This document contains additional material to the submission to 2011 Senate Inquiry *The Social and Economic Impact of Rural Wind Farms.* It contains information submitted during the 2009 NSW Inquiry into rural wind farms and excerpts of submissions made to the NSW Dept of Planning regarding the Yass Valley Wind farm proposal. An extensive annotated bibliography is given in a further additional document.

Dr David Burraston and Ms Sarah Last

EXECUTIVE SUMMARY

The current push for fast tracking industrial wind power stations in rural NSW is being put forward as solution to the problems of climate change. However, the public are not being presented with balanced information on the issues surrounding industrial wind energy. Landholders are being persuaded to host industrial wind turbines with little knowledge of the impact this will have on their own and other people's property, the environment or the wider community in general. In this submission we present evidence that demonstrates that industrial wind energy does not live up to the claims of its proponents, and counters the misleading information the wind industry continues to distribute.

The research and information presented in this submission will be of interest to people who care about the environment, the truth and a sustainable future. Our submission comprises of the following broad themes :

- Synopsis of major research requirements for industrial wind energy research
- Brief overview of problems with electricity generation by wind turbines
- Research demonstrating industrial wind energy's **failure** to displace fossil fuels or significantly reduce greenhouse gas emissions
- Discussion of environmental concerns, project lifespan and the urgent need for a realistic decommissioning policy
- Negative health effects and noise pollution
- Negative impacts on property values
- Negative visual impact
- Myths surrounding "green jobs"
- Sustainability considerations for rural landholders without industrialisation of the landscape
- Negative social impacts on rural communities
- Comments on Renewable Energy Strategy
- Conclusions from a rural landholders perspective on the reasons not to sign up to a wind power company lease

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1. INTRODUCTION

We wholly support the production of energy from sustainable, clean, renewable sources and public education on energy conservation. We are very interested in the development of farming strategies to offset carbon emissions, it is a fast advancing industry, and we regard it as an imperative global/local issue, where farmers will have an increasingly important role and responsibilities.

We have done significant research about renewable energy and the industrial wind power generation industry. We conducted this research when we and our community were approached by industrial wind energy developers, in order to inform ourselves and others. This research includes:

- Dialogue with an Ecological Consultant who has done assessments on Australian industrial wind power stations
- Dialogue with an ARC (Australian Research Council) Professorial Research Fellow and IPCC (Intergovernmental Panel on Climate Change) contributing author with specialist knowledge in global change modelling and carbon cycle interpretation
- Statements by people already affected by industrial wind farm developments
- Peer reviewed journal and conference papers
- Local, national and international media

Based on this information we have concluded that, with its significant social and environmental impacts, industrial wind energy developments are not sustainable, and would be to the detriment of NSW state, its landowners, environment and surrounding communities. We are strongly opposed to all industrial wind turbine power developments of this type, and will be continuing our research to include further IPCC reports, journal and conference papers, and new results and information as it is published.

Sarah grew up on the family farming property in rural NSW and David has spent many years living in rural areas in the UK and NSW. We have now taken over Sarah's family farming property in rural NSW. We are both trained academic researchers, Sarah in the arts and community cultural development, and David in acoustics, electronic engineering, sound, computer science and complex systems science; this training employs methodologies that seek information from a range of considered objective, quantitative and experiential resources. After reviewing this research we conclude that industrial wind farm developments have far too many detrimental impacts in the short and long term. These detrimental impacts include (but are not limited to):

- Decreased community health
- Poor greenhouse gas mitigation potential
- Poor electricity generating potential
- Increased bush fire risks
- Increased noise pollution
- Decreased land values and reduction in future land use rights for stakeholders, other properties and wider communities
- Strobe like 'flickering' across the landscape created by turbines during sunset and sunrise
- Decreased privacy

- Increased interference with communications devices and resources
- Irreparable destruction to farming resources and related ecologies near or adjacent to industrial wind turbines
- Irreparable destruction to native habitats such as the endangered Box Gum Grassy Woodlands and its associated tree, grass, forbs, bat and bird species
- The liability of landholders for third party claims for loss and damages associated with industrial wind turbine power stations.
- Industrial infrastructure on land zoned for farming/food production and the preservation of natural resources and habitat
- Industrial infrastructure and development that is counter productive to any nature regeneration and conservation efforts

We have also experienced at first hand the inappropriate conduct and divisive tactics employed by industrial wind energy companies within our own community, pitting neighbour against neighbour, blatantly lying and telling farmers that *"everyone else is signing or has signed".* We have repeatedly asked the industrial wind energy developers to get all the landholders together for a meeting rather than be divisive, nut to no avail. The industrial wind developers even admitted that these tactics are divisive to us, and that we should see it from their perspective. This sentiment was stated several times. Such an admission clearly demonstrates a wilful resistance towards transparency and due process, with lack of regard to the concerns landholders and residents may have about the large scale development and impacts associated with industrial wind turbine power stations. The industrial wind developers stated that should the wind farm proposal proceed any direct impact would only be on the landholders with the turbines, not those on surrounding properties. This statement again demonstrates a lack of regard to legitimate community concerns and totally misrepresents the magnitude of industrial wind power developments, their turbines, risk issues and detrimental impacts.

When we asked the industrial wind developers for unbiased information on wind energy we were directed to unreliable industry propaganda. We have watched as our neighbouring landholders have been constantly harassed by industrial wind developers whose only goal is to get a lease contract signed. Such a contractual arrangement for industrial scale development, especially development that is emergent in the Australian context with very few precedents and no Australia specific long-term impact studies, is grossly unfair to landholders, their neighbours and surrounding communities.

We are in no doubt that the wind energy industry and current NSW government's main motivation is money rather than addressing climate change.

2. INDUSTRIAL WIND ENERGY STILL REQUIRES MAJOR RESEARCH

The Proceedings of the 2008 Intergovernmental Panel on Climate Change (IPCC) "*Scoping Meeting on Renewable Energy Sources"* contains some information on problems associated with industrial wind energy (http://www.ipcc.ch/pdf/supporting-material/proc-renewables-lubeck.pdf). This document reports ongoing research and investment into all renewable energy sources, conducted by Working Group III, and will conclude with a Special Report in December 2010. This report discusses renewable energy options and issues, in parallel with the IPCC's other documents leading up to the 5th Assessment Report in 2014. It is worth noting that in the chapter "*Status and Perspectives of Wind Energy*" authored by Prof. A. Zervous, President, European Wind Energy Association and Chairman, Global Wind Energy Council in Section IV Challenges and Perspectives on page 117 he states that "*This agenda for research should be seen as only the first edition of an ongoing identification process, which is currently being updated through the European Technology Platform for Wind Energy. The Priorities listed below are divided into three categories: showstoppers, barriers and bottlenecks"*

i) Showstoppers : "These are the key priorities, which is to say that they are considered to be issues of such importance that failure to address them could halt progress altogether. Thus they need special and urgent attention."

ii) Barriers : "Barriers are defined as being principal physical limitations in current technology, which may be overcome through the opening up of new horizons through generic / basic research over the medium to long term."

iii) Bottlenecks : "Bottlenecks are problems which can be relatively quickly overcome through additional short or medium term R&D, i.e. through the application of targeted funding and / other resources."

These 3 areas are discussed over several pages. Among the 5 showstoppers it should be noted that these include the requirement for research into wind farm energy storage systems, which as yet do not exist, to make up for variability and unpredictability of wind resource. The current storage systems for wind energy are conventional fossil fuel power stations, which have to be kept running as a back up to cover variability in wind resource, which places the conventional plant under greater stress and leads to greater inefficiency. Also important are the need for research results on the effects of wind turbine power plants on ecological systems and public support. Ecological research and public support are also discussed again in regards to barriers and bottlenecks, as are the need for standards and certification, wind resource studies, grid integration and other issues.

A later chapter in this IPCC Scoping Report is titled "Global Investment in the Renewable Energy Sector" by Eric Usher, Head, Renewable Energy Finance Unit, United Nations Environment Program. Fig 5 on page 153 shows that Venture Capital and Private Equity places wind energy in 3rd position, with solar 2nd and biomass 1st. The overwhelming majority of the investment for wind is installing wind turbine capacity only, **leaving a very large shortfall for future research needs.** Fig 8 on page 154 shows Global Asset Financing by Sector for the period 2004 to 2007. In 2004 the $12bn total

was mainly taken up by wind, but as overall renewable energy financing increases in the following 3 years wind shows a reduction in proportion and by 2007 is roughly 45% of the $56bn total.

3. WIND TURBINE ELECTRICITY GENERATION

We have given much consideration regarding the viability of hosting industrial wind turbines to enhance our farms income stream. The amount of income per turbine must be carefully calculated and it should be noted the “nameplate” capacity represents the *theoretical maximum* MW output e.g. 1MW, 2MW etc.

3.1 LOAD FACTOR

In order to estimate the actual output of each turbine a Load Factor (LF) figure of 20 to 30% of nameplate capacity is often suggested, due to the high variability of wind speed and the turbines power curve. It should be stressed that 20 to 30% is a *very generous* estimate of efficiency, and the majority of wind installations do not reach this capacity, especially those with relatively poor wind resources such as inland NSW. It is highly unlikely that NSW industrial wind power stations will attain a 30% Load Factor.

This reduction in efficiency is due to a fundamental physical law relating the electrical output to the cube of the wind speed for a wind turbines power curve, usually between about 4m/s (metres per second) and 12 m/s wind speed. This demonstrates how sensitive a turbines output is to wind speed. If the wind speed is below 4m/s (its minimum speed) no power at all is generated from the turbine. If a turbine reaches its maximum capacity at around 12m/s any further increase in wind speed will not result in more power being generated. If the wind speed eventually increases above the turbines maximum rating, often around 25m/s, the turbine is shut down to prevent mechanical damage and no power is generated. Also, if the operating temperature is above 40C wind turbines are shut down to prevent turbine failure.

There is another fundamental physical law, derived by the German physicist Albert Betz in 1919 that further compounds the inefficiency of wind turbines. This law relates to the amount of energy in the wind that a rotor blade can convert. The power extracted from the wind can be no more than 0.59 of the total incoming wind energy. This is due to the fact that the wind is slowed down, but it is not completely stopped. This law puts a fundamental limit on the energy extracted from the wind, resulting in further losses for industrial wind energy.

These two fundamental unchanging physical laws, coupled with variability and unpredictability of the wind has prompted some illuminating studies around the world. We recommend examining documents at the Renewable Energy Foundation (REF) (www.ref.org.uk) who have commissioned independent reports from leading consultants and scientists. In 2006 the REF produced the UK Renewable Energy Data files (www.ref.org.uk/Pages/4/uk_renewable_energy_data.html) which presents publicly available data regarding renewable electricity generation since 2002 (wind, biomass, hydro, landfill gas and sewage gas) in the UK. The raw data for this project is obtained from the Ofgem Renewables Obligation Certificate Register (http://www.rocregister.ofgem.gov.uk/main.asp), which publishes data concerning the issue of Renewables Obligation Certificates to renewable electricity generators. These documents present the Ofgem wind farm data in an easily readable form together with

summary, review and comparison to some other European countries. The average national Load Factor for the UK is 27.4% for 2005 to 2007 compared to Germany 22.6%, Spain 20.2% and Denmark 26.2%.

3.2 NSW POOR WIND RESOURCE

We have looked at the Australian Government Department of the Environment, Water, Heritage and the Arts *Renewable Energy Atlas* (http://www.environment.gov.au/settlements/renewable/atlas/index.html). In our area in South West NSW this reports an average wind speed estimate of 6.9m/s at a 3km resolution (higher resolution data will give a more accurate representation). Given that this wind resource estimate is not very high, the other major criteria for sighting industrial wind turbine power stations is their locality to the electricity grid. The fact that such a powerline exists will have a major effect on any wind industry company decisions before and after they have conducted their wind monitoring phase. Proximity to the electricity grid will significantly reduce startup costs and enable a poor quality wind resource to become financially viable for a wind power company, but not for NSW landowners. A poor quality wind resource further reduces the meager greenhouse gas reductions and electricity output of industrial wind power stations in NSW.

It also appears that wind industry lease contracts are based on a percentage of potential income of electricity generated or a flat fee. This is a significant gamble for the landowner hosting an industrial development. These percentage and flat fee figures are agreed in contracts before wind monitoring has taken place, or are based on wind modeling software predictions that are not disclosed by the power company. The primary financial driver for wind power companies in such areas is to place wind turbines near the major powerlines. This has a potentially further detrimental effect on landholders hosting the turbines, because it means that the taxable income from generated electricity will be far less than in an area with a good quality wind resource. It is our understanding that some NSW landholders are making erroneous assumptions of income potential. These assumptions on income are being based on nameplate capacity MW figures, rather than an at best Load Factor of 20% to 30%, and verbal non-legally binding estimates on number of turbines given by wind power company representatives. Any profits from such installations are clearly in favour of the wind power company and not in the interest of the landholder. It is quite possible, and has happened with other wind developments, that landholders signing lease agreements may not end up with any turbines, but are left with an onerous long term lease agreement and extensive access roads to turbines on other properties.

3.3 HOMES POWERED FIGURES ARE MISLEADING

The “homes powered” figures that are constantly portrayed by the wind industry, government and in the media are very misleading for the general public. Professor David JC MacKay in the Department of Physics at the University of Cambridge and member of the World Economic Forum Global Agenda Council on Climate Change in his book (2008) “*Sustainable Energy — without the hot air”,* UIT Cambridge Ltd discusses this problem :

“The “home” is commonly used when describing the power of renewable facilities. For example, “The £300 million Whitelee wind farm’s 140 turbines will generate 322 MW –

enough to power 200 000 homes." The "home" is defined by the British Wind Energy Association to be a power of 4700 kWh per year."

The "home" annoys me because I worry that people confuse it with the total power consumption of the occupants of a home – but the latter is actually about 24 times bigger. The "home" covers the average domestic electricity consumption of a household, only. Not the household's home heating. Nor their workplace. Nor their transport. Nor all the energy-consuming things that society does for them."

In the UK the Secretary of State for Energy and Climate Change, the Rt Hon Ed Miliband MP recently published a prominent article in *The Times* (27.04.09) regarding number of homes powered by wind energy. Following an enquiry from a member of the public, REF wrote an open letter (07.05.09) to Mr Miliband with regard to this, and published the correspondence on the REF website at : http://www.ref.org.uk/PublicationDetails/52 Mr Milliband stated in his article that :

"To all those who scoff at the idea of wind making a difference, my reply is that last year enough power for all the electricity for two million homes came from wind power."

Some of the REF's comments help to clarify matters (underlining and bold font is their emphasis) :

"…you should not in any case use the homes equivalent figure, which is misleading to the public since domestic houses typically use only 30% of national electricity, and because the comparison suggests that the turbines could take this many houses off-grid, which is not the case."

"… so1.8 million homes equivalent rather than 2 million. (Incidentally, most of this increase appears to be from offshore wind, confirming a long-standing REF argument that given the capacity limit for wind in the UK system, perhaps 10 GW, it makes sense to seek high yielding sites.)"

"However, the real issue is that there are good reasons for not employing the homes equivalent calculation and presentation method:

Explaining Energy Quantities to the Public

In fact, the concluding and main point of my letter goes unaddressed in your response.

