

**Submission to:
Australian Senate Select Committee on Wind Turbines**

From:
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TRI-LEA-EM RR 5

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Dear Senators and Committee Members:

The Australian Government website notes that you will accept submissions regarding the application of regulatory governance and economic impact of wind turbines until 27 February 2015. Please accept this submission for consideration by your Committee. This submission is from a Canadian, but I have reviewed many aspects of the Australian situation, including the Executive Summary of your Renewable Energy Target Review Report, the ACIL Allen Consulting RET Review Modeling Report, and the information posted by your National Health and Medical Research Council. While not all of the details of Canadian experience may be directly applicable to you, I have selected relevant portions to include in this submission, which I believe may assist you.

By way of introduction, I am a Canadian Professional Engineer. As such I am obliged "to report a situation that the practitioner believes may endanger the safety or the welfare of the public," which is why my submission is sent to you. This submission is based on over 30 years experience in the electrical utility field, which dealt largely with the area of public safety and performance assurance, followed by over 10 years specific interest in the application of wind turbines in Ontario, Canada. I submitted to a previous Australian Senate Inquiry on the Social & Economic Impact of Rural Wind Turbines. Also, I have made submissions to the Australian National Health and Medical Research Council (NHMRC) review on Wind Farms and Human Health, and to the Australian Charities and Not-for-profits Commission (ACNC) regarding the charitable status of Waubra Foundation. I have provided information to Canadian legislators and senators, and have presented papers to my peers at International Wind Turbine Noise conferences, to the Acoustical Society of America, the Canadian Acoustical Society, and the Canadian Climate Change Technology Conference, as well as being qualified as an expert witness before commissions and tribunals in Ontario and the state of Ohio in the USA.

The principal reason for my submission is that as I reviewed the criteria for your Committee, I recognized an omission, which drives most of my discretionary time to this subject. Your references lead off on economics, as

did the Renewable Energy Target Review Report, and go as far as the effect of wind turbines on fauna, but missing from the list, other than via the closing consideration for “any related matter,” is the personal impact on humans. Over the years, I have met face to face with many citizens significantly adversely impacted by wind turbines. These impacted people are dismayed that no one seems to respect their situation, and instead they are the subject of derision or scoffed. It was because of these people that this submission is filed. Please consider them in your deliberations, as they will be trusting in your full review of the situation.

Advance Considerations for Giving Evidence:

While this submission is written at a fairly high level, the Committee may well want additional details. Recognizing the requirement of making a submission, that the Committee may choose to ask me to give evidence at a public hearing, I would request in advance that should the Committee find it advantageous for me to give evidence, please consider permitting sworn evidence to be given by teleconference or video conference (Skype). While my wife and I have had the opportunity to enjoy visits to parts of Australia, including the hills around Ballarat in Victoria, to Tasmania and around Sydney in New South Wales, we could not justify two 18 hour flights for 30 to 60 minutes of testimony. Hopefully this request for remote testimony could be favourably considered. My testimony represents my personal professional opinion, and is not subject to approval by any other individual or organization. I do not request any portion of my evidence to be considered as confidential, and it may be entered into the public record.

The Issue of Economics, Including the Effect on Household Power Prices:

Economics does matter, and the full cost of each energy option should be rationally addressed, but on a level playing field, and not on an ideologically sloped, emotionally charged, greased surface, which seems to be the current position in many nations. It certainly is in parts of Canada. To give a quick explanation, in 2009, just 6 years ago, the Minister of Energy in the Province of Ontario predicted that the Ontario “Green Energy and Economy Act” which would encourage the development of renewable energy options for the Ontario electrical supply system (an electrical system with a provincial annual consumption in 2009 of about 140 TWh – about 60% of that of Australia in 2009 with a national annual consumption of about 240 TWh) would increase the price of electricity by 1% a year. That did not sound too bad. Now, 6 years later in 2015, the price of electricity in Ontario has increased not 6%, as might have been expected by the Energy Minister’s statement, but about 80%. Basic “off peak” power (the lowest cost option, that consumers are encouraged to shift their consumption to) has increased by 59%, distribution costs have increased due to the construction of new transmission lines to enable connecting renewables to the grid, and taxes on the entire electricity supply have increased 8% on the total, for an aggregate consumer price increase of nearly 80%. The impact on Ontario consumers, commerce, and industry has been predictable. As Ontario progressed from one of the least expensive electricity rates in North America to the highest rate in North

America, industries are routinely moving out of Ontario to where rates are less, and stories of job losses and hardship of consumers unable to pay their utility bills abound.

