Energy in Victoria—Options for a Victorian market-based measure, Submission by Origin Energy in response to the Issues Paper released by Department of Infrastructure and Department of Sustainability and Environment, December 2005". The reason I mention the detail here rather than in a footnote is because there is a story to tell with regard to this document's mysterious disappearance from the public domain. Submissions were recorded on the Department of Primary Industries (DPI) website for some years. A Google search now using the key words "Origin Driving Investment in Renewable Energy in Victoria" will produce a number of links to the DPI website. But guess what? When you follow these links, the site opens and a message appears stating that this document has been deleted. Sounds like the "Climategate" response to FOI requests: delete the required information.

But all is not lost. Copies were downloaded when the report was first made available. And their contents make for sensational reading. Some incredibly damning statements are made about the technical viability of policies which promote wind energy (because of its industry maturity) ahead of other developing technologies because of their inability to "step up" and be commercially viable within the time frames demanded.

The following excerpts are important because of their relevance to the argument, and important to acknowledge because so many people either ignore these inconvenient truths and irresponsibly plough on regardless or simply aren't aware of these basic limitations in the first place.

> *Unreliable capacity requires additional generation support. Additional wind capacity will require two forms of generation support because of the intermittent nature of the underlying energy source:*
>
> *variability outside 5 minute dispatch intervals—gas turbine generation, which can take between 15 and 30 minutes to reach maximum output, is either required to run to adjust for wind generation variability or to stand idle as back up support; and*
>
> *variability inside 5 minute dispatch intervals—ancillary services generation is required, sometimes at significant extra cost, to cater for wind generation variability.* [5]

Keep in mind that grid-supplied electricity is a unique commodity; its production for and consumption from the grid must be matched instantaneously and continuously, day and night. Not averaged out over days, hours or even half-hourly intervals. The grid is not like some large lake into which electricity might be dumped. This is an unchanging law about grid operation.

The Origin document goes on:

> *The costs of both forms of generation support are ultimately borne by energy consumers. Moreover, these costs are magnified as greater amounts of wind generation are connected to the system and more generation support is required. This is compounded by inter-connector constraints from time to time as more generation support is required from other regions in the NEM ... 6*
>
> *The intermittent nature of wind generation translates into higher electricity spot price volatility. Modelling of the impact of 1000 MW of wind generation on the South Australian electricity market indicates that 1 per cent of the time 250 MW of supply could be lost within the half hour and 390 MW within the hour which, in Origin's view, would significantly increase electricity spot price volatility. Preliminary modelling by Origin indicates that Victorian electricity spot prices could increase by between $2 and $5/MWh (average flat price impact) as a result of a similar level of variability occurring in Victoria. The cost of additional financial risk associated with greater electricity spot price volatility will ultimately be borne by energy consumers.* [6]

The fact that wind energy supply can be lost in such a short period is no joke. Commentators who make assertions to the contrary appear blissfully unaware that the performance data of all major wind farms connected to the eastern Australian grid is readily available in the public domain[7].

To demonstrate that a widespread loss of wind generation can and will occur, the night of August 18, 2009, provides a perfect example. Very strong prevailing winds of a weather system covering the Cullerin and Capital wind farms in New South Wales (about 40 kilometres apart) caused the control systems of both wind farms to shut down the wind turbines for their own protection. Each wind farm had been operating near its rated full capacity of approximately 120 MW combined, which fell to zero within two minutes, starting at 5.19 p.m. This is a very significant loss that had to be replaced immediately.

The Origin document continues in its criticism of policy which promotes renewable energy such as wind over more economic forms of greenhouse gas abatement:

> *The economic cost of gas-fired generation is lower than wind generation—the combined capital and running costs of a gas-fired power station are approximately half that of a*

*wind turbine (adjusted for the intermittency of wind and including higher running costs of running a gas-fired power station);*

*Gas-fired generation is a more cost-effective source of greenhouse gas abatement than wind generation—at approximately half the economic cost, a gas-fired power station reduces emissions up to twice as much as a wind turbine, because of the better utilisation of the gas-fired power station and the relatively low emission intensity of gas-fired electricity (which makes gas at least 4 times more cost-effective on a $/tCO2 basis than wind);*

*Gas-fired generation is more reliable than wind generation which is reliant on the vagaries of nature—gas-fired generation can be turned off and on to meet demand requirements while wind generation is regarded as firm for about only 8 per cent of the time (according to ESIPC in South Australia);*

*Gas-fired generation can provide much larger increments to generation capacity to satisfy growing demand—a large scale gas-fired power station may be up to 1000MW which is all available to generate on average 95 per cent of the time compared to a 1000MW of wind generation which is available to generate on average 33 per cent of the time; and*

*Diversity and security of supply are improved by gas-fired generation and diminished by wind generation—gas-fired power stations stimulate gas supply sources (potentially expanding the range of viable gas production in regional Victoria available for other uses) and connect to the transmission system (potentially in more remote areas) without lowering supply security (as would be the case with wind)*[8]

Pretty damning isn't it? So why isn't the government listening?