I wrote:

8. Further, in my view, you should not in any case use the homes equivalent figure, which is misleading to the public since domestic houses typically use only 30% of national electricity, and because the comparison suggests that the turbines could take this many houses off-grid, which is not the case.

9. It would be much more accurate to express the significance of wind's generation in terms of national consumption (roughly 390 TWh in 2007):

5,777,249 /390,000,000 = 0.015.

My point was that "in any case", i.e. ***regardless of what exact figure is used, 1.2m, 1.8m, 2m, the "homes equivalent" calculation is potentially very misleading and not helpful in giving clear guidance as to progress towards meeting the 2020 targets****.*

Specifically, the "homes equivalent" figure is likely to lead to a misperception of significance, and particularly so should the public wish to understand the value for money offered by the Renewables Obligation. Assuming a ROC price of about £48 in 2007, wind cost the consumer about £278 million in indirect subsidy, a very substantial sum, so it is important to be clear about the scale of the value returned."

"In my view, and I know this view is shared by many observers, a better method of expressing the output of a generator, any generator in fact, is as a fraction of total electrical energy generation, as noted above. (Despatchable generators can also be described as a fraction of peak load, as a means of estimating their national significance, but this option is not open to wind in any straightforward way.)

Some would go further and say that since electrical energy is only roughly a third of total national ***energy*** *consumption, it would be best to express the wind energy generated as a fraction of Final Energy Consumption (i.e. all energy, heat, electricity, and transport), which is very roughly 1,745 TWh per year at present. Taking the 2007 figure for wind generation we can calculate:*

5,777,249 MWh / 1,745,000,000 MWh = 0.0033

In other words ***wind generated 0.3% of UK Final Energy Consumption*** *in 2007, at a cost in subsidy of £278 million."*

"I hope you will agree that this is a great deal less misleading than any homes equivalent figure which I really hope you or your department won't use again, however calculated."

4. ENVIRONMENTAL IMPACTS & LACK OF GREENHOUSE GAS REDUCTION

A significant concern worldwide is the environmental impacts of constructing industrial wind turbine power stations. These range from : calculations of the true carbon costs of industrial wind turbine power stations in the context of all green house gas emissions both nationally and internationally, to risks associated with catastrophic turbine failures, fire risk, fragmentation and destruction of wildlife habitat from industrial wind turbine power station development, irreparable destruction of fauna through industrialization of the landscape, and wind turbine collision fatalities of wildlife such as birds and bats. Research in these areas is ongoing which further demonstrates the need for considered, unrushed and reasoned debate before signing over land and government rubber stamping of such industrial development.

Some areas targeted for industrial wind power station developments are Box-Gum Grassy Woodland, and associated flora and fauna, which are listed as Endangered in NSW and Critically Endangered nationally. Understanding the environmental impact of industrial wind turbine power stations on flora and fauna is of critical importance, particularly in agricultural areas where many animals play a critical role in biological control such as the consumption of insects. For example see : Kunz, T. H., et al (2007) "Methods and metrics for studying impacts of wind energy development on nocturnal birds and bats." *Journal of Wildlife Management* 71: pages 2449-2486. These research studies require extensive monitoring of industrial wind turbine sites, and the use of dog handler teams on properties is likely to become the preferred technique for locating bird and bat carcasses : Arnett, E. B. (2006) "A preliminary evaluation on the use of dogs to recover bat fatalities at wind energy facilities." *Wildlife Society Bulletin*: 34: pages 1440-1445. Ongoing scientific research into bat fatalities are available at http://www.batsandwind.org This and other research clearly demonstrates that industrial wind turbines are environmentally destructive.

Our habitat of Box Gum Grassy Woodland is host to a number of vulnerable and endangered species of bats, birds, plants and trees that are being placed in further danger by industrial wind power station development. Also of note is the fact that NSW has the greatest level of diversity amongst its bird population. This has been identified as a major and growing sustainable tourist industry for NSW.

The wind energy industry and its associated environmental assessment studies claim that flora and fauna are more in danger from climate change than industrial wind power station development. This is completely misleading. Industrial wind power stations fail to live up to their environmentally friendly claim of significantly reducing greenhouse gas emissions as numerous studies have shown.

4.1 RENEWABLE ENERGY FOUNDATION STUDY

In December 2004 REF commissioned and published a report titled : *"Reduction In Carbon Dioxide Emissions: Estimating The Potential Contribution From Wind-Power".* This report is freely available at : http://www.ref.org.uk/PublicationDetails/27 and includes an executive summary. Some key points from the executive summary are reproduced here (all bold font is their emphasis) :

"Renewable electricity has become synonymous with CO2 reduction. However, ***the***

relationship between renewables and CO2 reduction in the power generation sector does not appear to have been examined in detail, and the likelihood, scale, and cost of emissions abatement from renewables is very poorly understood.*"*

"Wind turbine technology has been developing in Europe for nearly twenty years, and ample experience has been gained to show ***wind generated power to be variable, unpredictable, and uncontrollable****. In fact, the European experience shows conclusively that the annual production is* ***routinely disappointing****, and this does not augur well for the UK's chances of achieving significant emissions abatement."*
*"Indeed, the accommodation of the variable output from wind turbines into the transmission system is complex and the technical challenges are barely understood outside professional circles****. Fossil-fuelled capacity operating as reserve and backup is required to accompany wind generation and stabilise supplies to the consumer. That capacity is placed under particular strains when working in this supporting role because it is being used to balance a reasonably predictable but fluctuating demand with a variable and largely unpredictable output from wind turbines.*** *Consequently, operating fossil capacity in this mode generates more CO2 per kWh generated than if operating normally****. This compromising effect is very poorly understood****, a fact acknowledged recently by the Council of European Energy Regulators."*

"Thus, the CO2 saving from the use of wind in the UK is probably much less than assumed by Government advisors, who correctly believe that wind could displace some capacity and save some CO2, but have not acknowledged the emissions impact of matching both demand and wind output simultaneously. As a result, current policy appears to have been framed as if CO2 emissions savings are guaranteed by the introduction of wind-power, and that wind power has no concomitant difficulties or costs. ***This is not the case****."*

"With this level of disagreement between governmental authorities and trade bodies it is hardly surprising that there is general public confusion over the issue. ***This uncertainty is most undesirable, not least because of the economic implications of an erroneously reasoned choice of carbon abatement technology****."*

*"****Market forces will fix wholesale electricity prices at a level that discourages new investment in modern plant****, and* ***the focus on wind power for new generating capacity is likely to lead to the retention of old, low efficiency, coal-fired plant for an extended period****."*

*"****In conclusion, it seems reasonable to ask why wind-power is the beneficiary of such extensive support if it not only fails to achieve the CO2 reductions required, but also causes cost increases in back-up, maintenance and transmission, while at the same time discouraging investment in clean, firm generation****."*

The REF also commissioned a recent study into the effectiveness and reliability of industrial wind turbine power stations to produce 16% to 18.8% of nationwide electricity supply in the UK : Oswald, J., Raine, M. and Hezlin, A., "Will British weather provide reliable electricity?" *Energy Policy* 36(8), August 2008, pages 3212-3225 available at : www.windaction.org/documents/18480 among the negative conclusions of this paper it is important to note that :

i. volatile power swings of up to 70% from wind turbines result in conventional fossil fuel power stations placed under greater stress, reducing reliability and utilisation
ii. this will have cost implications for the network, and hence the consumer
iii. the amount of backup conventional fossil fuel power station CO2 emissions need to be factored into wind industry carbon saving calculations
iv. electricity demand can reach its peak with a simultaneous demise in wind power output

The study for this paper is the British system, **but these are recognised worldwide as industrial wind turbine power station problems that are not yet solved.** Yet the industrial wind industry maintains that the wind will always be blowing somewhere when scientific studies have shown that this is still a major problem.

4.2 ONTARIO STUDY

A recent study in Ontario, Canada by Tom Adams and Francois Cadieux *"Wind Power In Ontario: Quantifying The Benefits Of Geographic Diversity"* presented at the 2nd Climate Change Technology Conference, May 12-15 2009 which specifically looks at the aggregated output of multiple industrial wind power stations states :

"Average wind output is high in winter and low during the summer, whereas demand is highest in summer. This imbalance represents a key limitation with respect to reliance on wind power in Ontario. The seasonal wind output pattern observed in Ontario is very similar to that of wind farms across Canada and throughout central and northern Europe."

"Measurements presented here based on wind outputs from major wind developments in and near Ontario indicate that distances over 250 km between wind farms are required for hourly output correlations to drop to 50%, and distances over 350 km are required for daily correlations to drop to 50%. Moreover, the results presented here suggest that correlation coefficients will be positive over distances greater than 800 km and are not likely to be negative over conceivable distances within the province. The modest benefit of diversifying locations is illustrated when one large wind farm located more than 360 km away from another group of nearly equal capacity was added: the standard deviation in output decreased by only 2.7% of installed capacity. Other studies present similar results for Europe, although distance appears to be less effective in mitigating variability in Ontario than in Europe."

"Thus, to meet the policy objective of maximizing wind's penetration of Ontario's electricity generation mix while minimizing grid impacts, any new wind power capacity should thus be installed far away from other wind farms. Conversely, allowing concentrated wind development, either by co-locating wind farms or building relatively large farms, reduces the total wind capacity the system can accommodate within a given level of load balancing expenditure."

Although adding a distant wind farm to an existing fleet fills the valleys of average output and drops the standard deviation of output by a small fraction, it also increases the magnitude of overall output swings. Large overall wind output swings are inevitable because wind farms within the province are statistically more prone to increase and

decrease generation synchronously due to the nature and size of the meteorological fronts that largely drive wind speeds. In other words, if wind power output swings or peaks challenge the load balancing capacity of the power system, distance between wind farms does not help.

"Ontario has made a policy commitment to encourage extensive wind power development supported by only a preliminary understanding of the potential power system impacts of a large wind power fleet. Wind power's consumer impacts – incremental transmission, energy storage, ramping generation requirements, and grid reliability service costs such as automatic generation control and operating reserve – may be insignificant at low wind penetration of the overall electricity supply but will rise as wind capacity rises and may become significant. Additional research on the output variability of wind power, grid reliability mitigation measures, and the load carrying capacity of wind power is thus necessary."

Adam's Keynote Address for the Professional Engineers of Ontario
Annual General Meeting May 9, 2009 *"Transforming Ontario's Electricity Paradigm: Lessons Arising from Wind Power Integration"* also reports on this Canadian research :

"Advocates and sometimes even government engineers assure us that wind power is decentralized energy, that wind power can help replace coal, that wind volatility is smoothed by distance, and that wind can supply a large fraction of our electricity needs without imposing significant indirect costs on consumers. Although I wish it were otherwise, the data is uncomplimentary to this loose talk."

"Getting wind power to consumers when they want it will be a challenge. Unfortunately wind and load are out of sync across several dimensions."

"Other researchers have identified that Ontario tends to get most of our wind output at the wrong time of day and that the daily wind pattern tends to decline in morning when load is rising and ramp up in evening when load is declining."

"Unfortunately distance provides little smoothing benefit:

Considering hourly correlation coefficients, 250 km cuts the cross correlation by only 50%. No matter how far apart they are, wind farms in Ontario east of Wawa will be positively correlated. This means that the more wind capacity we add, the more output volatility the aggregate fleet will yield. Adding a distant wind farm fills the valleys of average output and drops the standard deviation of output a little but also increases the peaks of output. If output swings or peaks are challenging the system, distance doesn't help."

"Some of these factors are also significant in terms of wind power's ultimate environmental footprint. No one in Ontario can realistically estimate these factors right now, in part because the commercial impact of the GEA [Green Energy Act] *is still very difficult to estimate but also in part because much more technical homework is needed."*

4.3 USA NATIONAL ACADEMY OF SCIENCES STUDY

The National Academies (Science, Engineering and Medicine) in the USA published a recent study relating to the mid-Atlantic region in 2007 *"Environmental Impacts of Wind-Energy Projects"* available at : http://books.nap.edu/catalog/11935.html which is a 394 page report and a 33 page executive summary. On page 5 of the executive summary regarding the issue of displacement of coal power stations it states :

"However, because current and upcoming regulatory controls on emissions of NOx and SO2 from electricity generation in the eastern United States involve total caps on emissions, the committee concludes that development of wind-powered electricity generation using current technology probably will not result in a significant reduction in total emission of these pollutants from the electricity sector in the mid-Atlantic region."

On page 8 of the executive summary is a section regarding ecological impacts :

"The construction and maintenance of wind-energy facilities also alter ecosystem structure through vegetation clearing, soil disruption and potential for erosion, and noise. Alteration of vegetation, including forest clearing, represents perhaps the most significant potential change through fragmentation and loss of habitat for some species."

A selection of quotes from the Preface of the report on page ix states :

"The generation of electricity from wind energy is surprisingly controversial. At first glance, obtaining electricity from a free source of energy—the wind—seems to be an optimum contribution to the nation's goal of energy independence and to solving the problem of climate warming due to greenhouse gas emissions. As with many first glances, however, a deeper inspection results in a more complicated story."

"Building wind-energy installations with large numbers of turbines can disrupt landscapes and habitats, and the rotating turbine blades sometimes kill birds and bats. Calculating how much wind energy currently displaces other, presumably less-desirable, energy sources is complicated, and predicting future displacements is surrounded by uncertainties."

And from Preface page x :

"The benefits of wind energy depend on the degree to which the adverse effects of other energy sources can be reduced by using wind energy instead of the other sources. Assessing those benefits is complicated. The generation of electricity by wind energy can itself have adverse effects, and projecting the amount of wind-generated electricity available in the future is quite uncertain."

4.4 TYNDALL CENTRE FOR CLIMATE CHANGE RESEARCH STUDY

The Tyndall Centre for Climate Change Research published a report as part of their research project "*Ensuring new and renewable energy can meet electricity demand: security of decarbonised electricity systems*". The final report is, Nedic, D. P., Shakoor, A. A., Strbac, G., Black, M., Watson, J., and Mitchell, C. (2005) "*Security assessment of futures electricity scenarios*", Tyndall Centre Technical Report 30 available at : http://www.tyndall.ac.uk/research/theme2/project_overviews/t2_24.shtml A discussion of

the results are also presented on the web page, and of specific note is :

"The performed capacity adequacy studies for the mid-term future UK electricity scenarios clearly show that the capacity value of wind generation plant is limited. Analysis was carried out for a wide range of wind penetrations to examine the generating capacity of conventional plant that can be displaced by wind, while maintaining a specified security level. We observed that wind generation only displaces a relatively modest amount of conventional plant, which means that in order to maintain the same level of security, a significant capacity of conventional plant will still be required."

"Due to a disproportion between the conventional capacity and the energy substitution by the wind source, a considerable number of thermal plants will be running at low output levels over a significant proportion of their operational time in order to accommodate wind energy. Consequently these plants will have to compromise on their efficiency, resulting in increased levels of fuel consumption as well as emissions per unit of electricity produced."

