

# Submission to the Senate Inquiry into the Social and Economic Impact of Rural Wind Farms

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(...)

## ABSTRACT

The Submission addresses all the specific focus areas of the Inquiry. In respect of *“adverse health effects for people living in close proximity to wind farms”*; findings from a number of credible independent and commissioned Australian and international studies are presented showing no published scientific evidence credibly linking wind turbines with adverse health effects. In respect of *“the excessive noise and vibrations emitted by wind farms, which are in close proximity to people’s homes;”* findings of credible studies are presented showing that the levels of infrasonic noise and vibration radiated from modern wind turbines are so low that they lie below the threshold of perception, even for those people who are particularly sensitive to such noise, and even when very near to turbines. In respect of *the impact of rural wind farms on property values, employment opportunities and farm income*; findings of credible independent and commissioned studies are presented showing no depreciation of property values, and/or reduction of either employment opportunities or farm income due to the proximity of wind farms. In respect of *the interface between Commonwealth, State and local planning laws as they pertain to wind farms* it is argued that while greater harmonization between the various layers of planning controls would be advantageous, current siting controls are adequate. In respect of *“any other matters”* the high levels of community acceptance of wind power and wind farms is briefly discussed, the advantages of wind power in terms of green house gas abatement are noted and the low levels of water consumption especially compared to coal fired power generation are noted.

## *General*

I have long been active in community issues particularly those with an environmental connection. I have longstanding family connections to Denmark, perhaps the nation that has most wholeheartedly adopted wind power as a clean energy alternative to current destructive fossil-fuel based methods of energy generation. I am aware that although the issues to be examined by this inquiry are known in Denmark, the objections to wind power they raise are almost universally dismissed. Over the years I have had from time to time first hand experience of wind turbines at different scales. My personal experience (which does not form part of this submission) is in accord with the scientific studies that do.

Climate science has alerted us to the role of greenhouse gases produced from the combustion of fossil fuel as a driver of global warming. It has alerted us to the dire consequences of failing to halt global warming by restricting the generation of excess greenhouse gases. This highlights the need to shift the basis of the global economy away from a dependence on fossil fuel to a 'carbon constrained future. There is no credible doubt about any of the above despite the best efforts of a horde of climate change deniers.

We already have the technology to make this shift. We have denied ourselves the economic benefits of an early commitment to this inevitable change but further delays will mean further expense when we inevitably commit to the transformation. We must act now. A massive roll-out of renewable energy across Australia is essential if we are to have any chance of reducing our emissions sufficiently to avoid dangerous climate change.

Wind is currently the most advanced and cheapest option for us to begin the transition away from coal. Well-planned wind energy projects must be central to a carbon constrained future economic base. Wind energy is already producing direct financial support for many farmers and other landowners. In 2009-10 alone, wind energy in Australia generated almost \$1.6 billion in investment (Bloomberg, New Energy Finance, 2010). The wind industry is potentially economically important to the nation, through job creation during the development, construction and ongoing operation of the wind farm. Also increased employment and production would be created throughout the supply chain of manufacturers and suppliers of products and services to the industry. The supply of steel for wind turbine towers is just one example of the importance of the wind industry to Australian manufactures and suppliers.

The wind energy industry has the potential to create considerable 'down stream' employment opportunities, and help to diversify and strengthen employment and the local economies of these communities. This reduces the need for individuals to leave these areas to seek employment. A key advantage of wind farm development is that the jobs created by are spread over several regions, not concentrated in a few areas, as tends to occur with larger scale fossil fuel plants such as coal.

I would like to respond to the specific areas of interest outlined in the scope of the inquiry.

*(a) Any adverse health effects for people living in close proximity to wind farms”;*

Current research and scientific investigations have found no adverse health effects for people living in close proximity to wind farms.

The following is a summary of some key research into the health effects of wind-turbines.