A lack of transparency coupled with an absence of any analysis of live performance data in assessing the effects of policy in real terms from the highest levels down are contributing to these enormous mistakes.

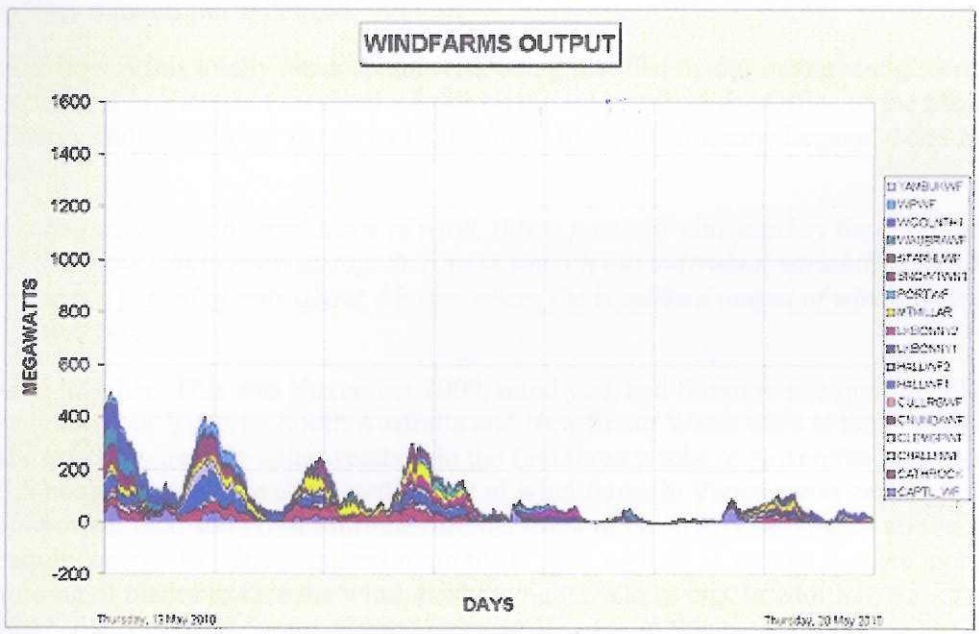
In an effort to combat the lack of transparency and non-availability of live performance data, Andrew Miskelly has, of his own initiative, developed a way to make electricity generation data more freely available and user friendly (see the website). Why has this task been left for unpaid "privateers" to complete?

The electricity provided to the national grid by every connected generator of greater than 30 MW installed capacity is published daily on its website by the AEMO, the operator of the eastern Australian grid. It is a statutory requirement that the data is made available in the public domain. At www.aemo.com.au there is the statement "under Clause 3.13.4(r) of the National Electricity Rules AEMO is also required to publish such data to Registered Participants, in a daily file covering all intervals of the previous trading day". In fact, the data is supplied to the website as the average output at five-minute intervals for each full day, midnight to midnight, at about 4 a.m. the following morning, every morning. Andrew has created a method which captures this information release.

On the back of this original information breakthrough, Andrew and Dr Tom Quirk teamed up to write a paper which debunked the myth of geographical dispersion[9]—the myth being that wind farms can be a reliable source of electricity if they are dispersed over a sufficiently wide area[10]. The wind will be "blowing somewhere", it is claimed. Given the real production output of wind farms in South Australia, New South Wales, Victoria and Tasmania, Andrew and Dr Quirk analysed the data and were able to determine that wind farms in south-eastern Australia are unlikely to supply any significant power output that system operators can rely on. Using five-minute power measurements for the month of June 2009, it was determined that the one benefit of grouping wind farms is that the 90 per cent reliability point is increased from 6 per cent for South Australia, 5 per cent for Victoria, to 10 per cent overall. This figure

should be expected to vary from month to month and from year to year as a result of changing weather patterns with no marked improvement as a result of saturation of wind turbines within respective states.

Since the Miskelly/Quirk paper was written, there have been a number of sustained meteorological events which highlight even further the obvious fallacy of geographical dispersion. The period November 1 to 21, 2009, was of particularly low output across the whole eastern Australian grid. More recently, May 13 to 20 paints a terrible output generation picture if you're a wind farmer. The operational data originally posted on the AEMO website for these date ranges is available via Andrew's www.landscapeguardians.org.au/data/aemo database. Also, go to http://windfarmperformance.info/ and alter the "change date" tab and flick through the May date range provided to confirm the graph below.




The above combined wind farm output incorporates all of the wind farms over 30 MW capacity which are connected to the eastern Australian grid and are listed to the right of this graph. This equates to a total installed capacity of 1611 MW. If this maximum potential output were to be demonstrated on the above graph, it would appear just above the 1600. As previously mentioned, not a good week if you're a wind farmer. So much for the certainty of geographic dispersion improving wind farm reliability.