4.5 CARNEGIE MELLON UNIVERSITY STUDY

The recent research and testimony to US House of Representatives of Professor Jay Apt, the executive director of the Electricity Industry Center at Carnegie Mellon University's Tepper School of Business and Distinguished Service Professor in the Department of Engineering and Public Policy, addresses the issues of lack of emissions reduction by gas power stations used to mitigate the variability of industrial wind power stations. In a research paper co-authored with Warren Katzenstein, "Air Emissions Due To Wind and Solar Power*", Environmental Science & Technology* (2009) Vol 43 No 2 pages 253-258, their research shows :

"Renewable energy emissions studies have not accounted for the change in emissions from power sources that must be paired with variable renewable generators"

"In many locations, natural gas turbines will be used to compensate for variable renewables. When turbines are quickly ramped up and down, their fuel use (and thus CO2 emissions) may be larger than when they are operated at a steady power level. Systems that mitigate other emissions such as NOx may not operate optimally when the turbines' power level is rapidly changed."

"Carbon dioxide emissions reductions from a wind (or solar PV) plus natural gas system are likely to be 75-80% of those presently assumed by policy makers. Nitrous oxide reduction from such a system depends strongly on the type of NOx control and how it is dispatched. For the best system we examined, NOx reductions with 20% wind or solar PV penetration are 30-50% of those expected. For the worst, emissions are increased by 2-4 times the expected reductions with a 20% RPS [Renewables Portfolio Standards] *using wind or solar PV."*

"We have shown that the conventional method used to calculate displaced emissions is inaccurate, particularly for NOx emissions. A region-specific analysis can be performed with knowledge of displaced generators, dispatched compensating generators, and the transient emissions performance of the dispatched compensating generators. The

results shown here indicate that at large scale variable renewable generators may require that careful attention be paid to the emissions of compensating generators to minimize additional pollution."

In Apt's testimony to U.S. House of Representatives Committee on Energy and Commerce Subcommittee on Energy and Environment's Hearing on The American Clean Energy Security Act of 2009 "Panel on Low Carbon Electricity, Carbon Capture and Storage, Renewables and Grid Modernization" of April 23, 2009 he states :

"Even in good areas, the wind doesn't blow all the time. Looking at all the wind power plants in Texas in 2008, we find that in a quarter of the hours during the year Texas wind production was less than 10% of its rated capacity. That means that when a wind farm is built, some other power source of the same size must be built to provide power during those calm hours. Our research shows that natural gas turbines, that are often used to provide this fill-in power, produce more CO2 and much more nitrous oxide (as they quickly spin up and then slow down to counter the variability of wind than) than they do when they are run steadily."

"The point is that wind and solar can lower the amount of fossil fuels used for generation, but they don't lessen the need for spending money on always-available generation capacity, nor do we get all the air emissions benefits we once expected."

"Wind farms can affect climate downwind, reducing precipitation. Massive reliance on wind energy would take energy out of the wind, changing the Earth's climate. All power generation options have feet of clay. There is no generation utopia. But just because there is no free lunch doesn't mean we can't eat: we just have to acknowledge the issues honestly so that we are not faced with a public backlash later on."

Apt and colleagues have recently published in the American National Academies of Science Fall 2008 on-line journal "Issues in Science and Technology" a paper titled *"A National Renewable Portfolio Standard? Not Practical"* covering issues regarding problems with wind energy :

"Producing sufficient wind turbines would require a major increase in manufacturing capacity. Demand (driven by state RPSs and the federal renewable production tax credit) has already stretched supplies thin, creating an 18-month delivery delay for wind machines. It has also emboldened manufactures to reduce wind turbine warranties from five years to two."

"Among the disadvantages of wind systems are that they produce power only when the wind is strong and that they are most productive at night and during spring and fall, when electricity demand is low. The capacity factor (the percent of maximum generation potential actually generated) of the best sites for wind turbines is about 40%, and the average capacity of all the wind turbines used to generate utility power in the United States was 25% in 2007."

"…if wind supplied 15% of the electricity, it would save less than 15% of fuel because other generators backing up the wind must often run at idle even when the wind is blowing and because their fuel economy suffers when they have to ramp up and slow down to compensate for variability in wind."

"Variability also requires constant attention, lest it threaten the reliability of the electric system. On February 26, 2008, the power system in Texas narrowly avoided a breakdown. At 3 p.m., wind power was supplying a bit more than 5% of demand. But over the course of the next 3.5 hours, an unforecast lull caused wind power to fall from 2,000 MW to 350 MW, just as evening demand was peaking. Grid operators declared an emergency and blacked out 1,100 MW of load in a successful attempt to avoid a system collapse. According to the Electric Reliability Council of Texas, "This was not the first or even the worst such incident in ERCOT's area. Of 82 alerts in 2007, 27 were 'strongly correlated to the drop in wind'.""

"Finally, wind energy is a finite resource. At large scale, slowing down the wind by using its energy to turn turbines has environmental consequences. A group of researchers at Princeton University found that wind farms may change the mixing of air near the surface, drying the soil near the site. At planetary scales, David Keith (then at Carnegie Mellon) and coworkers found that if wind supplied 10% of expected global electricity demand in 2100, the resulting change in the atmosphere's energy might cause some regions of the world to experience temperature changes of approximately 1ºC."

In the July 2009 edition of Power Engineering Thomas Hewson Jr. and David Pressman's paper "Calculating wind power's environmental benefits" also presents negative conclusions regarding emissions reduction of industrial wind energy :

"Finally, proponents who suggest that wind is able to entirely displace CO2 overlook a fact fundamental to energy generation: wind's unpredictability means it truly has no generating capacity value and its construction will not displace building any new coal or natural gas generating capacity. Grid reserve margins require wind back up and the inefficiency of quickly firing up a natural gas unit to meet erratic wind generation output means any emissions displacement is minimal. Wind is simply an additional capital cost which proves to be more than twice as expensive for the ratepayer."

"Creating a federal renewable portfolio standard would create a nationwide closed market for renewables, meaning wind projects would again offer no incremental emissions benefits given their direct competition with other renewables and not coal or natural gas. Unfortunately, many of the claims made regarding wind's supposed avoided air benefits are overstated."

4.6 OTHER STUDIES

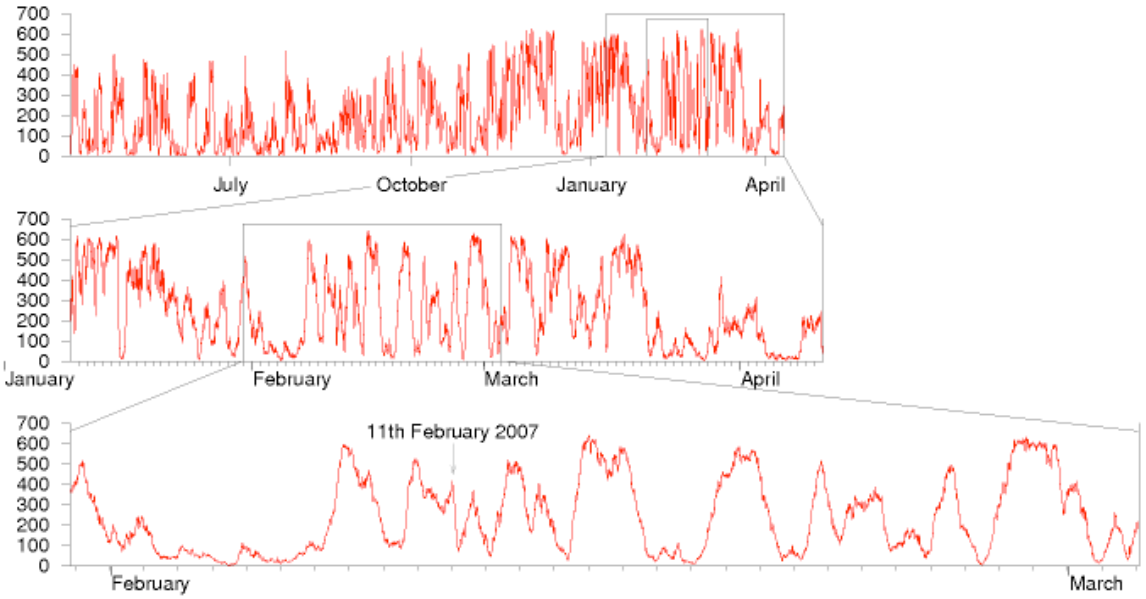
Professor David JC MacKay in the Department of Physics at the University of Cambridge and member of the World Economic Forum Global Agenda Council on Climate Change in his book (2008) "*Sustainable Energy — without the hot air",* UIT Cambridge Ltd discusses the problems of fluctuation and storage of wind energy. On page 187-188 he states :

"However much we love renewables, we must not kid ourselves about the fact that wind does fluctuate.

Critics of wind power say: "Wind power is intermittent and unpredictable, so it can make no contribution to security of supply; if we create lots of wind power, we'll have to

maintain lots of fossil-fuel power plant to replace the wind when it drops." Headlines such as "Loss of wind causes Texas power grid emergency" reinforce this view. Supporters of wind energy play down this problem: "Don't worry – individual wind farms may be intermittent, but taken together, the sum of all wind farms in different locations is much less intermittent."

Let's look at real data and try to figure out a balanced viewpoint. Figure 26.2 shows the summed output of the wind fleet of the Republic of Ireland from April 2006 to April 2007. Clearly wind is intermittent, even if we add up lots of turbines covering a whole country. The UK is a bit larger than Ireland, but the same problem holds there too. Between October 2006 and February 2007 there were 17 days when the output from Britain's 1632 windmills was less than 10% of their capacity. During that period there were five days when output was less than 5% and one day when it was only 2%."



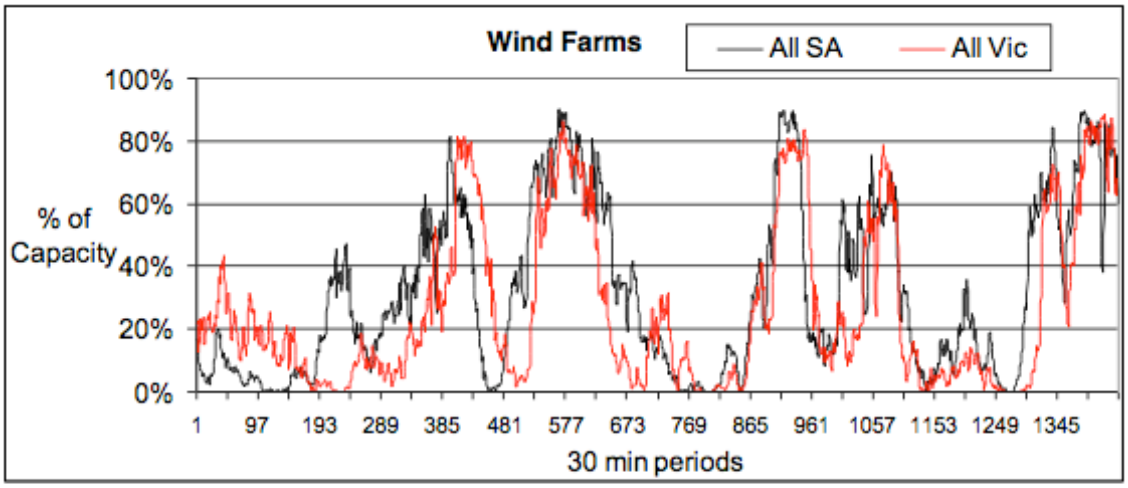
Total output, in MW, of all wind farms of the Republic of Ireland, from April 2006 to April 2007 (top), and detail from January 2007 to April 2007 (middle), and February 2007 (bottom). Peak electricity demand in Ireland is about 5000 MW. Its wind "capacity" in 2007 is 745 MW, dispersed in about 60 wind farms. Data are provided every 15 minutes by www.eirgrid.com. (Figure 26.2 from MacKay, D. (2008) "*Sustainable Energy — without the hot air*" UIT Cambridge Ltd : http://withouthotair.com)

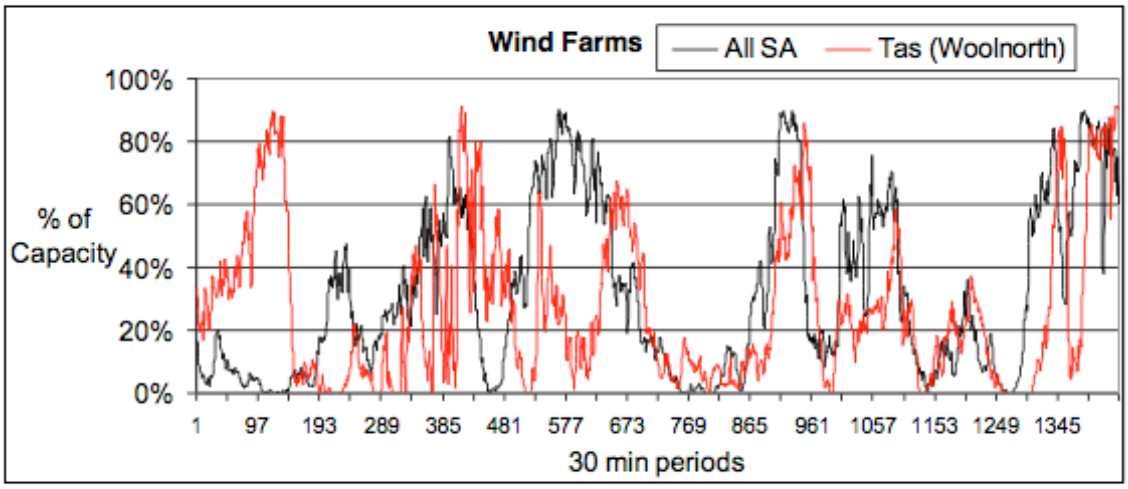
A preliminary study in Australia on existing industrial wind power stations by Andrew Miskelly and Tom Quirk shows that this intermittency is happening in Australia. Their analysis is based on 11 industrial wind power stations spread across 900km in South Australia, New South Wales, Victoria and Tasmania for the month June 2009. The data is obtained from the publically available *Non-Scheduled Generation Data* at the AEMO website (http://www.aemo.com.au/data/csv.html). They state :

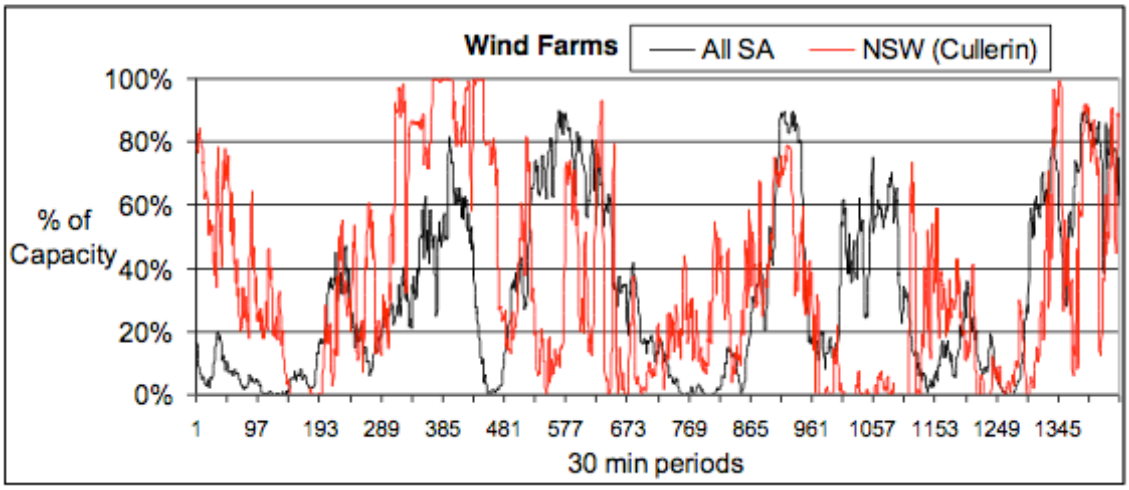
"South Australian wind power generation has been used as the standard as it is the largest sample and despite having 6 wind farms added together performs as if it were

one farm despite a spread of some 500 km.