How has electricity supply become ideologically driven, instead of based on rules of economics? Shortly after passing the Green Energy and Economy Act, Ontario progressed to change the rate structure to ensure that renewables (wind, solar, and biofuel supplied) have a guaranteed feed in tariff (at well over the normal system rates), with guaranteed first access to the grid. When the amount of available generation exceeded system base load needs, other suppliers were required to derate (to reduce output) in output to guarantee grid access to the wind generators. In some cases, this required paying the private nuclear operator to derate, keeping reactors at full power, but dumping steam to the condensers instead of generating, so they could stay available to return to service in the morning when the wind supply typically falls, as if they shut down, they cannot restart for about 40 hours.¹ While that specific need to derate nuclear units would not apply in Australia, it is included to give an idea of the impact of a poorly thought out addition of renewables when they are guaranteed grid access at premium rates, even when they cannot be depended on to supply when needed. No matter the generation source, if a supplying plant is required to reduce output, it increases the cost per unit of the generated energy, and thus increasing the overall cost, as fixed costs such as the number of staff are not reduced, and the maneuvering of generators can actually increase their maintenance costs due to increased wear and tear from maneuvering. Then regulations were changed again to allow the renewable generators to be paid to shut down, if the surplus exceeded the reduction capable by derating the nuclear generators. Further still, in the North American integrated electrical grid, oversupply in the Ontario grid at night often results in Ontario selling excess generated electricity to neighbours at the limit of the interconnection ties at low or even negative rates to be able to dump excess generation to maintain the system stability. To say that the electrical system in Ontario has become a mess is an understatement. Meanwhile the consumers pay and pay and pay again – pay the wind generators to produce unnecessary electricity (or for their capability even if not needed), pay the private generators to derate at night and dump steam instead of generating so they will be available to return to service in the morning, and then pay to export surplus electricity thereby subsidizing the electricity rates in neighbouring states or provinces, while at a cost to Ontario consumers. The reasons for an 80% increase in the Ontario electricity rates are coming into focus.

Other economic factors also need to be factored in when wind or solar are significant contributors to the grid. Since wind or solar generators typically supply on an annual basis only about 22 to 30% of their rated capability but sometimes produce full power, it is necessary to overbuild the transmission systems to handle to maximum supply, even while the transmission lines will remain only lightly loaded the majority of the time. Transmission line building

¹ A more detailed example of actual Ontario data identifying the impact of derating of Bruce Power nuclear units for a recent 6-month period is attached.

is by itself an expensive factor, in particular since even though regulations (as in Ontario) may permit easy siting of wind generators, building transmission lines with roughly four times the capacity of a normal generator, requires expropriation of property, at market values.

The economic factor not yet mentioned, arises from the common statement found in many write-ups that intermittency problems with renewables of wind and solar will be solved by storage. The best words to summarize this issue came a few years back from Jan Carr PhD, P. Eng., former Chair of the Ontario Power Authority in an interview, “... *when you need electricity the wind’s not necessarily blowing and so on. So there’s two issues here. There’s the fact that it’s not continuous and the fact it’s not available on command. ... And it is a product, which is very, very expensive to store. Virtually impossible to store. In large quantities – very expensive to store.*” Yes, storage is possible, but are those speaking so glowingly about storage the ones who are going to profit gloriously? If electricity is expensive now, with storage the cost will be incredible. A more detailed comment on addition of storage capability is also included in the attachment.² When even prestigious journals such as *The Economist* give examples of storage solving the problem renewables pose to an electrical operator, but describe storage capabilities that are incredibly tiny in comparison to the need, the problem becomes clearer.

A number of storage options are under consideration, including:

- hydrogen production from the excess electrical generation for later reconversion to electricity by fuel cells, or gas turbines, or
- compressing and storing compressed air, for later decompression to power a turbine, or
- flow batteries, such as vanadium redox cells, or
- industrial scale flywheels, or
- thermal storage (heating bricks for building heating, or making ice for storage for building cooling)

The fact is however that even large investment in infrastructure for any of these options can store only small amounts of energy relative to the Australian (or Ontario) electrical grid demand. Not only would the capital cost to create a viable storage system to fully accommodate renewables of wind and solar be very, very expensive, the losses in efficiency in conversion of the energy’s state to a storable medium makes any one of them very inefficient, adding to the overall system electrical cost. Simply put, storage options that require significant over-generation so as to be able to accommodate large amounts of energy waste in the conversion and reconversion process are hard to justify on any environmental basis, as surely the first goal is to reduce waste.

As your Committee members are well aware, Australia is no longer isolated in the world. Australia is a part of a global economy that communicates across national and oceanic boundaries at the speed of light. If the price of energy

² The issue of storage of electrical energy including a letter to “*The Economist*” is included in this attachment.

becomes higher in Australia than elsewhere, then industry, and the jobs industry generates will move to where prices are lower, just as surely as it will if labour rates become non-competitive, or if the price of capital changes. A global economy requires thinking globally, even when the actions will be taken locally. This fact is becoming painfully obvious in Ontario. Clearly, while global shifts in employment are the result of many factors, including value of the national currency, availability of appropriate labour forces, labour/management relationships, and propensity of governments to invest in job creation or saving commitments, it is clear that the factor having the largest relative change in Ontario is the price of electricity.