Wind farms on the eastern Australian grid have a geographic spread of over 1100 kilometres east-west and over 500 kilometres north-south. This grid has the largest geographic dispersal of any interconnected grid in the world. Weather systems can occupy and influence large if not whole areas within this geographic spread[11]. Further, no matter how many turbines are erected throughout this geographic area, wind energy will always require instantaneous reserves equal to the total installed wind farm capacity to be kept operational at all times. This reserve requirement is in addition to any reserves presently required to cover the loss of any large controllable generation unit, simply because the scenario that a large generation unit (such as a coal power station) might fail remains a separate, independent probability to that of wind farms' frequent "failures".

Furthermore, Andrew's data base provides conclusive evidence that wind farm output does suddenly start and stop on a regular basis, and does so in a totally unpredictable fashion. This

data cannot be averaged out for the purpose of analysing wind farm performance and its ability to supply a secure, reliable, efficient energy source into the grid. To do so completely ignores that unchanging law of grid operation, where supply and demand must be matched instantaneously and continuously, all the time. Not averaged out over days, hours or even half hourly intervals. This unpredictability may well have serious impacts on the controllability and stability of the eastern Australian grid.

It is impossible to forecast wind speeds and wind speed variation over timeframes of seconds to minutes, or to provide any sort of accurate estimate of wind speed variation across the meteorological micro-scale of any given wind farm location. It is possible to forecast some sort of regional mean wind speed (that is, average value) over timeframes of hours. But again, averages are not good enough when it comes to managing the grid second by second. Thus the flow-on effects such as market volatility, higher electricity prices, grid instability, security and efficiency issues become an everyday reality if the current RET policy promoting wind energy remains unchallenged.

And how is this totally unacceptable risk being justified by our incumbent governments? At a state level in Victoria I received a letter on the subject from the Office of the Minister for Energy and Resources, signed by the Chief of Staff, Ms Susanne Legana, dated November 17, 2009:

> *Regarding the intermittency of wind, this is partially mitigated by the installation of multiple wind farms, as together these smooth out individual variability. In 2007, there was a period of only about 4 hours where the combined output of wind farms in Victoria was zero.*

God love her! This was November 2009, mind you, and Susanne was quoting 2007 data. Not only this, but Victoria, South Australia and New South Wales were at that exact moment in the grip of extremely calm weather. In the first three weeks of November there was a total of 5.5 hours in which the combined output of wind farms in Victoria was zero or below (important fact: sometimes turbines are net *users* of electricity because at all times they require energy to initiate and maintain blade spin, cooling of motors, remote monitoring, turning of blades to face the wind, flashing lights, and so on). In addition, for a further 5.67 hours the combined output of wind farms in Victoria in this period was between zero and 1 MW. This is just as bad. What good is 1 MW of power from all that capacity? On top of this again, for a further 26.25 hours the combined output of wind farms in Victoria in this same time frame was between 1 and 5 MW.

That's a total of 37.42 hours of less than 5 MW Victorian combined wind farm energy generation during a three-week period from a combined maximum generating capacity of 439 MW. So for a day and a half in a three-week period, all the wind farms in Victoria combined produced less than 1 per cent of their capacity. How is this smoothing out intermittency? How is this energy security? How is this timely analysis of live data? The Office of the Minister for Energy and Resources is two years behind!

In total, the system produced at less than 50 MW for the equivalent of eight days. It produced at less than 100MW for the equivalent of thirteen days. The average output for the whole Victorian system for the three-week period was 86.32 MW. It peaked at 341 MW at 11.05 a.m. on November 3 during one of two days of elevated activity. I must reiterate that it is very important not to rely on averages alone when analysing this data. Big movements from minute to minute are not the exception, but the rule. On November 3 at 4.10 p.m. the combined system was producing 306.07 MW; at 4.15 it was producing 290.445 MW; at 4.20 it was producing 274.28 MW; at 4.25 it was producing 258.21 MW. This was a loss of 47.86 MW within fifteen minutes. This is not an isolated incident.

Now imagine a further 2000 MW installed capacity within this Victorian system as per approved and planned applications. Assuming a total capacity of 2439 MW, a variance of 11

per cent capacity in fifteen minutes would translate to a loss of 268 MW from the system. This type of event will occur regularly.

On the same day at 03:05 a.m., 77.27 MW was lost in ten minutes; at 4.50 a.m., 80.43 MW was lost in twenty-five minutes; on a further six instances on the same day 10 per cent or greater capacity was lost within minutes. And this isn't counting the equivalent increases being forced *into* the grid. Multiply this out against a larger installed capacity as is intended for the state and this is the equivalent of a large gas-fired generator being switched on and off regularly. The operator of a gas-fired generator would be fined hundreds and thousands of dollars if it were to perform in this manner. The wind generators get away with this behaviour.

So can you now see why backup generation must not only be built, but kept running at all times? What's the point of installing two systems when one alone will suffice? Where are the savings?