It is clear that the responses in each area are correlated. The correlation of South Australia with Victoria is the clearest example."





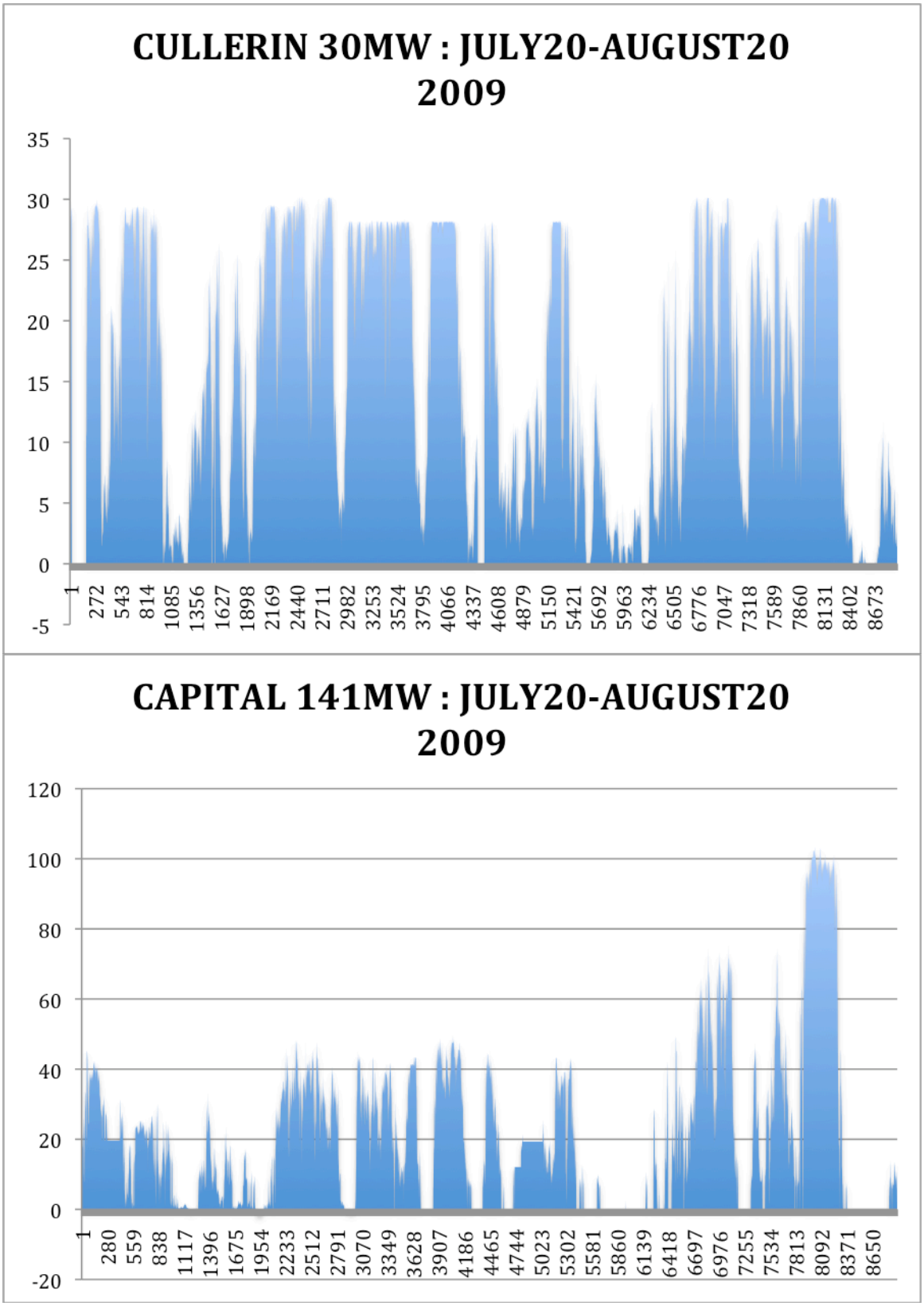


June 2009 performance of the wind farms in NSW, Victoria and Tasmania compared to that of South Australia. (From Miskelly, A and Quirk, T. (2009) Wind Farming in South East Australia)

All of these studies show that significant smoothing does not occur from such correlation, and that more industrial wind power stations result even greater fluctuations in electrical output. The fact that the electricity outputs from large geographical distributions of industrial wind power station are *correlated* means that they tend to act as one power station, because weather fronts cover vast distances. This can result in simultaneous lulls affecting multiple wind power stations.

The AEMO data for a number of wind power stations can be obtained selectively through the Australian Landscape Guardians website : http://www.landscapeguardians.org.au/data/aemo/ We have computed the graph for the output of the 30MW Cullerin Range Wind Farm and the 141MW Capital Wind Farm at Bungendore for the month from 20th July to 20th August, data sampled at 5 minute intervals. The output is seen to be highly variable, with very extreme shifts in output noticeable.The output is again seen to be highly variable, with very extreme shifts in output noticeable.

It is also easily seen that in the July 20 to August 20 data sets for both Cullerin Range and Capital/Bungendore there are simultaneous dips in power output.



Cullerin Range (top) and Capital/Bungendore (bottom) MW output for the month

July 20 to August 20 2009 from AEMO 5 minute data

Peter Lang is a retired engineer with 40 years experience on a wide range of energy projects throughout the world, including managing energy R&D and providing policy advice for government and opposition. His experience includes: coal, oil, gas, hydro, geothermal, nuclear power plants and nuclear waste disposal (6.5 years managing a component of the Canadian Nuclear Fuel Waste Management Program). In 2009 he self published the paper "*Cost and Quantity of Greenhouse Gas Emissions Avoided by Wind Generation"* and provided a simple analysis of the amount of greenhouse gas emissions avoided by wind power and its associated cost. In agreement with the other studies cited above he concludes :

"These calculations suggest that wind generation saves little greenhouse gas emissions when the emissions from the back-up are taken into account.

1. Wind power does not avoid significant amounts of greenhouse gas emissions.

2. Wind power is a very high cost way to avoid greenhouse gas emissions.

3. Wind power, even with high capacity penetration, can not make a significant contribution to reducing greenhouse gas emissions."

It is clear from all these studies just cited in this section that **industrial wind power fails to deliver any significant savings in greenhouse gas reduction. No independent scientific study has ever shown that industrial wind energy saves a significant amount of greenhouse gases.**

This fact has been well known for many years, the REF study was published in Dec 2004, over four and a half years ago. Despite the repeated claims the wind industry may make about any recent improvements the most recent 2009 study by Carnegie Mellon University states that **emissions can actually be increased by industrial wind power.** Industrial wind power stations are therefore of no environmental benefit and should not be built.

5. PROJECT LIFESPANS

Wind industry developers suggest a 20 to 25 year lifespan for an industrial wind turbine, which involves continuous monitoring and maintenance requiring unlimited 24 hour / 7 days per week / 365 days per year access to the leased land. However, due to the majority of these installations being new developments, few turbines have been around to test these lifespan assumptions under real world conditions. Regarding wind turbine warranties Apt and colleagues state in the American National Academies of Science Fall 2008 on-line journal "Issues in Science and Technology" in a paper titled *"A National Renewable Portfolio Standard? Not Practical"* that :

"Demand (driven by state RPSs and the federal renewable production tax credit) has already stretched supplies thin, creating an 18-month delivery delay for wind machines. It has also emboldened manufactures to reduce wind turbine warranties from five years to two."

Turbine failures and engineering problems are an occurrence that has also affected our decision not to host wind turbines. For example, TrustPower's Snowtown installation was built and is maintained by India's industrial wind turbine manufacturer Suzlon Energy Ltd. Suzlon have experienced problems with blade failure which has impacted on their share price recently. The 25th October 2008 Wall Street Journal article "Windmill Mishap Weighs on Suzlon" at (http://online.wsj.com/article/SB122485006026866321.html) reported on a blade failure incident which drove down the Suzlon shares by 39%. This report tells of a 140ft (42.67m) long turbine blade snapping off and being thrown 150ft (45.72m) from the tower. This is a known problem with Suzlon's turbine blades *: "Earlier this year, Suzlon, of Pune, India, said it would strengthen or replace 1,251 blades -- almost the entire number it has sold to date in the U.S. -- after cracks were found on more than 60 blades on turbines run by Deere and Edison International's Edison Mission Energy."* Suzlon has been in further trouble as seen in a recent Bloomberg news report on 16th April 2009 "Suzlon Falls Most in 3 Months on Faulty Blade Report" (http://www.bloomberg.com/apps/news?pid=20601091&sid=aEEY_nocEVzo). Suzlon shares fell 84% last year, with further losses already in 2009. These technical problems are experienced across the whole wind industry and are not just limited to Suzlon. An article in Business Week, 24th August 2007, " The Dangers of Wind Power" discusses the global rise in the number of accidents and failures (http://www.businessweek.com/globalbiz/content/aug2007/gb20070824_562452.htm?chan=globalbiz_europe+index+page_top+stories). Gearboxes in wind turbines are often replaced within the first 5 years. Wind turbines can stand idle for up to 18 months waiting for replacement parts. Also in this report Jan Pohl of insurance firm Allianz in Munich, who faced about 1000 claims in 2006 stated : "an operator has to expect damage to his facility every four years, not including malfunctions and uninsured breakdowns."

Land leases also commonly have options to renew for a further term, meaning that leases can be tied up for up to 50 or more years. This is similar to the contracts that the wind industry are currently urging landholders to sign. Leases are often on-sold to other companies, bearing in mind that a wind energy company will expect to have profited from their investment well before the lease expires.

For the landholder attempting to judge the lifetime of an industrial wind plant it is also

vital to consider research on the effects of climate change on energy infrastructure. In Chapter 11 (Australia and New Zealand) of the IPCC Working Group II Contribution to the 4th Assessment Report *"Climate Change 2007 – Impacts, Adaptation and Vulnerability*" it is worth noting the following in Section 11.4.10 Energy on page 523 : "*Climate change is likely to affect energy infrastructure in Australia and New Zealand through impacts of severe weather events on wind power stations, electricity transmission and distribution networks*". Later in the same section an assessment of potential risks for Australia found, among other risks, that : "*increased peak and average temperatures are likely to reduce electricity generation efficiency, transmission line capacity, transformer capacity and the life of switchgear and other components*". This potential for future failures coupled with the known unreliability of wind energy further diminishes the financial returns of industrial wind turbines for the landholder.

Other studies have shown that there is also the potential for climate change to impact directly on wind resource : Sailor, D.J., M. Smith, and M. Hart, 2008. "Climate change implications for wind power resources in the Northwest United States," *Renewable Energy*, 33 (11), pages 2393-2406. This paper concludes that wind generated electricity in the area studied could be reduced by up to 40% through climate change. This research builds on their earlier study Breslow, P., and D.J. Sailor, (2002) "Vulnerability of Wind Power Resources to Climate Change in the Continental United States", *Renewable Energy*, 27 (4), pages 585-598. In this work they estimate a 1% to 3.2% reduction in wind speeds in the area studied over the next 50 years, and a 1.4% to 4.5% reduction over the next 100 years. As mentioned in Section 3 of this submission, turbine power output is greatly affected by any small change in wind speed on the power curve, so even small reductions in future wind speeds can have a significant effect on maintaining industrial wind turbine power station viability.

6. DECOMMISSIONING WIND TURBINES AND INFRASTRUCTURE

From our meetings with other NSW landholders who are or have been coerced by industrial wind energy companies it is evident that they are under the impression that they will benefit from the "scrap value" for turbines when they are no longer in service. Governments, on the other hand, are being given the false impression by the wind industries project application documents that decommissioning costs will be covered by scrap value. **This is not true and represents a significant problem for the future and further demonstrates that industrial wind energy developments are NOT environmentally responsible.**

For example, the false assumption of scrap value covering decommissioning costs is stated by the developer Epuron (http://www.epuron.com.au) in the current Harden / Yass Preliminary Assessment document Chapter 4, Page 13, Section 4.5.3 available at (http://majorprojects.planning.nsw.gov.au/page/project-sectors/transport--communications--energy---water/generation-of-electricity-or-heat-or-co-generation/?action=view_job&job_id=2765) :

"It should be noted that the scrap value of turbines and other equipment is expected to be sufficient to cover the majority of the costs of their dismantling and site rehabilitation."

The final Environmental Assessment document for the now approved Conroy's Gap site, Chapter 1, Page 42, Section 3.4.3 available at (http://www.epuron.com.au/desktopdefault.aspx/tabid-786/) :

"The scrap value of turbines and other equipment is expected to be sufficient to cover the majority of the costs of their dismantling and site restoration."

These are incorrect assumptions and highlight that decommissioning plans are a more recent problem the wind industry and the NSW Government should now be addressing. **All industrial wind energy developers are making exactly these same claims in their planning applications which are being systematically approved in NSW without question.**

Decommissioning is a very expensive, industrially intensive process. The decommissioning process outweighs potential scrap value and currently requires adherence to State Government legislation in the form of a Decommissioning Management Plan, which currently includes, but is not limited to: disposal of non-recyclable components, removal within 18 months of any wind turbine that is continuously inoperable for 12 months (which may occur through a fault or economics), restoration of land and vegetation, removal of infrastructure and access roads within 12 months, procedures for notification of surrounding landholders of decommissioning activities as this will again be intrusive to the surrounding community. For an example of this requirement see Page 6 of the Project Approval document for Conroy's Gap at (http://majorprojects.planning.nsw.gov.au/page/project-sectors/transport--communications--energy---water/generation-of-electricity-or-heat-or-co-generation/?action=view_job&job_id=140).