- The National Health and Medical Research Council (NHMRC) recently found that *“... there is currently no published scientific evidence to positively link wind turbines with adverse health effects”*.<sup>i</sup>
- In addition, the World Health Organisation states that *“... There is no reliable evidence that sounds below the hearing threshold produce physiological or psychological effect”*.<sup>ii</sup>
- The Victorian Department of Health after examining both peer reviewed and validated scientific research also concluded that, *“... the weight of evidence indicated that there are no direct health effects from noise (audible or inaudible) at the levels generated by modern wind turbines.”*<sup>iii</sup>

Studies in North America and the United Kingdom also support this finding. The American and Canadian Wind Energy Associations established a scientific advisory panel comprising medical doctors, audiologists and acoustic professionals from the US, Canada, Denmark and the UK. This panel concluded that labels such as “wind turbine syndrome” are not a recognised medical diagnosis but rather reflective of symptoms associated with annoyance. Factors culminating in annoyance include the nocebo effect defined as *“... an adverse outcome, or worsening of mental or physical health based on fear or belief in adverse affects”*. In other words a pre-determined belief-in or expectation-of adverse symptoms ensures their appearance.<sup>iv</sup>

The likelihood of such outcomes is increased by the increasing volumes of negative media coverage of the health implications of wind turbines that Australians are currently subject to. Often once the farms are actually operating, the resulting intrusion is far less than had been anticipated by people living around the developments.

Research produced by acoustic specialists Sonus for the Clean Energy Council found that once wind farms are built, the rates of complaints are very low in Australia and New Zealand. It also found that if a noise can be heard, then annoyance can result for some people, regardless of the noise level experienced.<sup>v</sup>

This effect is backed up by the NHMRC review that concludes: *“... It has been suggested that if people are worried about their health they may become anxious, causing stress related illnesses. These are genuine health effects arising from their worry, which arises from the wind turbine, even though the turbine may not objectively be a risk to health”* (NHMRC, 2010).

*(b) Concerns over the excessive noise and vibrations emitted by wind farms, which are in close proximity to people's homes;*

Research conducted on modern wind turbines has shown that the levels of low frequency noise and infrasound are within accepted thresholds.

Modern wind turbines can generate noise across the frequency range of human hearing. As with most sounds, some of this energy occurs below the level of human hearing. Human hearing ability ranges from 20Hz to 20,000Hz, with 1dB being the smallest change in noise that humans can detect. Low frequency noise refers to noise in the range of 10 to 200 Hertz (Hz) and infrasound occurs in the range of 20 Hz down to 0.001 Hz – below what the human ear can pick up.

Low frequency noise and infrasound is emitted by many other natural sources, for instance wind passing through trees or waves at a beach or human-made sources such as industrial processes, air-conditioning and vehicles. There is currently no peer reviewed scientific data to suggest that the levels of low frequency noise or infrasound emitted by wind turbines make humans sick. Research to date has not shown any negative health effects at the sound levels produced by operational wind turbines.

Advances in technology mean that noise from wind turbines is minimal. Research conducted on modern wind turbines has shown that the levels of infrasonic noise and vibration radiated from modern wind turbines are at a very low level; so low that they lie below the threshold of perception, even for those people who are particularly sensitive to such noise and even when very near to turbines (British Wind Energy Association, 2005).

Large-scale generation of electricity first appeared over 100 years ago. There are now more than 150,000 turbines installed globally, and some of these have been in place for more than 20 years. After decades of successful wind turbine operation no credible scientific research has identified any negative effects supports the prevailing view that wind power is one of the safest ways of generating electricity.

In contrast, coal-based energy production, which is a major contributor to our current greenhouse gas emissions, is literally fuelling climate change and hence impacting directly on human health. The United Nations Intergovernmental Panel on Climate Change (IPCC) suggests that 150,000 people around the world actually die as a result of climate change every year ([World Health Organisation](#)).

The recent massive flooding in many parts of Australia and the subsequent cyclones in Queensland graphically illustrate the type and increasing severity of extreme weather events which will occur in coming decades unless we take substantial action at a global scale to reduce emissions to a safe level. It is easy to see the massive human suffering that has come with these floods, and imagine what could happen to many individuals, families and communities in coming decades should we decide to take insufficient action on climate change as we experience ever more natural disasters.