Frightening isn't it? And the people managing and governing our country are not analysing this data and therefore do not have a clue what effects their policies are having in real terms. The ignorance gets worse. Note the following paragraph from the same letter:

> *Wind farms are private sector investments which derive income from two sources, the sale of electricity and the sale of Renewable Energy Certificates (REC). Private investors would not continue to develop wind energy projects if they were not commercial in competitive electricity and REC markets.*

If the Office of the Minister for Energy and Resources were private enterprise, the Board and the CEO would be sacked. Where is the accountability of the Australian government? Wind energy does *not* compete in the electricity market. It drops in and takes the next available bid price. And no, the private sector wind farm investor is not happy with the current competitive nature of wind versus solar in the REC market, and that's why they have lobbied Penny Wong, federal Minister for Climate Change, Energy Efficiency and Water so intensively to have their own market in which they do not have to compete. Thus the new RET legislation currently before the parliament. New wind energy gets electricity price plus REC value with no requirement to compete. New gas energy gets electricity price only plus has to compete for opportunity to supply. Hello? Who's driving this bus?

Contrary to the belief of the Minister for Energy and Resources that wind farms would not be built if they weren't able to compete in the electricity and REC market is the unavoidable fact that private investors are applying in their droves for new wind farm developments due to current friendly policy which removes the risk of competition and guarantees cash windfalls. And it's our money the government is using as bait to achieve their political objective of being "seen to be green".

Departments such as the Energy and Resources Department quite clearly do not have a clue. They lack a basic understanding of industry dynamics, with no level of accountability or responsibility, and there is no intelligent, transparent analysis or debate behind their decision making.

A blind faith in RET legislation and an ETS being able to solve all of these issues is driving this madness. A blind faith in a Green utopia which decrees "in theory" (confirmed by computer modelling?) that we must have a generous mix of all energy types with a magical "20 per cent renewable" falling out at the end of the equation. And an even blinder faith which assumes we can acquire all of these different energy types off the shelf and simply plug them into our current electricity grid, ready to use. In Australia, we are not connected to any neighbouring countries which have the luxury of fast-acting secure conventional backup generation capacity (such as nuclear, hydro, gas and coal) as is the European experience. Why are these basic facts being ignored? If the system is going to be forced to work in an

inefficient manner for no gain (and that includes little if any carbon abatement), we have a right to know: "At what cost?"

The damage does not end here. Environmental costs of equal if not greater significance must also be included in this analysis. The most significant of all is the human cost.

Human health is an issue of major concern for those forced to reside near turbines and for good reason. I know because I speak and correspond with these people every day. I know because I am invited into their homes and for the relatively brief length of my stay, I experience their symptoms. Luckily for me, I am able to leave, and in doing so my symptoms disappear. Not so lucky the people who can't leave and are forced to endure long-term exposure with significant long-term consequences. Some have been fortunate enough to have the means to leave their homes. The majority are not so lucky, having lost the ability to sell their most valuable asset, their farm or home.

Symptoms range in strength and severity and include sleep disturbance, motion sickness and nausea, inner ear symptoms, headaches and migraines, excessive tiredness, palpitations, high blood pressure, eye symptoms, and cognitive as well as gastrointestinal problems. The residents of some homes experience more problems than others, and sometimes certain family members within these homes are affected more than others. Explanations for these differences include a combination of an individual's physical predisposition, distance from the wind farm and climatic conditions which affect the operation of the turbines at the time.

In a rather clever analogy, a Waubra resident recently compared her experiences of ocean racing with those of living next door to a wind farm. She said in ocean racing, some of those on board the same boat would fall ill to seasickness immediately and be totally incapable of moving for the remainder of the journey, some would be ill yet could still function, while others felt no ill effects at all. Much the same happens around a wind farm, although the biggest concentration of people affected in Australia appears to be at the Waubra wind farm site, north-west of Ballarat. Unlike ocean racing, where a seasickness sufferer is given sympathy and accommodated in their reduced capacity, those suffering wind farm sickness are ridiculed by wind company managing directors[12] and their genuine concerns are ignored by those who are supposed to at the very least initiate investigations, support and protection—the government and its delegated agencies.

Sound familiar? Parallels with the tobacco and asbestos histories come to mind—misrepresenting data, hiring PR firms, attacking the detractors. Remember, there is a great deal of money and green votes at stake here.

In response to a Legislative Council adjournment debate issue raised by Peter Kavanagh MLC in the Victorian parliament on September 2, 2009, in relation to the possible health effects of wind farm generators, on October 14 the Minister for Workcover Tim Holding announced: "WorkSafe has commenced work with the Department of Human Services (DHS) and the Environment Protection Authority, and will work with local government and relevant individuals to identify potential hazards related to the issues raised by Mr Kavanagh."

In January, Mr Holding announced the conclusion of his investigation with the finding that after examining both peer reviewed and validated scientific research, no correlation could be found between direct health effects and the operation of wind turbines. However, not one resident who had raised their concerns with the wind company was interviewed or even approached as part of this investigation.