As electricity prices increased in Ontario compared to our neighbours in North America, jobs moved. Xstrata (now Glencore Xstrata, a company with strong Australian links) shut down a newer copper smelter (an industry with high energy demands) in Ontario to move production to an older smelter in Quebec where energy costs were lower. Some 1162 direct jobs of the largest employer in Northern Ontario (and more indirect jobs) went with the move. Australia had similar parallels with the Xstrata refinery in Townsville, Queensland. Ice cream producers, an industry with relatively high-energy demands for cooling, having decades of experience producing in Ontario, and employing people in Ontario, moved production and the jobs from Ontario to Quebec or to the United States. When Honda Motors agreed to invest to rebuild an assembly plant in Ontario, rising electricity price was a key subject for discussion, and the decision to invest to retain 4,000 jobs in Ontario was only made after the Province of Ontario agreed to pump 10% of the money into the investment. There is a real risk to provincial or national economies when electricity prices become higher than in neighbouring areas.

It was not a coincidence that the same day on Jan. 30, 2015, our local daily newspaper, the Owen Sound Sun Times ran two parallel front-page stories.³ The first story headlined that the “Wind Turbine Working Group Opposes Plan for More Wind Power Proposals” noting that a Multi Municipal Group representing 12 municipalities where over 30% of Ontario’s wind turbines have been erected, had written to the Ontario Minister of Energy asking why the province wants to add even more wind power. “The financial ramifications of what the green energy act has done to the cost of electricity is decimating this province,” the working group Chair noted. Beside this article, a completely independent story was titled, “Bruce Grey United Way Seeing High Demand for Utility Bill Assistance.” The director of the local United Way noted that in the first three weeks of the year 165 families had sought assistance with utility bills, a third of all the people who needed the program in the entire last year, with 51 applicants asking for \$21,000 in help with electrical utility bills from Hydro One or Westario, two independent electricity distributors. While these figures may seem small on an overall basis, they are notable since the entire population of Bruce and Grey Counties is less than 160,000, so this growing number of families needing assistance to pay electricity bills is indeed a concern. Rising electricity prices do influence families, forced to choose between buying groceries or paying the utility bill. Becoming unemployed, as

³ Copy of articles from Owen Sound Sun Times dated January 30, 2015 attached.

your job shifts out of the province also has a huge impact. Rarely do studies consider these economic challenges to be stressors that impact public health, but surely they do, as well as they impact community health as well as personal health.

The Issue of Public Health, Including the role of the Australian NHMRC:

As this submission was under preparation, the statement of the Australian Government National Health and Medical Research Council (NHMRC) was issued. Their summary statement, "Evidence on Wind Farms and Human Health" closely paralleled a similar summary statement issued recently by the Health Canada summary of key findings of their, "Wind Turbine Noise and Health Study." Both studies found no link between wind turbine noise and illness or adverse health. So why do I continue to feel uncomfortable? It must have something to do with the fact that I have listened, face-to-face, with what is now approaching 90 people who have said in one way or another, "You know Bill, I just cannot stand to live in my home since the wind turbines started up. When I go away I get better, but when I come back home, the sensation comes back." Does the fact that no link between wind turbines and what those people tell me about how they feel, mean that no link exists? Does not finding a link mean that no link exists, or just that we have not looked in the right places? Maybe each of those people is just lying, or deluded about how they feel? I can only say, that to me, that just does not seem right. Do I have marvelous skills, to get inside their heads? No, I can only listen. But, I have no reason to believe that they do not know how they feel. A person may not know why they feel the way they do, but surely they have to be the best judge to say if they do feel impacted.

Then I listen to another voice, one that told in Luke 10, the story of a man who was hurt while on his daily walk by the actions of others. At first nobody would stop to help him. It was easy to pass by and seem to not notice the hurting person, as those passing by had their own priorities. Then a stranger stopped, listened to the man, took pity, and helped him. The story ends describing the one who helped as a "good neighbour" and we are told to go and do likewise. Yes, it is easier to walk by "on the other side" and not offer to help. It's like not finding a link to what a person claims is bothering them. Unless we stop, listen, and try to help, we may never find the link. But not finding the link does not mean it does not exist.

No. I am not a medical person, so I'm not qualified to examine the person to see what is wrong with them. But, as a human being, I can start by listening to the person, and then as an engineer, I can try to study the situation to see if anything has changed. When something that used to work has a problem, it usually means that something has changed. Others too are looking for the change, and evidence of a change in the environment has been proven to exist.