A recent USA study on public record was independently commissioned regarding

realistic decommissioning costs for a currently proposed 124 turbine project in West Virginia. This study, by Energy Ventures Analysis Inc (EVA), found that the wind energy companies engineering decommissioning report stating that costs would be covered by scrap were incorrect. **EVA found that the decommissioning costs for that particular 124 wind turbine development were underestimated by US$10million.** The final decommissioning estimate was US$100,000 per turbine, resulting in an up front bond estimate of US$12+million at the start of the project. It is becoming more likely that future industrial wind energy projects will now require an up front bond, without inclusion of any scrap value due to the fluctuating nature of the scrap metal market. Should such large bonds be required by any future government legislation, these would be an additional financial burden that may halt a project after a lease has been signed, potentially leaving the landholder tied to an onerous long term lease agreement without income. The potential problem should decommissioning not be underwritten is that this financial burden reverts to the landholder and/or the community. **However, nowhere in the project approval documents for Conroy's Gap is there any requirement for a bond to cover decommissioning costs.**

7. HEALTH PROBLEMS AND WIND TURBINE NOISE POLLUTION

A further example of the environmentally negative impacts is the many health problems caused by industrial wind turbine power stations. Among the increasing worldwide reports of negative health effects of industrial wind turbines we draw particular attention to the work of many health professionals who have produced papers and studies on this issue. The National Academy of Medicine of France in their March 2006 report "Repercussions of the Operation of Wind Turbines on the Health of Man" requested the necessity of epidemiological studies, these issues have been systematically ignored and denied by the industrial wind industry and governments :

http://www.academie-medecine.fr/detailPublication.cfm?idRub=26&idLigne=294

The following is brief summary of just some of the reports currently published, further references are given in these reports.

7.1 WIND TURBINE SYNDROME

Dr Nina Pierpont MD, PhD (www.windturbinesyndrome.com), who has recently published a book and several articles on the detrimental health effects. Dr Pierponts research and observations are reiterated in the press release by the Medical Staff of Northern Maine Medical Center (http://www.windaction.org/documents/20306). These issues of are of considerable concern for landholders, neighbours, residents, the general public and particularly for young children and the elderly. According to Dr Pierpont the symptoms of Wind Turbine Syndrome include :

1) Sleep problems: noise or physical sensations of pulsation or pressure make it hard to go to sleep and cause frequent awakening.
2) Headaches which are increased in frequency or severity.
3) Dizziness, unsteadiness, and nausea.
4) Exhaustion, anxiety, anger, irritability, and depression.
5) Problems with concentration and learning.
6) Tinnitus (ringing in the ears).

A very recent paper has demonstrated new results on human sensitivity to low frequency vibration, offering substantial support for Dr Pierpont's work : Neil P. McAngus Todd, Sally M. Rosengren, James G. Colebatch, "*Tuning and sensitivity of the human vestibular system to low-frequency vibration*", Neuroscience Letters 444 (2008) pages 36-41.

7.2 DR HANNING'S REPORT

One of the most recent reports (June 2009) is by Dr Christopher Hanning MD on "Sleep Disturbance and Wind Turbine Noise". Hanning founded, and until retirement, ran the Leicester Sleep Disorders Service, one of the longest standing and largest services in the United Kingdom, and he has 30 years of experience in the field. Hanning's report is very comprehensive and some points are mentioned here :

"There can be no doubt that groups of industrial wind turbines ("wind farms") generate sufficient noise to disturb the sleep and impair the health of those

living nearby." **Section 2.1.1**

"The swishing or thumping noise associated with wind turbines seems to be particularly annoying as the frequency and loudness varies with changes in wind speed and local atmospheric conditions. While there is no doubt of the occurrence of these noises and their audibility over long distances, up to 3-4km in some reports, the actual cause [of the wind turbine noise] *has not yet been fully elucidated."* **Section 2.2.4**

*"Unfortunately **all** government and industry sponsored research in this area has used **reported awakenings** from sleep as an index of the effects of turbine noise and dismisses the subjective symptoms. Because most of the sleep disturbance is not recalled, this approach seriously **underestimates** the effects of wind turbine noise on sleep."* **Section 3.1.2 (**Bold emphasis by Hanning)

Hanning later refers to this issue in Section 3.5 in relation to a 2006 UK DTI report :

"The lack of physiological expertise in the investigators in not recognising that noise can disturb sleep without actual recalled awakening is a major methodological flaw rendering the conclusions unreliable, as is the short recording period. It is well recognised also that not every resident affected by a nuisance such as noise will actually register a complaint. Many will not be sufficiently literate or confident so to do and others may wish to avoid drawing attention to the problem to protect property prices. They may assume also that protest is futile, which seems to be the experience of many with wind turbine noise. Recorded complaints are thus the tip of the iceberg."

"In my expert opinion, from my knowledge of sleep physiology and a review of the available research, I have no doubt that wind turbine noise emissions cause sleep disturbance and ill health. " **Section 3.8.3 (**Bold emphasis by Hanning)

7.3 ONTARIO HEALTH SURVEY

A recent study, the Ontario Health Survey, was made public on 22nd April 2009 by Wind Concerns Ontario. Of the 76 respondents, 53 people living near industrial wind turbine generators have reported significant negative impact and adverse health effects. The Ontario Health Survey reports problems associated with both humans and animals such as birds, cats, dogs, farming livestock, horses, ponies and wildlife, as well as stress related problems due to decline in property values. In conjunction with this study is a Deputation to the Standing Committee on General Government by Dr. Robert McMurtry M.D., F.R.C.S (C), F.A.C.S. Both documents are available at :

http://www.windaction.org/documents/22261

7.4 PHOTOSENSITIVE EPILEPSY AND FLICKER

The flicker effect of wind turbines blades are also known to precipitate seizures in people with photosensitive epilepsy. This research was published in Graham Harding, Pamela Harding, and Arnold Wilkins, (2008) "Wind turbines, flicker, and photosensitive epilepsy: Characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them" *Epilepsia* 49(6) pages 1095-1098. Some key points made by this paper are :

"Rotating blades interrupt the sunlight producing unavoidable flicker bright enough to pass through closed eyelids, and moving shadows cast by the blades on windows can affect illumination inside buildings."

"Planning permission for wind farms often consider flicker, but guidelines relate to annoyance and are based on physical or engineering considerations rather than the danger to people who may be photosensitive."

"Two examples of seizures induced by wind turbines on small wind turbine farms in the UK have been reported to the authors in 2007."

"Note that the risk of seizures does not decrease appreciably until the viewing distance exceeds 100 times the height of the hub, a distance typically more than 4 km."

7.5 VIBROACOUSTIC DISEASE

Pathologist Nuno Castelo Branco MD has been conducting extensive research on Vibroacoustic Disease (VAD) since 1980, including in relation to wind turbine generators. VAD is detailed in Castelo Branco NAA, Alves-Pereira M. (2004) "Vibroacoustic disease", *Noise & Health* 2004; 6(23): pages 3-20. VAD specifically related to industrial wind turbines is reported in Castelo Branco NAA, Alves-Pereira M. (2007) "In-Home Wind Turbine Noise Is Conducive to Vibroacoustic Disease*", Second International Conference on Wind Turbine Noise, Lyon, France*. The VAD study in relation to wind turbines discusses a rural property in an agricultural area occupied by 2 adults and a 10 year old child, with four 2MW wind turbines which began operation in Nov 2006. A section from the paper follows, note that ILFN stands for Infrasound and Low Frequency Noise, and WT stands for Wind Turbines :

"ILFN levels contaminating the home of Case 2 are amply sufficient to cause VAD. This family has already received standard diagnostic tests to monitor clinical evolution of VAD. Safe distances from residences have not yet been scientifically established, despite statements by other authors claiming to possess this knowledge. Acceptance, as fact, of statements or assertions not supported by any type of valid scientific data, defeats all principles on which true scientific endeavor is founded. Thus, widespread statements claiming no harm is caused by in-home ILFN produced by WT are fallacies that cannot, in good conscience, continue to be perpetuated. In-home ILFN generated by WT can lead to severe health problems, specifically, VAD. Therefore, real and efficient zoning for WT must be scientifically determined, and quickly adopted, in order to competently and responsibly protect Public Health."

7.6 WIND TURBINE NOISE

Contrary to statements by wind industry proponents, industrial wind turbines are noisy. A major issue with industrial wind turbines is noise pollution and the ongoing setting of standards to mitigate these effects. There has been much independent research indicating the failure of current legislation and the potential for this to be changed in the future. This will have a direct effect on the number and location of any wind turbines near residential homes and property boundaries, or their operation and potential for being shut down once built. **It will also impact upon and limit any future land use within the vicinity of wind turbines once they are erected.** Noise pollution is also directly linked to the adverse health effects described by Dr Pierpont and others in the previous

section of this submission.

Noise measurements are an important part of an industrial wind turbine power station development. These are conducted before, during and after construction at residential properties in the local area, as well as at properties hosting turbines. A recent paper by community noise experts George Kamperman and Richard R. James, was presented at the 2008 International Noise Conference held in Dearborn, Michigan "Simple guidelines for siting wind turbines to prevent health risks" available at (http://www.windaction.org/documents/17095). This paper reviews wind turbine noise studies to determine a set of safe guidelines. Also noted are the unique aspects of wind turbine noise, which are different from other common forms of noise such as traffic and industrial factories. Their review shows that residents as far away as 3km can experience sleep disturbance. The study specifically makes note of wind industry claims that turbine noise is masked by background noise. However this is not the case and due to atmospheric effects, particularly at night, the wind speed at the turbine hub height can be high but almost no wind can be experienced at nearby dwellings : *"This is the heart of the wind turbine noise problem for residents within 3 km (approx. two miles) of a wind farm."* This was first noted by G. P van den Berg in his PhD thesis "*The Sounds of High Winds: the effect of atmospheric stability on wind turbine sound and microphone noise*" and associated papers. G. P van den Berg's thesis is freely available online (http://dissertations.ub.rug.nl/faculties/science/2006/g.p.van.den.berg/). The research of van den Berg shows that there are significantly higher levels of noise pollution at night than are experienced in the daytime, and the effects of complex terrain such as hills are different to flat terrain. This research was first published in : Van den Berg G.P. (2004) "Effects of the wind profile at night on wind turbine sound", *Journal of Sound and Vibration* 277 (4-5), pages 955-970. More recent research relating to complex terrains as opposed to flat terrains is discussed in : Van den Berg G.P. (2007) "Wind profiles over complex terrain." *Second International Conference on Wind Turbine Noise, Lyon, France*.

On the 29th Feb 2009, the REF obtained data under the Freedom of Information Act relating to work conducted in 2007 by the University of Salford who were under contract to the Department of Business, Enterprise and Regulatory Reform: *Research into aerodynamic modulation of wind turbine noise* (www.ref.org.uk/PublicationDetails/49). This work indicates that current UK regulations on noise pollution relating to wind turbines *"(ETSU-R-97) is not fit for purpose, is failing to protect the amenity of neighbours and is urgently in need of revision."* A summary of wind turbine noise studies with links to articles is also available at (www.windaction.org/faqs/12759).

The Acoustic Ecology Institute produced a special report in January 2009 on Wind Energy Noise Impacts (www.acousticecology.org/srwind.html). More recent research was presented at the 3rd International Conference on Wind Turbine Noise held in Denmark in June 2009 (www.windturbinenoise2009.org), and the previous two conferences also contain research documents relating to negative impacts of wind turbine noise (www.confweb.org/wtn2005/) and (www.confweb.org/wtn2007/). The 4th International Conference on Wind Turbine Noise is scheduled for 2011.

8. PROPERTY DEVALUATION

It is worth noting that the negative environmental effects of industrial wind turbine power stations on property values are not just purely based on visual amenity. As mentioned above in the excerpt from Section 3.5 of Dr Hannings report "Sleep Disturbance and Wind Turbine Noise" he states in relation to complaints about noise pollution that "*others may wish to avoid drawing attention to the problem to protect property prices."* The Ontario Health Survey, and other health reports have mentioned the issue of stress related problems due to decline in property values.

A recent presentation by Gardner Appraisal Group Inc. given at the South Plains Agriculture Wind & Wildlife Conference in Lubbock, Texas, USA on February 13, 2009 titled "*Impact of wind turbines on market value of Texas rural land*" which discusses the **reduction of property values for landholders hosting turbines, as well as properties in the surrounding areas of such developments** : (www.windaction.org/documents/20145). Their appraisal research showed :

- A view adds value to rural property
- Take away view – added value goes away
- Brokers in rural areas confirm that property values in areas of wind facilities are 10% - 30% less than property not in areas of wind facilities
- Wind energy development creates an income stream for a property but this does not necessarily result in increased market value
- Previous studies funded by wind power proponents declaring no loss of property value are flawed due to built in bias and poor methodology

Two case studies are presented in this presentation. Case Study 1 is a 350 acre property with 27 turbines within 1.5 miles on the market in 2007. A prospective buyer agreed a purchase price but on disclosure of the wind turbine project the buyer backed out. The seller discounted the property by 25% but the buyer declined and little interest remains in the property. Case Study 2 is an analysis of seven properties with varying proximity to wind turbines, with two properties hosting turbines. **Loss in property value was reported as :**

- turbines on property = 37% loss on average
- turbines within .2 to .4 miles (0.32km to 0.64km) = 26% loss on average
- turbines within 1.8 miles (2.89km) = 25% loss on average

Further potential for loss in property value can occur due to

- wind turbine infrastructure
- high power transmission lines
- substations
- additional traffic for service of wind turbines and power lines
- additional roads

Gardner states that *"Market data and common sense tell us property values are negatively impacted by the presence of wind turbines."*

Land value issues are also addressed in many of the invited submissions to the Australian Federal Government's 2007 *"Inquiry into developing Australia's non-fossil fuel energy industry in Australia: Case study into selected renewable energy sectors"*. is available online and this report mentions some of the problems and issues with wind energy. The report also outlines other fast advancing renewable energy sources such as solar thermal and geothermal :

http://www.aph.gov.au/house/committee/isr/renewables/report.htm

This inquiry invited numerous Parliamentary Submissions from individuals and organizations, many of which address the negative impacts of industrial wind turbine developments :

http://www.aph.gov.au/house/committee/isr/renewables/subs.htm

Many of the invited submissions address the decline of property values. Submission 90 by the Molonglo Landscape Guardians is also recommended reading for an overview of issues of concern such as wind industry motivations, property value decline, questionable sustainability, and dubious economic benefits. The Tarwin Valley Coastal Guardians submission 7 and 7_1 presents, among others, some of the issues surrounding jobs that never appeared, variability of wind energy supply, noise levels and land value decline.