On November 11, I participated in the National Wind Farm Development Guidelines: Stakeholder Reference Group (SRG) meeting. The meeting was called to discuss what the working group had planned for the consultation process for the draft National Wind Farm Development Guidelines, the timeframe for analysing the public comments and addressing those comments in the final version. It was expected that the SRG would provide a diverse

range of views and highlight issues that the Working Group could address during and after the public consultation period. It was an experience to say the least.

Of greatest concern to me was the stated purpose of the guidelines: "to support government renewable energy policy by providing a nationally consistent set of methods for addressing issues that are *unique or significant to wind farms*"[13] (emphasis added). Beside the fact that the wind companies present at that meeting decreed that they would not follow guidelines which were not a legislative requirement (so what was the point of having a nationally consistent set of guidelines?), there was no mention of health effects in any of the chapters or appendices. As far as I and the hundreds I represented at that meeting were concerned, health was a major subject "unique or significant to wind farms", yet there was no mention or recognition of it, let alone a guideline on the subject. How could potential safeguards be put in place if the problem itself was not recognised? By not acknowledging the problem, were we not condemned to more of the same mistakes?

This was quickly countered with the "no peer-reviewed evidence" excuse during the ensuing debate. But during a subsequent break, the convenors (from the Department of the Environment, Water, Heritage and the Arts, DEWHA) approached me and explained that until there was evidence of a conclusive scientific peer-reviewed nature, they couldn't act. But if I was to obtain something of significance, I should provide it to them and I would be assured of the subject's recognition. Yeah, right. Quite clearly, the state and federal governments had no intention of initiating the scientific studies required to investigate the causal links. Given this was a new frontier in scientific research, the cost, resources and expertise required to complete the task were extensive, so how was this the responsibility of ordinary Australians? Wasn't it the government's responsibility to at least send in an assessment team to interview and investigate the people affected?

Rather than rely on the assertions of DEWHA employees, I then moved on to Peter Garrett, federal Minister for the Environment, Water, Heritage and the Arts (the position he held at that time). I was beginning to understand in explicit detail how the pink-batts tragedy had evolved. On February 18, 2010, I met with Mr Garrett and took with me a Waubra resident who was suffering health effects and had been forced to move out of his home. I also took and provided to Mr Garrett a short documentary of the testimonials provided by other Waubra residents who were unable to attend the meeting. We also provided medical evidence and expert advice, some of which was personally addressed to Mr Garrett. On the issue of health and its omission from his National Guidelines, Mr Garrett contended that he had no jurisdiction in this area and it was the responsibility of the states. He stated he had jurisdiction only under the Environment Protection and Biodiversity Conservation Act (EPBC Act). When asked why he was writing National Guidelines which included subjects such as noise, shadow flicker, electromagnetic interference, aircraft safety, fire risk, if he had no jurisdiction in these areas, he would not respond.

I then introduced Mr Garrett to the Waubra resident who had been displaced from his home. I took the evidence to him. There was no show of concern on Mr Garrett's behalf, no request for this man to relay his story so that he could at least make his own assessment. Just an assistant next to Mr Garrett pointing out the necessary response in the response book: "there is no peer-reviewed scientific evidence to support the link".

We left Mr Garrett with some very fundamental and damning evidence which at the very least would be grounds to commence an initial assessment. He promised to respond personally. To this date (June 1) we have not received any correspondence, let alone a response to the information we provided. Unlike the pink-batts scandal, he can't say he wasn't warned of the consequences to people's health on the wind farm issue.

Given Mr Garrett's perception that health was a state government responsibility, on March 15 I attended a Victorian State Community Cabinet meeting in Geelong. With me I took a

number of other Waubra residents as well as residents from other wind-farm-approved locations who would soon be affected by turbine operation near their homes. We all wanted answers. The ones we got were quite unexpected.

First, the Premier, John Brumby, had no idea that his wind farm policy mandated use of a New Zealand noise standard. Mr Brumby and Mr Batchelor (Minister for Energy and Resources) equally had no idea that any national standards or guidelines, if and when they were released, would have no jurisdictional power in Victoria over their mandated New Zealand standard.

The most telling answer of all was Mr Batchelor's response to Waubra residents when they relayed to him what was happening in their own homes: it was up to them to prove there was an issue with scientific peer-reviewed evidence to back up their claims, because the wind companies had been granted development approval through the proper channels and it was hardly fair that they should have to change their practices just because someone complained. When he was told that it wasn't just one person complaining and an investigation should be the government's responsibility, Mr Batchelor used the same old excuse, "there is no peer-reviewed scientific evidence to support such a study".

How on earth can they make this determination when not one incumbent government minister or their representatives or agencies will even visit Waubra, let alone speak with the residents? After all this (and much more)—you have to ask yourself: Why?

There are only two possible answers to this question. Either it is true that there is no connection between health and wind turbines and the people I have personally surveyed in Waubra and the people making similar claims at other wind farms in Australia and throughout the world are imagining them, or ...