At the wind turbine noise conference to be held in Glasgow in April, a paper submitted titled, "Wind turbines – a changed environment" has been approved

for presentation. A pre-presentation copy of that paper is attached for the information of your committee.⁴ The paper shows that the sound from wind turbines is rich in low frequency, exceeding the low frequency contribution received from the wind in the environment, of a helicopter flying directly overhead, of refrigerators, or libraries, or most highway traffic. The paper shows that the sound from wind turbines shows tonal characteristics, and that inside homes, room conditions cause a greater variation across a room than in the outdoor environment, resulting in intensity increases at room mode frequencies. As the document goes on, it shows that there are reasons of changed conditions brought about by wind turbines that are not addressed by current regulations, which call for their review.

Work by others such as the recent issuance by Steven Cooper of The Acoustic Group of Lilyfield, NSW, Australia, of “The Results of an Acoustic Testing Program – Cape Bridgewater Wind Farm”⁵ followed a similar pattern, listening first to the complaints of persons concerning the subject wind farm to investigate a possible relationship to the observations. The Executive Summary of the report states that, “The study found that the diarized resident’s observations identified “sensation” as the major for of disturbance from the wind farm.” It is important to note that the Press Release of Pacific Hydro in releasing the report acknowledges the preliminary findings of the report, but notes “the results do not demonstrate correlation that leads to a conclusion that there is a causal link between the existence of infrasound frequencies and he sensations experienced by the residents.” However, the press release also notes that further study is required. It is hoped this might be conducted as part of the targeted call for research that the NHMRC considers is warranted. Clues such as these do suggest there is a link between wind turbines and adverse health impact.

On a similar basis, from listening to the concerns expressed by others, an earlier paper presented to the International Congress on Acoustics, held in Montreal, 2013 explored, “Wind Turbine Sound Prediction – the consequence of getting it wrong.”⁶ That paper included a depersonalized summary of harm reported by individuals as recorded professionally by a qualified individual. That summary will be of interest to the committee as they consider the findings of both the Australian NHMRC and Health Canada that found they could make no conclusion about adverse health. The people documented on the list in the attachment are indeed real people, and something is impacting them. Is it right to dismiss their pain by a simple statement in the NHMC or Health Canada summaries that no link to adverse health can be found?

⁴ The attached copy of the paper “Wind Turbines – A Changed Environment” will be presented at the 6th International Meeting on Wind Turbine Noise, Glasgow, Scotland, April 2015. Conference conditions require this paper to be not circulated until the conference, but this advance copy is presented to the Senate Committee as relevant to your deliberations.

⁵ The report by Steven Cooper, “The Results of an Acoustic Testing Program – Cape Bridgewater Wind Farm – Energy Pacific (Vic) Pty Ltd” is available from <http://www.pacifichydro.com.au/english/our-communities/communities/cape-bridgewater-acoustic-study-report/?language=en>

⁶ The paper by Palmer, “Wind Turbine Sound Prediction – the consequence of getting it wrong” is available from the Proceedings of Meetings on Acoustics of the Acoustical Society of America, and is attached.

On a similar basis, recently the Australian Charities and Not-for-profits Commission (ACNC) ruled that the Waubra Foundation is not a Health Promotion Charity, on the basis that the ACNC Assistant Commissioner found that "to date there has been no rigorous independent scientific evidence that finds that the ill health complained of is caused by the physiological effects from wind turbines nor that there are human diseases called "wind turbine syndrome" or "vibroacoustic disease". It is indeed curious when a group that is trying to help citizens of Australia who identify suffering, is told that looking for the cause is not permitted, thus dismissing the claimants without apparently considering their situation.⁷

Summary:

This submission to the Australian Senate Select Committee on Wind Turbines is made with the earnest hope that it may provide insights that are applicable to the Committee's deliberations on the application of regulatory governance and economic impact of wind turbines in Australia. Out of necessity, only a few examples can be provided in this submission, but if the Committee desires further detail an offer to provide additional information at a public hearing is extended.

The work your Committee has undertaken is indeed important to Australia. This submission has tried to identify some highlights of the economic impacts that installation of wind turbines has caused in a related cultural environment, and has tried to identify that regulatory governance does not currently seem to be serving all citizens, particularly those who have already, and may in the future suffer adverse consequences from wind turbine installations.

Please, consider those who are hurting, and after listening, help them.

Submitted with respect,

William K.G. Palmer P. Eng.

⁷ A copy of a letter "Feedback to ACNC Regarding Charitable Status of Waubra Foundation" on Feb. 8, 2015 is attached, along with the one additional attachment #7b it included that is not already included in this submission. (Attachment A is #6 and Attachment C is #4 previously in this submission)