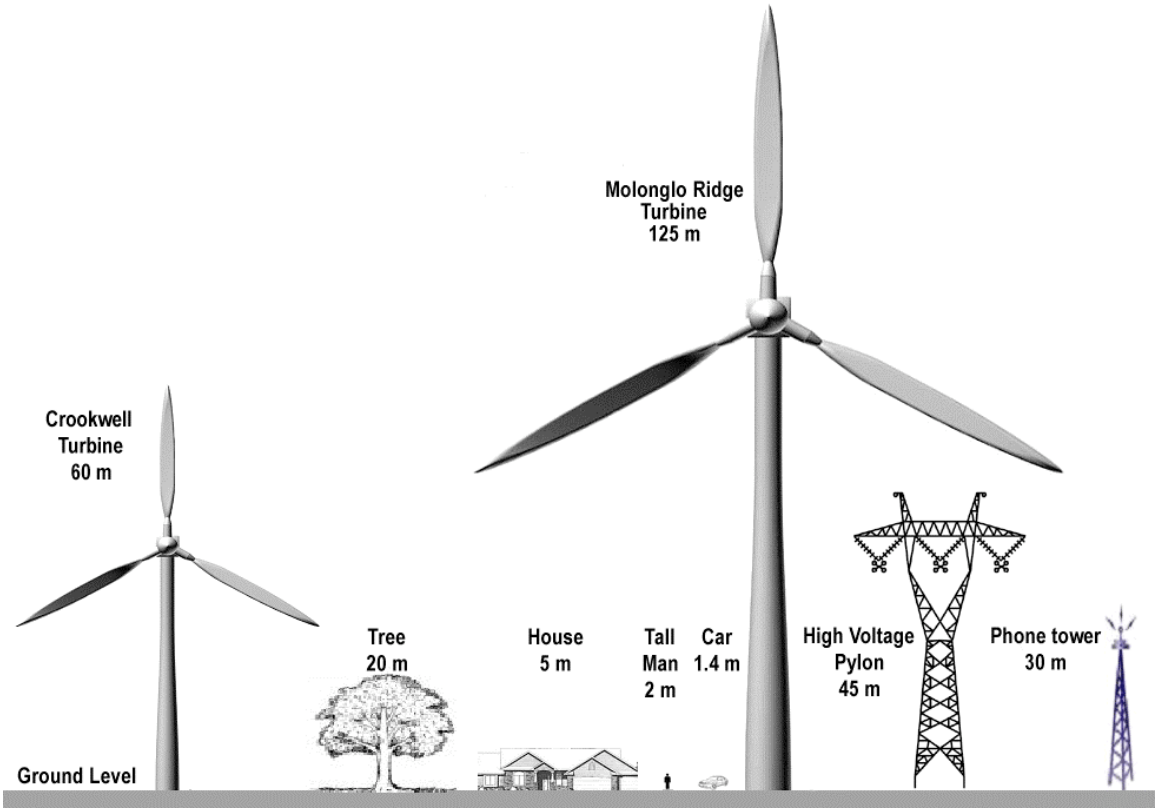
We are also aware of farmers experiencing negative effects on the value of their properties in NSW and Victoria where industrial wind energy developments have been proposed or established in their communities. It should also be noted that property value decline has occurred both during the proposal and contract phase, as well as once turbines are constructed. Decline of property values are noted throughout the 2007 Parliamentary submissions. In pages 14 to 16 of Submission 90 e.g. *"Bruce Richards, managing director of PBE Real Estate in South Gippsland, said that it was nearly impossible to sell a property within one kilometer of a wind turbine or a proposed wind turbine."*

9. VISUAL IMPACT

In terms of the visual impact of industrial wind turbines their size is increasing rapidly, and this has also been part of our decision not to host turbines on our property. As confirmed by our meeting with wind industry developers attempting to sign up land holders, and our knowledge of other industrial wind turbine developments, the areas of leased land hosting turbines and associated infrastructure, access roads, powerlines and substations, cannot be specified with certainty until after the lease agreement has been signed, monitoring has taken place and planning permission granted.

Many NSW landholders are under the impression they know the amount and location of turbines on their properties before monitoring takes place or planning permission sought, **which is clearly incorrect**. Any communication by wind power companies that is not in writing regarding specific siting (or any aspect) is unlikely to be legally binding. Wind industry representatives clearly stated during our meetings that even after the monitoring phase they would not be able to confirm exactly where the developments would be located.

Industrial wind turbine heights have risen from 60m, such as those seen at the original Crookwell site, to the now common height of 125m for 2MW turbines, almost the same height as Sydney Harbour Bridge, with a rotor diameter roughly the size of a 747 jumbo jet. A picture showing the scale of a 2MW 125m turbine is shown below obtained from the Molonglo Ridge Landscape Guardians site (http://www.mlg.org.au).



The current REPower 5MW turbines available for onshore sighting are much larger at 180m tall, almost the height of Canberra's Black Mountain Tower which is 195m, with rotor diameters of 126m. The 5MW turbines have been in use since 2005. Wind industry representatives stated in meetings that they would not be able, nor are they obliged, to stipulate to the landholder the type / size of turbines they may use in the developments.

According to the Zervous paper (mentioned in Section 2 of this submission) on "*Status and Perspectives of Wind Energy*" on page 105 of the IPCC 2008 report *Scoping Meeting on Renewable Energy Sources* and other wind industry documents, turbine heights and diameters continue to grow in size. For 8MW to 10MW turbines rotor diameters alone are estimated to reach 160m, twice the wingspan of an Airbus A380. As every increase in rotor diameter requires an increase in tower (hub) height, these newer turbines will be taller than Canberra's Black Mountain Tower. **How are NSW Government planning regulations addressing these new turbines to protect public health and amenity?**

The rapidly expanding size of wind turbines to obtain higher power outputs clearly demonstrates that as a minimum landholders should expect 125m high 2MW turbines in any development proposal that is currently in progress. For landholders still with contracts in the wind monitoring phase they could be in for a very tall shock. Again this is indicative of the enormous scale and visual impact industrial wind turbines will have in the rural NSW and surrounds. The approved Conroy's Gap development is to contain 15 x 2MW turbines, and the currently under submission Harden / Yass Valley (Coppabella Hills, Marilba Hills, Carrolls Ridge) proposal is for up to 200 turbines of 1.75MW to 3.3MW each.

10. THE GREEN JOBS MYTH & THE RENEWABLES BUBBLE

It is often stated that “green jobs” will be created by industrial wind energy developments. Two important recent studies from the USA and Spain have reported on problems with the strategy to support so-called “green jobs”. The recent report “*Study of the effects on employment of public aid to renewable energy sources”* by Dr. Gabriel Calzada, an economics professor at Juan Carlos University in Madrid, demonstrates that for Spain the “green job” has proven elusive and unsustainable. This study is available from : http://www.juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf Some important points from the executive summary are :

“This study is important for several reasons. First is that the Spanish experience is considered a leading example to be followed by many policy advocates and politicians. This study marks the very first time a critical analysis of the actual performance and impact has been made. Most important, it demonstrates that the Spanish/EU-style "green jobs" agenda now being promoted in the U.S. in fact destroys jobs, detailing this in terms of jobs destroyed per job created and the net destruction per installed MW.”

“Optimistically treating European Commission partially funded data, we find that for every renewable energy job that the State manages to finance, Spain's experience cited by President Obama as a model reveals with high confidence, by two different methods, that the U.S. should expect a loss of at least 2.2 jobs on average, or about 9 jobs lost for every 4 created, to which we have to add those jobs that non-subsidized investments with the same resources would have created.”

“Despite its hyper-aggressive (expensive and extensive) "green jobs" policies it appears that Spain likely has created a surprisingly low number of jobs, two thirds of which came in construction, fabrication and installation, one quarter in administrative positions, marketing and projects engineering, and just one out of ten jobs has been created at the more permanent level of actual operation and maintenance of the renewable sources of electricity.”

“This came at great financial cost as well as cost in terms of jobs destroyed elsewhere in the economy.”

“The study calculates that since 2000 Spain spent €571,138 to create each "green job", including subsidies of more than €1 million per wind industry job.”

“The study calculates that the programs creating those jobs also resulted in the destruction of nearly 110,000 jobs elsewhere in the economy, or 2.2 jobs destroyed for every "green job" created.”

“Each "green" megawatt installed destroys 5.28 jobs on average elsewhere in the economy: 8.99 by photovoltaics, 4.27 by wind energy, 5.05 by mini-hydro.”

“These costs do not appear to be unique to Spain's approach but instead are largely inherent in schemes to promote renewable energy sources.”

“The high cost of electricity due to the green job policy tends to drive the relatively most energy-intensive companies and industries away, seeking areas where costs are lower.”

“The study offers a caution against a certain form of green energy mandate. Minimum guaranteed prices generate surpluses that are difficult to manage. In Spain's case, the minimum electricity prices for renewable-generated electricity, far above market prices, wasted a vast amount of capital that could have been otherwise economically allocated in other sectors. Arbitrary, state-established price systems inherent in "green energy" schemes leave the subsidized renewable industry hanging by a very weak thread and, it appears, doomed to dramatic adjustments that will include massive unemployment, loss of capital, dismantlement of productive facilities and perpetuation of inefficient ones.”

“The energy future has been jeopardized by the current state of wind or photovoltaic technology (more expensive and less efficient than conventional energy sources). These policies will leave Spain saddled with and further artificially perpetuating obsolete fixed assets, far less productive than cutting-edge technologies, the soaring rates for which soon-to-be obsolete assets the government has committed to maintain at high levels during their lifetime.”

The 97 page University of Illinois Law & Economics Research Paper published in March 2009 authored by Professor Andrew P. Morriss, Professor William T. Bogart, Andrew Dorchak and Distinguished Professor Roger E. Meiners titled *Green Jobs Myths* contains an extensive survey and analysis. They show how the special interest groups promoting the idea of green jobs have embedded dubious assumptions and techniques within their analyses. The paper can be downloaded at : http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1358423

Their abstract states the main points of the study :

“A rapidly growing literature promises that a massive program of government mandates, subsidies, and forced technological interventions will reward the nation with an economy brimming with green jobs. Not only will these jobs improve the environment, but they will be high paying, interesting, and provide collective rights. This literature is built on mythologies about economics, forecasting, and technology.

***Myth**: Everyone understands what a green job is.*

***Reality**: No standard definition of a green job exists.*

***Myth**: Creating green jobs will boost productive employment.*

***Reality**: Green jobs estimates include huge numbers of clerical, bureaucratic, and administrative positions that do not produce goods and services for consumption.*

***Myth**: Green jobs forecasts are reliable.*

***Reality**: The green jobs studies made estimates using poor economic models based on dubious assumptions.*

***Myth**: Green jobs promote employment growth.*

***Reality**: By promoting more jobs instead of more productivity, the green jobs described in the literature encourage low-paying jobs in less desirable conditions. Economic growth cannot be ordered by Congress or by the United Nations. Government interference - such as restricting successful technologies in favor of speculative technologies favored by special interests - will generate stagnation.*

***Myth**: The world economy can be remade by reducing trade and relying on local production and reduced consumption without dramatically decreasing our standard of living.*

***Reality**: History shows that nations cannot produce everything their citizens need or desire. People and firms have talents that allow specialization that make goods and services ever more efficient and lower-cost, thereby enriching society.*

***Myth**: Government mandates are a substitute for free markets.*

***Reality**: Companies react more swiftly and efficiently to the demands of their customers and markets, than to cumbersome government mandates.*

***Myth**: Imposing technological progress by regulation is desirable.*

***Reality**: Some technologies preferred by the green jobs studies are not capable of efficiently reaching the scale necessary to meet today's demands and could be counterproductive to environmental quality.*

11. CONCLUSIONS

The short and long term problems of industrial wind turbines for the landholder, and surrounding communities is a subject of great concern. We have investigated these issues in order to come to a decision regarding leasing our land for industrial wind turbine developments. We ask that this inquiry make particular note of the destruction of the local environment and communities, and the loss of ours and others future livelihood and land use, when considering industrial wind turbine development in NSW.

11.1 SUMMARY OF KEY PROBLEMS

A summary of some of the key problems for NSW include :

- wind is a poor, highly variable, intermittent and unreliable resource for electricity generation
- potential landholder liability to 3rd party claims e.g. from neighbouring properties, local community and wind industry contractors / investors
- ongoing legislative changes e.g. planning, tax, emissions trading schemes, carbon credits etc.
- uncertainty regarding number, type and location of turbines
- uncertainty of associated access and infrastructure
- uncertainty of essential future infrastructure requirements, such as wind turbine energy storage devices, maintenance and access issues
- uncertainty of landholder income and the tax liabilities for the landholder
- considerable decommissioning expenses for abandoned projects and turbines, coupled with state regulations regarding decommissioning
- on-selling of leases by power companies
- electricity generated will be fed into the grid and is unlikely to be used by the surrounding community
- uncertainty of construction duration, which may be at least 18 months, 2 years or even longer
- uncertainty of length of time before wind turbine income stream begins, project could easily take 5 years before installation is complete
- meager income from onerous lease before and after wind turbines installed
- construction phase is a period of intense industrial development involving significant disruption to all landholders, neighbouring properties, the environment, local communities and surrounding towns
- ongoing access requirements for wind turbine security, monitoring, maintenance and upgrading
- destruction of environment and environmental monitoring required pre, during and post construction
- ongoing environmental and ecological monitoring of bird and bat fatalities necessitating further access to land, potentially with dog handler teams for carcass recovery without requiring owners permission
- ongoing environmental and ecological monitoring of flora and fauna necessitating further access to land without requiring owners permission
- noise pollution and the need for ongoing monitoring of noise pollution without requiring owners permission
- increased potential for trespassers and vandalism
- increased risk of theft for owners and neighbouring properties

- loss of privacy
- landholders loss of rights of complaint after signing lease agreement
- landholders loss of rights of disclosing any negative impacts after signing lease agreement
- loss of rural night sky views and sleep due to high visibility aviation warning lights for entire local community
- additional structures specifically to warn aviation of true height of turbines blade tip because height has to be indicated by stationary structures
- loss of ability for light aircraft to fly in vicinity of turbines for safety reasons, resulting in a diminished service for rural communities
- reduction in rights for landholder regarding wind turbine sighting after signing lease agreements e.g. participating properties have to tolerate higher noise levels from wind turbines than non-participating properties, which equates to closer sighting of turbines to dwellings
- restrictions on landholder and neighbours future land use with or without turbines being erected
- decline in property values for wind turbine hosts, neighbouring properties and wider community in vicinity of development
- irreparable destruction of environment and ecology through destruction and fragmentation of wildlife habitat
- unnecessary community divisions and loss of amenity for stakeholders and non-stakeholders
- loss and destruction of environmental, familial and cultural heritage

These are just some of the many concerns we have considered from a landholders point of view when considering industrial turbine wind energy lease agreements, irrespective of our more detailed environmental and other areas of concern.

Our conclusion is that there are far too many financial, legal, health and environmental risks for the landholder, for surrounding communities and for NSW to make industrial wind turbine development worthwhile. The only certainty from such a development within rural communities is the bitter and counter productive divisions of those rural communities. To commit unknown parts of our property to an onerous lease, drawn up by an uninvited tenant in a tenant oriented manner seems unwise. Such a lease with its intended development would restrict both our and our neighbours future rural land use. In addition, the rapidly advancing technology of other renewables, climate change predictions, volatile economic climate, ongoing debate of “true” carbon costs for wind energy and other variable / intermittent renewables requiring fossil fuel backup, and shifting government policies surrounding these issues, produces more uncertainty. Committing to a long term agreement with the wind industry would therefore be a bad business decision for us, our neighbours and our community.

Further large scale industrial wind turbine power plant developments in our rural NSW communities would have a major detrimental impact to our current and future business, research, lifestyle and investment activities.