... the ramifications of undertaking such a study and finding a connection are too great from the perspective of either litigation (with the potential to destroy the wind industry in Australia and any chance of achieving the RET's 20 per cent renewable target by 2020) or planning scheme adjustments (which would recognise and prevent health issues and thus severely alter the locations at which wind turbines can be placed, again jeopardising the 20 per cent renewable target by 2020).

Either way, there is obviously a great deal at stake here, which the government and the wind industry are keen to keep a lid on. Ultimately a proper study which satisfies the current scientific peer-reviewed criteria is required to determine an outcome either way. The government has a duty of care and it should fulfil this obligation.

On May 20, we met with the state Liberal Opposition leader Ted Baillieu, who had the week before released a wind farm policy in the lead-up to the state election in November. Amongst other things, his policy mandates a two-kilometre setback of turbines from homes (currently there are no planning setback provisions, with homes unwillingly as close as 400 metres in some approved developments). We took this one step further with Mr Baillieu and sought his opinion on the necessity of an approved health study. His opinion was in the affirmative and he later confirmed this affirmation at the media conference on the steps of Parliament House in answer to a direct question on camera. A Ballan resident with turbines proposed within a kilometre of her home who was not part of the earlier meeting but was there to listen to Mr Baillieu speak, burst into tears on hearing this news. Such was her relief. Again I ask the question: "At what cost?" We have a right to know.

From the work I have undertaken on the health issue with experts to date I have a fair idea of what is contributing to the problem from a physical and planning perspective. I don't believe there is a single contributing factor or a single available solution. I do believe that what can't be acknowledged can't be changed. I do believe without a question of doubt that this is an avoidable problem. I do believe without a question of doubt that the same mistakes are being

made in current planning approvals via policy which will guarantee the displacement of hundreds more rural residents situated close to turbines through no fault of their own. I don't care if my hypotheses of contributing factors or suggested solutions are wrong, as long as someone determines what they should be and fixes the situation before more innocent rural families are subjected to the same form of torture as those currently suffering.

The moral high ground taken by those in government and those initially in favour of turbines is that they are doing their bit for the environment. People not wanting turbines in close proximity to their properties or homes are considered collateral damage by the very planning process established to protect them. Any risk or resulting damage is not costed in its assessment of "benefits to the greater community". And then these people discover that they are being sacrificed for no real gain—that their loss and harm will not contribute to saving the planet.

This is what the Renewable Energy Target is doing to real people in real terms, right now. Why is anyone of sound mind supporting this legislation?

*Kathy Russell, a Member of the Institute of Chartered Accountants in Australia, is Vice-President of Australian Landscape Guardians Inc, whose website www.landscapeguardians.org.au contains some of the data referred to in this article. She lives in rural Victoria.*


[1] Data available via the Australian Landscape Guardians website; www.landscapeguardians.org.au

[2] Green Energy Markets, www.greenmarkets.com.au

[3] Juan Carlos University, "Study of the effects on employment of public aid to renewable energy sources", March 2009

[4] Terry McCrann, "Your power bills will triple", Herald Sun, 15 April 2010

[5] DRIVING INVESTMENT IN RENEWABLE ENERGY IN VICTORIA - Options for a Victorian market-based measure, Submission by Origin Energy in response to the Issues Paper released by Department of Infrastructure and Department of Sustainability and Environment, February 2006, page 10

[6] "DRIVING INVESTMENT IN RENEWABLE ENERGY IN VICTORIA", by Origin Energy, February 2006, page 11

[7] Data available via the Australian Landscape Guardians website; www.landscapeguardians.org.au

[8] "DRIVING INVESTMENT IN RENEWABLE ENERGY IN VICTORIA", by Origin Energy, February 2006, page 13

[9] Miskelly A and Quirk T, "Wind Farming in South Eastern Australia", Energy and Environment, Volume 20 No.8 2009/Volume 21 No.1 2010, Multi Science Publishing Co. Ltd.

[10] Diesendorf M. The Base-Load Fallacy. http://www.sustainabilitycentre.com.au/BaseloadFallacy.pdf

[11] Anon. 2009 *State of the Energy Market 2009*. Australian Energy Regulator, page 72, available for download at http://www.accc.gov.au/content/index.phtml?itemId=904614

[12] Brett Thomas, Managing Director, ACCIONA, letters to the editor, Geelong Advertiser, 14 September 2009.

[13] Draft National Wind Farm Development Guidelines, http://www.ephc.gov.au/taxonomy/term/25, page 7.

## From Quadrant Online

# The looming energy disaster

by Tom Quirk

June 15, 2010

### Australia, where too much wind is still never enough

The Deakin Lectures for 2010, *Brave New World – The Climate Change Challenge,* were launched by Tim Flannery on June 6. The first detailed session, Future Energy Solutions followed on June 8 led by Grant King.