There has been local research into the possible impacts of infrasound associated with wind turbines. Wind operator Pacific Hydro commissioned Sonus to measure and compare infrasound levels from wind farms and some common environment infrasound sources, both natural and human-made. This research showed that the levels of infrasound produced by wind turbines are well below established perception thresholds and, importantly, is also below levels produced by other natural and man-made sources.<sup>vi</sup>

Infrasound was measured at two wind farms – Clements Gap in South Australia and Cape Bridgewater in Victoria. These measurements were compared to measurements taken in the Adelaide CBD and suburbs, at the beach, on a coastal cliff, inland from the coast and at a gas-fired power station. At all these locations infrasound was inaudible to the human ear and the infrasound levels were higher on the beach and in the Adelaide CBD than near a wind turbine. The report shows that infrasound is not unique to wind farms and exists at higher levels in other settings not the subject of claims of negative health effects from the ambient infrasound levels.

*(c) The impact of rural wind farms on property values, employment opportunities and farm income;*

Studies have found no statistical evidence that wind farms reduce property values. An assessment of 45 property sales located within a 10 kilometre radius of 8 wind farms sites was made by the NSW Valuer General.<sup>vii</sup> It considered the impact of wind farms on surrounding land values and found that wind farms do not appear to have negatively affected property values. No reductions in sale price were evident for rural properties located in nearby townships with views of the wind farm.

The findings of the NSW Valuer General are consistent with studies in the United States and United Kingdom which also found no statistical evidence of reduction in property values associated with the development of wind farms.

An extensive and rigorous assessment of the relationship between wind farms and property values was completed in December 2009 by U.S. Department of Energy's (DOE) Lawrence Berkeley National Laboratory (LBNL).<sup>viii</sup> The report was based on site visits, data collection and analysis of almost 7,500 single-family home sales in areas where wind farms have been developed. The data was collected on homes situated within 10 miles of 24 existing wind facilities in nine different U.S. states.

Each home in the sample was visited to collect important on-site information such as whether wind turbines were visible from the home. The home sales used in the study occurred between 1996 and 2007, spanning the period prior to the announcement of each wind energy facility to well after its construction and full-scale operation. The analysis revealed that home sales prices are very sensitive to the overall quality of the scenic vista from a property, but that a view of a wind farm did not demonstrably impact sales prices. Neither the view of wind farm nor the

distance of the home to wind farm was found to have any consistent, measurable, and significant effect on the selling prices of nearby homes.

The Berkeley Lab researchers also did not find statistically observable differences in prices for homes located closer to wind facilities than those located further away, or for homes that sold after the announcement or construction of a wind energy facility when compared to those selling prior to announcement. Even for those homes located within a one-mile distance of a wind project, the researchers found no persuasive evidence of a property value impact.

Another Canadian study by consultants Canning & Simmons, 2010<sup>ix</sup> demonstrated “... where wind farms are clearly visible, there was no empirical evidence to indicate that rural residential properties released lower sale prices than similar residential properties within the same area that were outside of the viewshed (sic) of a wind turbine”

The employment and economic benefits of wind farms are substantial. These are not confined to the initial investment in the project. Wind-farms also provide a reliable and on-going income for landowners, direct employment opportunities for locals, and flow-on employment for local businesses through provision of products and services to the project and its employees.

This is demonstrated in a study prepared by SKM<sup>x</sup> which investigated the economic impacts that AGL’s Hallett wind farm project had on the mid-north region of South Australia. The report found that \$800 million had been spent on the projects, including \$88 million spent directly in the region, and the creation of 98 construction jobs and 15 ongoing jobs directly created by the wind farm, which will increase to 42 upon completion. The study also found that for every job created directly by the wind farms, at least three further jobs are created indirectly.

Unlike coal and coal seam gas (CSG) production – which are significant and growing threats to agricultural communities in a number of parts of the country – wind energy is compatible with grazing and crops. It occupies less land area per kilowatt-hour (kWh) of electricity generated than any other energy conversion system, apart from rooftop solar energy.

*(d) The interface between Commonwealth, state and local planning laws as they pertain to wind farms;*

There is a need for robust planning processes ensuring that wind farms are appropriately sited. However to make substantial changes to existing guidelines simply to appease the vocal minority of opponents to wind energy whose objections are (as already indicated) would be to do a grave disservice to the people of Australia. That the current Victorian State government appears to be about to introduce a very restrictive wind energy policy for no better reason than to appease a self interested minority is a disgrace.