The issues surrounding industrial wind energy development are broad and wide ranging. We have only briefly covered some of the issues of concern in this submission, **in particular the failure of industrial wind to have any significant impact on greenhouse gas reduction as evidenced by numerous studies, and their inability**

to replace any fossil fuel power stations. Other issues such as flora and fauna biodiversity, community consultation, land use, archeological, traffic / transportation, cultural heritage and fire risk due to industrial wind power station development are therefore issues of significant concern. **Is this really the legacy we want to leave for our children?**

11.2 SOME UNANSWERED QUESTIONS

There are many unanswered questions that industrial wind energy poses for Australia. For example :

- **What watchdog or committee is continually assessing whether wind power stations are living up to their promises?**
- **Who is assessing the ongoing environmental impacts on flora and fauna once these installations are built?**
- **Why are industrial wind turbine power station developments being allowed in vulnerable and endangered ecosystems in NSW, such as Box Gum Grassy Woodlands? (As noted in recent Federal Government "Caring for Country" publications conventional farming is already putting significant stress on such ecosystems.**
- **Who is assessing whether the electricity output of these wind power stations is living up to the original claims of the developers?**
- **How many fossil fuel power stations have been decommissioned in Australia as a direct result of displacement by existing wind power stations?**
- **How many fossil fuel power stations are expected to be decommissioned in Australia as a direct result of the currently proposed wind power station developments?**
- **Who is assessing what, if any, greenhouse gas reduction benefit wind power stations are producing and how close are they to the developers claims?**
- **What studies are to be conducted in Australia to assess whether peoples health have been affected by wind power stations?**

These unanswered questions must be addressed prior to any further rubber stamping and fast tracking of industrial wind turbine power station developments in NSW.

11.3 INDEPENDENT WEB RESOURCE ON INDUSTRIAL WIND ENERGY

We recommend visiting the Industrial Wind Action (IWA) Group website (www.windaction.org) which is a quality worldwide resource on industrial wind energy issues. As well as providing a continually updated web based resource the IWA are considered professionals who advise officials at federal, state and local levels to counteract misleading information from the wind energy industry.

The recent invited presentation by IWA Executive Director Ms Lisa Linowes at the 2009 Midwest Energy Conference in Chicago, USA (March 4-5) is an informative overview of the technical problems of large-scale wind turbine integration into the electricity grid : (http://www.windaction.org/documents/20337)

A subscription to the IWA news feed (www.windaction.org/subscribe) is a particularly constructive resource, as it compiles news stories and opinion from around the world. These news stories and academic research papers demonstrate that there are many

negative impacts from industrial wind turbine developments, and around the world these detrimental impacts consistently outweigh the very few (if any) positive impacts.

IWA's *Important Docs* section (http://www.windaction.org/?tab=topdocs) contains a number of peer reviewed documents from internationally recognised journals and conferences, as well as working papers by academics, medical doctors and industry professionals. These documents address many concerns regarding industrial wind energy and also provide cautionary information on lease agreements / easements between landholders, neighbouring / nearby properties and industrial wind energy companies.

11.4 RENEWABLE ENERGY STRATEGIES

The governments renewable strategy is based on targets for quantities of energy that are unknown. Again the REF in the UK makes this quite clear and in a briefing note in response to the UK governments 2009 strategy the issues are made quite plain. This briefing note, published on 27-07-09 is available from
http://www.ref.org.uk/PublicationDetails/54

This briefing note is highly relevant to this inquiry and some selected comments are included below (bold emphasis is theirs) :

"It should be noted this target is focused specifically on obtaining quantities of energy and does not bear directly on green house gas emissions reductions targets, though it is related at one remove with climate change policy.

"In the following discussion we show that, regrettably, the UK Government is probably mistaken with regard to the size of the target. This error arises since the target is 15% of an unknown quantity, namely Final Energy Consumption in 2020. In our view Government estimates of FEC in 2020 are overly optimistic. The potential error is large, and ***the target will probably be around 20% greater than that for which the government is planning****. This has significant implications for feasibility and cost."*

"REF noted that since energy consumption would probably increase Government was almost certainly underestimating the target magnitude. REF pointed out that in some EU data sets Final Energy Consumption was predicted to rise to around 185 mtoe, an increase of over 23% on current levels. This scenario is not addressed in the Renewable Energy Strategy."

At the lower levels Government admits that these targets will be very difficult to achieve. At the higher levels they are almost certainly infeasible. Indeed, there are reasonable doubts about the attainability of the lower quantities. For example, the levels of wind currently suggested (upwards of 25 GW) as necessary for the lower target would confront the UK with unprecedented balancing and grid management problems…"

"REF concludes that ***the Government's Renewable Energy Strategy is extremely and heroically optimistic about the scale of the targets, and so almost certainly underestimates the risks, the difficulties and the costs facing the UK****."*

"So the Renewable Energy Strategy would deliver annual savings of 7% of UK emissions and just 0.1% of current world emissions at extreme costs, and additional fiscal strain on already fragile economy. Clearly, this is not a good bargain, and reinforces the point we have often made that renewables are poor emissions reducers, whatever other virtues they might have."

"This is particularly disappointing since the UK's role in global climate change policy is to provide an economically compelling example, rather than any quantitatively significant contribution. At present our policy is unlikely to provide a constructive lead to any state in either the developing or developed world."

"For example, subsidised and mandated wind power on the scales currently contemplated by government will impair the economics of other plant but fail to provide compensating value. Investors in the still indispensable firm capacity needed to meet peak load (60 GW at 5.30 on a winter's day) will have no option but to minimise their risk by seeking the least capital intensive generation, which is gas-fired."

"…in the electricity sector ***the very aggressive wind policy (26GW of installed capacity) will ensure that for economic and technical reasons no other generation capacity except gas can be built, thus deepening and compounding UK gas dependency rather than alleviating it."***

"In other words, the Renewable Energy Strategy effectively makes capital intensive but high efficiency coal and nuclear infinitely too risky for investors, who will reduce their exposure by selecting the least capital intensive plant available, namely gas-fired generators, or, as is already apparent, scaling back investment in the UK altogether."

"It must be emphasised that ***contrary to Government assertions the renewables policy is a gas policy in disguise****."*

"… ***renewables on the irrational and politically driven scale outlined in the Renewable Energy Strategy will become a dangerous liability****. Distressed and painful policy corrections are inevitable."*

Appendix : NSW Department of Planning Environmental Assessments

With particular reference to NSW environmental assessments / impact statements we have found that the sections on Noise Assessment use a flawed methodology. Research demonstrating these flaws is presented in Kamperman & James (2008), and also in James' Statement of Evidence in 2008 regarding the development at Mills Creek, NZ. Both are listed in the bibliography below. Kamperman and James examined a number of noise assessments in Europe, Canada and USA which had received noise complaints after construction. Some important excerpts from their Noise-Con 2008 conference paper :

"After reviewing the materials in the tables; we have arrived at our current understanding of wind turbine noise and its impact on the host community and its residents. The review showed that some residents living as far as 3 km (two (2) miles) from a wind farm complain of sleep disturbance from the noise. Many residents living one-tenth this distance (300 m. or 1000 feet) from a wind farm are experiencing major sleep disruption and other serious medical problems from nighttime wind turbine noise. The peculiar acoustic characteristics of wind turbine noise immissions cause the sounds heard at the receiving properties to be more annoying and troublesome than the more familiar noise from traffic and industrial factories. Limits used for these other community noise sources do not appear to be appropriate for siting industrial wind turbines."

"The common method used for establishing the background sound level at a proposed wind farm used in many of the studies in Table 1 was to use unattended noise monitors to record hundreds often (10) minute measurements to obtain a statistically significant sample over varying wind conditions or a period of weeks. The measured results for daytime and nighttime are combined to determine the statically average wind noise as a function of wind velocity measured at a height of ten (10) meters. This provides an enormous amount of data but the results have little relationship to the wind turbine sound immission or turbine noise impact in nearby residents. The purpose of this exhaustive exercise often only demonstrates how much noise is generated by the wind. In some cases it appears that the data is used to 'prove' that the wind noise masks the turbine's sound immissions."

The most glaring fault with this argument is shown during the frequent nighttime conditions with a stable atmosphere when the wind turbines generate the maximum electricity and noise while the wind at ground level is calm and the background noise level is low. This is the condition of maximum turbine noise impact on nearby residents. It is the condition which most directly causes chronic sleep disruption. Furthermore, this methodology is usually faulty, as much of the wind noise measured by unattended sound monitors is the wind noise generated at the microphone windscreen resulting in totally erroneous results."

An example of this flawed methodology in a noise assessment is evident in the NSW Government approved Conroy's Gap development. The monitoring campaign summary by noise consultants Heggies Australia on page 25 of Epuron's environmental assessments details numerous problems with data gathering, due to flat logger batteries, damaged microphones, non-functional wind monitoring, logger failure etc. In fact out of

25 monitoring periods only 1 produced a full period. This Noise Assessment is Attachment 7 of Epuron's Environmental Assessment available on line at :

http://www.epuron.com.au/desktopdefault.aspx/tabid-786/

Of further concern for environmental assessments is the repetition and "cut and paste" that appears. Such techniques demonstrate low professional standards. Error and repetition is seen in the case of Gullen Range, the Traffic Impact Study still has "Conroys Gap" as the header on pages 4, 24 and 25. The Traffic Impact Study is Attachment 3.8 of Epuron's Environmental Assessment available on line at :

http://www.epuron.com.au/desktopdefault.aspx/tabid-787/

Noise levels are certified by the wind turbine manufacturer assuming optimal operating conditions; a perfect linear intersection velocity with the surface area of the blade. Once the blade incorporates turbulence (from either a sudden increase in gradient - also known as shear, tall tree plantations, inadequate spacing or atmospheric turbulence), then extreme variances in pressure over the surface area of the blade are created. This results in vibration and therefore operating inefficiencies, the potential for blade damage and noise issues. Noise level certification becomes invalid when operating conditions are breached.

The Vestas V90 wind turbine specification document (Vestas 2008) recommends that turbines not be placed on slopes greater than 10 degrees within 100m of a turbine (see Section 1.3 Terrain Conditions). A spacing of 5 rotor diameters is recommended at Section 1.4 Climatic Conditions. At Section 2.1 Wind Climate, it also mentions that the turbulence % maximum is 20%. The wind speed data for the Victorian Government's recently approved Winchelsea Wind Farm, one of the few sites at which wind speed data was ordered to be released by VCAT, showed a night time turbulence pattern of over 20% for 75% of the time over a 12 month period and slopes greater than 10 degrees. Other industrial wind power stations have been built on slopes greater than 10 degrees and spacing issues are very much apparent. Basic manufacturer specifications are not taken into consideration during the planning process and noise standards deliberately exclude low frequency noise. This problem of turbulence is well known and is discussed in the CSIRO publication on wind resource assessment, Coppin, Ayotte and Steggel (2003).

Submission 1 to NSW Dept of Planning re Yass Valley Windfarm

21 December 2009
The Director,
Major Infrastructure Assessments,
Department of Planning,
GPO Box 39,
Sydney NSW 2001

Dear Mr Osborne,

RE : Objection - Yass Valley Wind Farm proposal Application Number: MP08_0246

I wish this emailed letter to be considered as a further submission on the Yass Valley Wind Farm proposal, your Application Number: MP08_0246.

I hereby lodge this objection to this application. I object on the grounds that:

1) The stated GHG reduction figures are incorrect and inconsistent, re p15 to 17 of the main EA document.

The Capacity Factor (unstated by Epuron) works out at 36% based on their MWh / year figure : 1,200,000MWh / (380MW x 8760hours). Although this CF is highly optimistic I have calculated the CO2 reduction estimates based on displacing peaking gas plant at this CF, which is what will occur in the case of Yass Valley wind farm. I have provided figures also for coal, even though this won't be displaced, to give an example of how Epuron's figures are significantly over estimated.

0.86t coal = 1,032,000 tCO2/year
0.36t gas = 432,000 tCO2/year

Compare this with Epuron's claim of 1,160,000 tCO2/year, and it appears that this wind farm would deliver a third of their claim at best.

Epuron worked it out as 0.96t tCO2/year, which is the NSW Pool Coefficient and has nothing to do with estimating wind farm GHG reduction figures. Epuron repeatedly mentions coal fired power stations during the EA, but this has no relevance to this application as NO coal fired power stations or their generation output will be displaced by this development.

P17 : CO2 reduction figure diff to page 15, p17 claims : 1,140,000 tCO2/year

Homes powered / cars removed is a misleading claim and should be removed, these are not recognised scientific physical units, and bear no relation to the reality of security of supply that the electricity system produces, nor does it state how much of the power produced is divided between residential and business/industrial use.

I would also point out to the Department that recent research in the USA has identified that peaking gas plant paired with industrial scale wind power stations do not deliver the C02 reductions that are currently assumed by policy makers, and in some cases NOx emissions can increase. It is highly likely that the GHG reduction figure for industrial scale wind power stations will be reduced further, as well as a re-adjustment of Life Cycle Analysis (LCA) figures as a result of this scientific research :

Katzenstein, W & Apt, J, "*Air Emissions Due To Wind and Solar Power", Environmental Science & Technology* (2009) Vol 43 No 2 pages 253-258

The most recent (2009) research paper in the scientific journal *Environmental Science & Technology* which goes into great detail on the poor greenhouse gas reduction capability of wind power, and also presents research results showing increases in NOx emissions due to wind.

* Katzenstein, W & Apt, J, "*Incorporating Wind into a Natural-gas Turbine BaseloadPower System Increases NOx and CO2 Emissions from the Gas Turbines*", (2008), Fifth Annual Carnegie Mellon Conference on the Electricity Industry, Future Energy Systems: Efficiency, Security, Control available on line at :

http://www.ece.cmu.edu/~electriconf/2008/PDFs/6-2%20Katzenstein%20and%20Apt.pdf

This presentation is an overview of their work detailed in the previous paper and makes particular note that :

- **1MWh of wind energy does not eliminate 1MWh of emissions**
- **Amount of emissions displaced by wind are overestimated**
- **Life Cycle Analyses does not account for wind's effect of decreasing the emission efficiencies of conventional fossil fuel generators**

2) Lack of community consultation.

I enclosed my correspondence with Epuron below. I also enclose the sum total of the information I have received, which was supplied in one of those emails. I have heard nothing more from Epuron since April 9th 2009. This has severely affected my ability to write this submission to my satisfaction. My discussions with other affected residents and friends in the Harden / Binalong / Bookham have revealed a similar lack of contact and information. It seems that most people are now only just becoming aware of this, and of course the 30 day

exhibition period is now over, so they cannot lodge a legal objection and submission to the developer. To my knowledge the developer Epuron has not sent anyone a community newsletter stating the date for exhibition. This is unacceptable and contravenes Best Practice.

3) Illegibility of Figures & Diagrams :

Most of these are practically unreadable throughout the document and Appendices. E.g. Fig 2-1, Fig 3-2, 3-3, 3-4, 3-5… in fact to name all the illegible figs and diagrams would take far too long, all figs should be checked and redone for this document at a resolution that is readable. From the dates that I can make out on the figures, these images have been made many months previous to the on-exhibition date, no community consultation has taken place regarding the turbine layout or any other matter.

4) Number of landholders is inconsistent

P28 of main EA states 15 involved landholders for Coppabella, on P30 this is stated as 13. The image on P30 contains a section that is not shown on any other map that I can find, compare it with p29 layout. This is the section at the north east, an olive green colour to the right of the purple section. As the key, road names and any other useful information is illegible I cannot state the names of these blocks. In addition it has been brought to my attention by neighbouring landholders and other residents that some of the properties listed as "participating landholders" have not yet signed contracts. How can this be a credible application without such landholder lease agreements being in place?