Grant King the CEO of Origin Energy is a believer in man-made climate change. A man who has invested some of his shareholders' funds in wind farms, geothermal prospecting and solar voltaics research deserved some respect. He should have been treated as a hero, or at least in the words of Sir Humphrey Appleby, seen as courageous but he had a bumpy reception at the Edge in Federation Square when he delivered his Keynote Address on *Future Energy Solutions: Powering a Sustainable Tomorrow.*

Australia is well endowed with energy resources. On present rates of consumption we have 100 years of identified black coal reserves, 500 years of brown coal reserves and very large reserves of natural gas and uranium. Our success as a country has been powered by these resources yet present policy is taking us elsewhere to renewable sources of energy. The table below is an example of present electricity energy demand and where it is sourced.

| Sources of Electricity | Energy Demand in 2008 | | Installed Power Supply Rating | | Capacity Use |
|---|---|---|---|---|---|
| | GWh | % of Total | MW | % of Total | Average % of installed power used |
| **Conventional** | | | | | |
| Thermal Coal and Gas | 175,490 | 76.3% | 31,000 | 67.2% | 65% |
| Gas Turbines | 33,650 | 14.6% | 5,750 | 12.5% | 67% |
| **Renewable** | | | | | |
| Hydro | 17,150 | 7.5% | 8,400 | 18.2% | 23% |
| Wind | 950 | 0.4% | 350 | 0.8% | 31% |
| Other | 2,760 | 1.2% | 600 | 1.3% | 53% |
| | | | | | |
| Total | 230,000 | 100.0% | 46,100 | 100.0% | 52% |

There are substantial economic costs associated with generation of electricity from renewable sources. Grant King was putting the best case forward but unfortunately he is a practical man who has to run a business that is profitable.

A summary of the state of play in the renewables tournament is that an energy demand target of 41,000 Giga-watt-hours (GWh) has been set for the year 2020. If you take out hydro-electricity generation then the target is 27,000 GWh. Divide this by the number of hours in the year and you need an apparent 3,100 Mega-watts (MW) of generator power. Not a lot you might

wind which comes and goes the present performance tells us that you need around 10,000 MW of installed wind turbines to get the required energy. Grant King stood on a very windy hill and declared that he only needed 7,000 to 9,000 MW to satisfy the demand (of the legislators not the customers). But it gets worse. The Australian Energy Management Operator (AEMO) does not consider wind farms very reliable and will only credit them with 10% of their installed capacity. The reason for this miserable credit is that the AEMO knows that customers get upset if they experience black-outs so when forecasting the need for more generators, most of the demand must come from reliable conventional plant. This was once a mixture of coal burning plant that satisfied the steady expansion of the base load and gas turbines or hydro for peak demand times. But with the uncertainty over an Emission Trading Scheme, it is unlikely that any coal burning plants will be built. This leaves gas turbines on the playing field with substantially higher operating costs compared to coal fired power stations. They may well interfere with a game in another stadium where gas producers and consumers try to balance their supply and demand. The link occurs on very cold winter days when gas turbine generators are meeting peak demand and need gas at exactly the time domestic heating is being turned up. The only forecast that can be made for this situation is trouble not only for the capacity of the transmission pipelines but also for the future supply and price of gas. This means more infrastructure and more costs.

The AEMO forecasts a need for 7,000 to 9,000 MW of new generators to satisfy the growing demand for electricity up to 2020. A rough estimate of the cost is $7 to $9 billion. But there is a saving of 1,000 MW from the wind farm contribution at a marginal cost of $14 to $20 billion!

**The cost of meeting the expanding demand for electricity and introducing a legislated renewable energy target is $21 to $29 billion. The contribution from wind energy in the supply planning could be met for just $1 billion with gas turbines rather than the $14 to $20 billion for wind farms.**

The transmission system will need significant expansion to cope with dispersed windfarms and their varying output incurring further billions of dollars in costs. Management of the system will become more difficult with the wind supply swings so more generator back-up will be needed and further costs added.

South East Australia is reckoned to have 15,000 MW of available wind resources but a single weather system can cover this region and then in a heatwave you may have no wind power.

There is another tournament like this in another place. It is called the National Broadband Network. What is distressing about the renewables approach is that the expansion of the scheme from a few percent of demand to near 20% occurred without serious consideration of the consequences and with bi-partisan support. Electricity generation is responsible for about 50% of our carbon dioxide emissions. The renewable scheme aims to reduce this by about 10%.

**The electricity sector is taking a double hit of 10% when the government target is a 5% reduction.**

The renewable energy scheme is chasing the reduction of carbon dioxide emissions. This is driven by the supposed linkage of increasing carbon dioxide to a dangerous rise in global temperatures. Yet the science is by no means certain while our governments assume certainty and make choices that may well damage the economy. The collateral risk is the uncertainty for the industry superannuation funds and other investors in wind farms and alternative energy technologies that depend on government policy and subsidy.