Planning policies in this as in all other areas must balance the rights of the individual against the need for outcomes in the greater public good. Planning policies should not subvert the public good to the self-interested desires of individuals. Although wind farms (as with all other infrastructure projects) will have special characteristics that should be reflected in the planning processes that apply to them in general they should not be subject to greater restriction than any other infrastructure developments eg. coal mines, conventional power stations.

The existing planning controls applicable to wind-farm developments adequately balance the benefits of wind farm development with any impacts that may arise. Further, many jurisdictions have already introduced some form of planning provisions to cater for any unique characteristics of wind farms. Unnecessary burdens on clean energy development are contrary to the government's 20 per cent renewable energy target and are detrimental to the attraction of clean energy investment and the creation of clean energy jobs in Australia.

Wind energy proponents already apply rigorous processes to their developments to ensure they are appropriately managed and mitigate potential impacts on the environment or the amenity of local communities. Extensive and exhaustive assessments are undertaken by proponents prior to submitting a development application to determine whether a wind farm is feasible on a specific site and as to whether there are any potential environmental or social issues that will impact upon the viability of a proposal.

In addition to this, proponents engage with a range of stakeholders at early stages of feasibility assessment to determine whether there are any further environmental, cultural or amenity impacts that need to be understood and responded to as part of the development. Stakeholders that are consulted include not only the local community, the landowners, local council, but also the State and Federal Governments, government agencies such as CASA, Network Service Providers, electricity retailers, indigenous groups and other specific interest groups including groups advocating in relation to local fauna or flora.

The final form of the proposed development is often substantially different from the original plan, because of issues that have arisen during the planning and approvals phase. I would argue that this shows that existing systems are working effectively to find the balance between what a developer wants and what the community will support.

The interplay of already existing Federal, State and local government laws and regulations already create an unnecessarily complex, sometimes-ineffective regulatory environment in respect of wind-farm projects. Differing regulatory controls in different jurisdictions make it more cumbersome for developers working across jurisdictions. Harmonizing the different layers of the regulatory environment applying to wind-farm projects is in the national interest. The introduction of further restrictions on the industry along the lines of the Victorian State government's proposed new laws is not. These will only make wind energy more expensive and

less competitive. This is in direct opposition to the Federal government's goal of achieving 20% of electricity generation from renewable sources by 2020.

The industry group for the sector, the CEC, has previously highlighted concerns with the Draft National Wind Farm Development Guidelines. In 2008, a report was developed for the Environment Protection and Heritage Council (EPHC) Report on Impediments to Environmentally and Socially Responsible Wind Farm Development. This report identified that the existing approval systems in the jurisdictions are generally robust and that many of the issues that have been identified are adequately dealt with through the existing procedures.

National guidelines do have the potential to encourage greater consistency between State planning regimes and remove impediments to further development. However the Draft National Wind Farm Development Guidelines as currently proposed only add substantial impediments to wind farm development beyond those imposed on other infrastructure investments, reducing certainty for the planning assessment process by introducing additional, and often conflicting guidelines. This would add additional costs and delays to wind farm developers without delivering improved outcomes.

*(e) Any other relevant matters.*

**Community support**

It should be noted that despite the vocal campaign organised by a small number of people and organisations against the development of the wind industry, it remains well supported in the broader society. For instance, a Newspoll survey commissioned by the Clean Energy Council in December 2009 found that in regional areas 90% of people said that Australia should produce more renewable energy.

Similarly, an AMR Interactive survey commissioned by the NSW government in mid 2010 on community attitudes to wind farms, found wind farms were regarded as an acceptable form of power generation by 81% of the population. The survey also found that 80% of residents were supportive of wind farms being built in their local region and more than 60% supported them at 1 – 2 kilometre from their residence.<sup>xi</sup> There was also broad acknowledgement of the benefits of wind farms to the local community including economic and employment benefits and broad endorsement of more wind farms being built in the area.

**Greenhouse abatement**

The other obvious benefit of wind farms is the greenhouse emissions abatement that they provide.