Grant King laid this out without necessarily connecting the dots for his audience. However it did not matter, for his audience had brought their own dots. They complained that he had given no credit to base load solar thermal generation, paid little attention to those that wanted solar panels on their houses and ignored the successes of Spain and Norway. Worst of all he was picking winners by going for the lowest cost solution. His co-conspirators in the panel discussion that followed his address did not help: either talking on an evangelical level or promoting technology that is just on the horizon for deployment.

It is worth rereading the chapter in *Gulliver's Travels* where Gulliver visits the island of Laputa to get a sense of what might happen if we were all unlucky enough to see this scheme brought to fruition.

# RRY McCRANN

A 90 per cent Henry tax would turn mini investments into riskless and rewardless

LIA'S LEADING BUSINESS COMMENTATOR

# nry lets the of the bag

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Even were the model pure, you still have the problem of integrating old and established ventures.

What I'm saying is: OK, let's assume the tax 'works' with prospective investment decisions. But with *existing* ventures, it's like the government just taking 40 per cent of the equity.

Unless as adjunct professor George Fane of the ANU pointed out in a punishing critique in *The Australian* yesterday, the government refunded 40¢ in the dollar (plus interest) lost on all the failed projects going back to 1901.

Obviously it can't and won't. So there is no perfect symmetry on existing mines. And that means there is no perfect symmetry between the prospective aspect of the tax and its

**HENRY: ... an RSPT at the rate of 50% would have no different economic impact from an RSPT at the rate of 40%. It should not have an impact on the level of mining sector investment.**

**JOYCE: If we took the rate to 70% or 80% would that make a difference?**

**In concept it should not make a difference.**

**Even if it went to 70% or 80%**

**That is correct.**

**What if it went to 100%?**

**At 100% we might find that the government had to finance all of the investment itself. I do not want to make too much of this, but other countries -- take Norway, for example – have managed to attract very substantial amounts of private capital investment while taking 95% of the profits.**

Barnaby Joyce

nry's tax is a nonsense. A
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forfeiting some — all? — of
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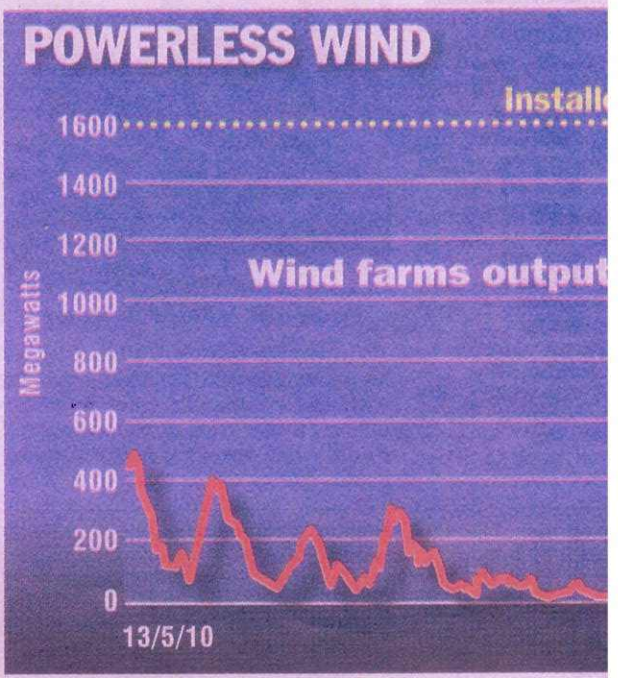
partial expropriation of existing projects.

Now put all this together. Henry says there's no difference between a 40 per cent tax and a 60 per cent tax.

Oh yeah. If you lifted the tax to 60 per cent you would expropriate another 20 per cent of existing ventures. That's the government just taking that share of the mine.

And there's no sovereign risk issue from the unveiling of this tax? Oh




# When there's no there won't be p

IN THE immortal words of John McEnroe: you have got to be kidding.

If we weren't wasting billions of dollars in an utterly fruitless pursuit of 'renewable energy', it really would be a laughing matter.

A very sick joke true, and one that almost every disgraceful politician in the country — with very few exceptions — should be the butt of.

Take a look at the chart. Could any rational person — indeed, even gutless half-rational politician — build our energy supply on the total unreliability of so-called wind power.

This is what our total wind 'power' industry across southeastern Australia — NSW, Victoria and South Australia — delivered in one week in May. To all intents and effective purposes: ZERO power.

The chart comes to me from pesky iconoclastic independent thinker and bull---t debunker Tom Quirk, by aggregating data from NEM — the National Electricity Market, which is the wholesale

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blow at the same
southeastern Aus

In the process u
the 'geographic di
argument of the ir
chancers, rent-see
rip-off merchants.

That even if ain'
it will be in South
as the chart show

Further wind ca
high power delive
little in very short

So you don't onl
back-up power al
to the wind indust
slack when it com
to *keep it running*
utterly pointless h
power anyway.

Despite all the s
empty-headed ga
of the sun, wind is
'practical' alterna
energy 'source' an

Almost all our p