A study by MMA on "Estimating Greenhouse Gas Emissions Abatement from Wind Farms in NSW"<sup>xii</sup> found that wind displaces fossil fuel generation and can act to lower wholesale electricity prices. Wind reduces demand for electricity from other sources, which are typically fossil fuel based generation. An average sized wind farm of 150 MW will displace from 150 kt CO<sub>2</sub>e to 450 kt CO<sub>2</sub>e per annum, while a large (500MW) wind farm will displace from 900 kt CO<sub>2</sub>e to 1,600 kt CO<sub>2</sub>e per annum.



The level of greenhouse gas abatement varies depending on the location of the wind farm. Increased greenhouse abatement occurs for wind farms located in areas with good quality wind resource that are close to electricity users or high quality transmission lines. For many projects the commercial viability of a wind farm relies on optimisation of wind turbine types and layouts to maximise the electricity output that in turn would result in the highest emission abatement. This is of particular relevance for this inquiry.

The MMA study also found that the emissions resulting from the manufacture, construction and operation of wind farms are low relative to those associated with the manufacture, construction and operation of large fossil fuel plants. For a 50 MW wind farm of average output it takes about 14kg CO<sub>2</sub>e/ MWh to manufacture, build and operate it. This represents less than 2% of the typical emissions reduction that such a wind farm would achieve from displacing fossil fuel generation.

### **Low water consumption**

An additional benefit of wind energy is the fact that unlike traditional cower-fired power stations it does not consume any water for generation. Coal powered stations require large quantities of water to generate steam to drive the steam turbines, and for cooling the exhaust steam. Thermal power plants, primarily coal-fired power stations, are responsible for around 1.4 % of total water consumption in Australia.<sup>xiii</sup> Given the on-going water stress in most parts of Australia, and growing demands for fresh water supplies for agricultural and other human use as well as to ensure environmental flow in our river systems, wind looks even more attractive compared with older, and dirty, coal fired power generation.

### **Conclusion**

With appropriate controls and robust planning processes, wind has proven itself to be an excellent form of energy as part of a broader mix, while driving investment and employment in rural areas and acting to reduce our greenhouse emissions. Australia, as one of the highest per capita greenhouse gas emitters, and one of the richer nations on the planet, must show leadership in reducing our emissions. Yet the domestic debate around the future growth of the wind power industry in Australia is increasingly characterized by self-centred assertions of the negative impacts on individual amenity of wind turbines. This is so despite the fact that no scientific evidence supporting these claims has emerged, anywhere around the world. It is vital that this Senate inquiry recognize the urgency of the situation and base its conclusions in this matter firmly on the **plentiful established scientific** evidence, rather than **fanciful, unsubstantiated claims to the contrary**.

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<sup>i</sup> National Health and Medical Research Council (NHMRC, 2010): *Wind Turbines and Health: A Rapid Review of the Evidence*.

[http://www.nhmrc.gov.au/files/nhmrc/file/publications/synopses/evidence\\_review\\_wind\\_turbines\\_and\\_health.pdf](http://www.nhmrc.gov.au/files/nhmrc/file/publications/synopses/evidence_review_wind_turbines_and_health.pdf)

<sup>ii</sup> World Health Organisation (2010): Climate Change resource page: Deaths from climate change. <http://www.who.int/heli/risks/climate/climatechange/en>

<sup>iii</sup> Victorian Department of Health, Worksafe 2010.

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- <sup>iv</sup> W. Colby, R. Dobie, G. Leventhall, D Lipscomb, R McCunney, M Seilo, B Søndergård, Wind Turbine Sound and Health Effects: An Expert Panel Review. Prepared for American Wind Energy Association and Canadian Wind Energy Association, December 2009.
- <sup>v</sup> Sonus (2010): Wind Farm Technical Paper Environmental Noise Paper S3387C6 9 November 2010.
- <sup>vi</sup> Sonus (2010): Infrasound Measurements from Wind farms and other sources, Prepared for Pacific Hydro P/L, November 2010.
- <sup>vii</sup> NSW Valuer General, *Preliminary assessment of the impact of wind farms on surrounding land values in Australia*. (2009)  
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- <sup>xii</sup> MMA (2010): Estimating Greenhouse Gas Emissions Abatement from Wind Farms in NSW. Report to NSW Department of Environment, Climate Change and Water. July 2010.  
<http://www.environment.nsw.gov.au/resources/climatechange/GHGAbtMntWindFarms.pdf>
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