5) Decommissioning

From our meetings with other NSW landholders who are or have been coerced by industrial wind energy companies it is evident that they are under the impression that they will benefit from the "scrap value" for turbines when they are no longer in service. Governments, on the other hand, are being given the false impression by the wind industries project application documents that decommissioning costs will be covered by scrap value. **This is not true and represents a significant problem for the future and further demonstrates that industrial wind energy developments are NOT environmentally responsible or Ecologically Sustainable Development (ESD).**

For example, the false assumption of scrap value covering decommissioning costs is stated by the developer Epuron (http://www.epuron.com.au) in their current Harden / Yass
Preliminary Assessment document Chapter 4, Page 13, Section 4.5.3 :

"It should be noted that the scrap value of turbines and other equipment is expected to be sufficient to cover the majority of the costs of their dismantling and site rehabilitation."

The final Environmental Assessment document for the now approved Conroy's Gap site,

Chapter 1, Page 42, Section 3.4.3 :

"The scrap value of turbines and other equipment is expected to be sufficient to cover the majority of the costs of their dismantling and site restoration."

These are incorrect assumptions and highlight that decommissioning plans are a more recent problem the wind industry and the NSW Government should now be addressing. **All industrial wind energy developers are making exactly these same claims in their planning applications which are being systematically approved in NSW without question.**

Decommissioning is a very expensive, industrially intensive process.

A recent USA study on public record was independently commissioned regarding realistic decommissioning costs for a currently proposed 124 turbine project in West Virginia. This study, by Energy Ventures Analysis Inc (EVA), found that the wind energy companies engineering decommissioning report stating that costs would be covered by scrap were incorrect. **EVA found that the decommissioning costs for that particular 124 wind turbine development were underestimated by US$10million.** The final decommissioning estimate was US$100,000 per turbine, resulting in an up front bond estimate of US$12+million at the start of the project. It is becoming more likely that future industrial wind energy projects will now require an up front bond, without inclusion of any scrap value due to the fluctuating nature of the scrap metal market. Should such large bonds be required by any future government legislation, these would be an additional financial burden that may halt a project after a lease has been signed, potentially leaving the landholder tied to an onerous long term lease agreement without income. The potential problem should decommissioning not be underwritten is that this financial burden reverts to the landholder and/or the community. **However, nowhere in the project approval documents for Conroy's Gap is there any requirement for a bond to cover decommissioning costs.**

Hewson, T & Stamberg, J, (2008), "*Beech Ridge Energy LLC Financial Assurance Needs",* Energy Ventures Analysis, Inc. Available on line at :

http://www.windaction.org/documents/23450

This document us the full Energy Ventures Analysis (EVA) decommissioning report on the **USD$10million** underestimate for the 124 turbine Beech Ridge development in the USA. All NSW developers are claiming that decommissioning is covered by scrap value, this report shows that this is not the case and a serious underestimation of the realities of decommissioning/site restoration. Cost estimates per turbine for decommissioning were **US$100,000** and ultimately the landholder is liable should funds not be available by the wind energy company. (Please refer to section 6 of our submission) The summary from EVA :

"Tom Hewson of Energy Ventures Analysis, Inc. ("EVA") was hired by the citizen's group, Mountain Communities for Responsible Energy, to evaluate a Decommissioning Cost Report prepared for the Beech Ridge Energy Project - a 124-turbine project proposed for Greenbrier County, West Virginia.

The project wind developer, Invenergy, had argued that the scrap value of the wind turbines would far exceed the cost to decommission the wind project and thus, bonding only $2,500 per turbine that would slowly escalate to $25,000/turbine by year 16 would be more than adequate.
The applicant's consultant estimated that its salvage value credit would reach $12.64 million ($101,900/turbine) in their decommissioning fund study based upon application of general scrap factors and prices. This scrap value credit would more than offset their estimated demo costs ($8.68 million: $70,000/turbine).
EVA completed an independent assessment of the salvage value of the Beech Ridge Wind turbines by first contacting the major regional scrap yards directly and obtaining current scrap prices for steel, copper and transport. From these data, EVA developed a Beech Ridge project-specific salvage credit estimate of only $2.63 million, i.e., $10.01 million less than the original applicant study. They also uncovered several major flaws in the applicant study methodology and pricing. The developer not only used old scrap prices but failed to take into account costs related to transporting scrap to a yard. In addition, to obtain the posted scrap price, they would need to break down the tower into 3-4 ft length pieces else the quoted price would be significantly less. In addition, the copper materials must also have their insulation stripped and/or copper pieces separated to obtain their posted copper price. If not, their scrap value would be far less than the common posted price. Given the large drop in scrap prices in recent years (>40%), EVA found that scrap value would no longer cover decommissioning costs.
EVA also compared the estimated demolition costs to another decommissioning report for another wind project developer that had contained detailed cost breakdowns. The other study estimated demo costs of $97K/turbine vs. $70K/turbine by Beech Ridge. Using the demolition costs from the other wind turbine project decommissioning study would translate to a Beech Ridge demo cost of $12.03 million, i.e., $3.35 million more the applicant's $8.68 million estimate. (Note: In another very recent project EVA had reviewed, the decommissioning costs were again severely underestimated by more than 50% by not taking into account recent crane rental rates, assuming extremely low earth moving costs, and assuming high productivity rates (6 turbines/wk).)
The bottom line is that even if the permitting agency allows the salvage credit, the total net cost of decommissioning the Beech Ridge project today would be $10.4 million ($83,900/turbine). EVA's analysis quantified the large scrap price and demo cost escalation risk being assumed by the local community. To protect the community, the permitting agency should require a bond of a minimum $100K/turbine ($12.4 million) to capture demolition cost escalation risk. If the wind developer can convince the bonding company of the high salvage value, then they should be able to negotiate a lower rate for the bond. If they were right, there would be very little price difference for a larger $12+ million bond. EVA encourages shifting the risk to the bonding company.
The developer and bonding company should assume the price risk and not the community."

* Brown, R (2009) "*Appeal of Maine final order, Record Hill Wind LLC*", State of Maine Board of Environmental Protection re : Record Hill Wind Project. Available on line at :

http://www.windaction.org/documents/23278

Appeal filed by the Concerned Citizens to Save Roxbury ("CCSR") regarding the 22 industrial scale turbine proposal in Roxbury, Maine. The full appeal includes testimony

filed by sound expert, Richard James. Also includes objections to the **Decommissioning Plan** and makes note of the fact the fact the **Deerfield** ruling disallowed a deduction for scrap value, see pages 31 to 33 in part 2 of the PDF documents.

* Comfrey Wind Energy, LLC, (2007) "*Docket Number: IP6630/WS-07-318 Decommissioning - Estimated Cost and Funding Analysis for Comfrey Wind Energy – REVISED, page 31a*", Minnesota Dept. of Commerce. Energy Facility Permitting, Siting and Routing

This decommissioning report submitted on 1st August 2007 is the estimated costs by Comfrey Wind Energy for fifteen Suzlon S88 2.1MW wind turbines, hub height 80m and rotor diameter 88m. Total estimated cost to dismantle & remove turbine per unit without scrap value is **US$154,000.** No other infrastructure dismantling costs were submitted in this report.

* State Of Vermont Public Service Board (2009) *"Docket No. 7250, Section VI Decommissioning Fund",* pages 91-96. Available on line from Government of Vermont website at :

http://www.state.vt.us/psb/orders/2009/files/7250finalorder.pdf
Some excerpts from the ruling relating to decommissioning:

Finding 331. *"The establishment of a fund to decommission the Project is necessary in the event the Project does not succeed, or to ensure its timely and permanent removal at the end of its useful life."*

Finding 331. *"Salvage value for scrap is vulnerable to market price volatility and thus should not be considered a reliable funding source for decommissioning the Project. The amount placed in the decommissioning fund should represent the full estimated costs of decommissioning without netting out estimated salvage value."*

Epuron have not given any indication that they have secured funds to cover any decommissioning costs associated with this or any other project.

Note : The recent findings / recommendations on decommissioning of the NSW Rural Inquiry into Rural Wind Farms :

P75-76

5.145 The Committee notes with concern the apparent lack of policy regarding decommissioning of
wind farms in NSW. The importance of managing the 'whole of life' of utility scale wind farm
developments should not be underestimated. Without adequate foresight during the planning
process, wind farms may present a public health and safety risk once they cease operating.

They may also adversely affect the environment and have socioeconomic ramifications such as
burdening NSW taxpayers to fund their removal.

5.146 The Committee further notes that under their lease agreement host landowners may have
responsibility to remove wind turbines from their property once the wind turbines stop operating. Due to the enormous size of wind turbines, the Committee is not confident that current decommissioning arrangements will in fact result in wind turbines being adequately removed from the landscape.

5.147 The Committee believes that effective wind farm planning should take responsibility for the
whole life of a wind farm, including decommissioning and it is unclear whether this is currently occurring. There is a risk that rapid planning and construction of wind farms is being
prioritised over adequate whole of life planning. This could present problems in future years.

5.148 The Committee notes that decommissioning requirements are identified as conditions of
consent in development approvals. The Committee further notes that these responsibilities *may* be passed on to host land owners in their lease contracts with wind farm developers. As host land owners may not be able to afford to remove wind infrastructure, there is a level of uncertainty regarding wind farm decommissioning.

5.149 The Committee believes that improved clarity and assurance is required for wind farm decommissioning to ensure that the requirements identified as conditions of consent are adhered to. The establishment of a system that guarantees funding for wind farm decommissioning is also supported by the Committee.

5.150 The Committee notes that the decommissioning information provided in the Auswind *Best*
Practice Guidelines for Implementation of Wind Energy Projects in Australia should be applied to wind farms in NSW. The Committee further notes the need for NSW policy to make this information obligatory in wind farm planning. The Committee believes that additional information is required to be included in the development of the *NSW Planning and Assessment*
Guidelines for Wind Farms to identify responsibility, the time period after operation in which turbines must be dismantled and how dismantling will be funded, including the option of applying a bond.

Recommendation 9

That the Minister for Planning address decommissioning of wind turbines in the *NSW Planning and Assessment Guide for Wind Farms*, including responsibility for decommissioning, the time period in which turbines should be dismantled and removed and how decommissioning will be funded. And that the Government consider requiring the developer to pay a bond.

I reserve the right to provide to the Department further detailed comment on these and other aspects of the findings in the Yass Valley Environmental Assessment subsequent to today.

Yours sincerely
Dr David Burraston PhD

Submission 2 to NSW Dept of Planning re Yass Valley Windfarm

11 January 2010
The Director,
Major Infrastructure Assessments,
Department of Planning,
GPO Box 39,
Sydney NSW 2001

Dear Mr Osborne,

RE : Objection - Yass Valley Wind Farm proposal Application Number: MP08_0246

I wish this emailed letter to be considered as a further submission on the Yass Valley Wind Farm proposal, your Application Number: MP08_0246.

I hereby lodge this further objection to this application and I object on the grounds that:

1) Table 3.1 Nearby Residencies P34 / 35 Marilba Hills

Further to my earlier statement that the number of involved Copabella Range landholders is inconsistent. So to is Marilba Hills where Table 3.1 lists 11 involved landholders, whereas Fig 3-6 states 13 landholders, which further raises the issue of whether these landholders actually have a lease agreement with Epuron.

2) Table 3.2 – Turbine Height

Siemens SWT107 height is 153.5m and maximum height is stated as 150m. Note 4 states that the maximum tip height will not exceed 150m if this turbine is used. How will this modification be achieved?

3) P70 – relocation of 250m

A comparison of Yass Valley WF with Taralga WF is completely unwarranted in the context of relocation of infrastructure, particularly with the close proximity of

residences. This would have a significant impact on residents in terms of noise and visual amenity for example. Furthermore such relocations would impact on the biodiversity study and have the potential to encroach on otherwise unsurveyed native species.

4) Repetition of text P72/3

Clear evidence of repetition / cut and pasting is evident in the text, which is indicative of the poor standards used in the preparation of the EA. The first 3 paragraphs in “Concrete Batching” on p72 is repeated on p73

5) P79/80 & onwards : Energy context of the proposal

The statement on p79 that Yass Valley WF would “help secure reliable energy” is ridiculous. Wind energy is intermittent and offers no security of supply, as stated by the Australian Energy Regulator (AER) in the State of the Energy Market Report 2009, p65 : *“wind capacity depends on the weather and cannot be relied on to generate at specified times.”* Has the proponent invented a reliable source of energy storage at a power station level? Is the proponent aware of the role of the AER? The function of the AER according to their website (http://www.aer.gov.au/content/index.phtml/tag/aerAboutUs/) is :

“The AER regulates the wholesale electricity market and is responsible for the economic regulation of the electricity transmission and distribution networks in the national electricity market (NEM). The AER is also responsible for the economic regulation of gas transmission and distribution networks and enforcing the national gas law and national gas rules in all jurisdictions except Western Australia.”

& principle functions are stated here
http://www.aer.gov.au/content/index.phtml/itemId/659161

The principal functions of the AER in relation to electricity networks include:

- *making electricity transmission and distribution regulatory decisions*
- *developing and publishing service standards to be applied to electricity transmission and distribution networks*
- *making and amending guidelines for the ring-fencing of operations and information flows between activities, or within a business, of a regulated entity*
- *promulgating the regulatory test referred to in the National Electricity*

Rules (the Rules)

- *enforcing the National Electricity Law (the Law) and the Rules made under that Law and investigating and bringing proceedings in connection with any breaches.*

The proponent again brings up Energy Reliability in section 4.5. How will the proponent ensure that the wind will blow at steady speed sufficient to generate electricity throughout the year 24 hours a day, 7 days a week, and without the requirement of a fossil fuel power station for backup?

The statement that Yass Valley WF will assist in reduction of GHG absolutely requires clarification. The proponent has failed to give any indication of the expected percentage of GHG reduction in any context. And later in section 4.3.4 the proponent repeats the incorrect statements regarding GHG reduction values, confusing the NSW Pool Coefficient with the true state of affairs. For some inexplicable reason the proponent is under the impression that base load coal fired power stations will be displaced by wind farms, when in actuality wind is shadow backed up by peaking gas plant. This further shows that the proponent has no understanding of electricity generation or its operation within the NEM. The issues such as intermittency/variability/non-reliability of wind, use of gas for back up, and start up times for coal are clearly stated extensively throughout the AER's State of the Energy Market Report 2009 as shown by the following brief quotes :

Page 38 :

"Gas is likely to play an important role under climate change policies in complementing intermittent renewable electricity generation. Wind generation — the likely primary renewable technology to 2020 — has intermittent output and must be backed up by other generation. Open cycle gas plants can respond quickly when there is insufficient wind generation, but any new plant is likely to operate at relatively low capacity factors. There will also be an increased need for gas transmission and storage to provide gas at short notice."

Page 50 :

"The fuels that can be used to generate electricity each have distinct characteristics. Coal fired generation, for example, has a long start up time (8 – 48 hours), while hydroelectric generation can start almost instantly."

Page 55 :

"The extent of new and proposed investment in intermittent generation (mainly wind) has raised concerns about system security and reliability."

The intertwined nature of wind and gas generation is well known to AER, the AEMO, and the general public but again, inexplicably, even though the proponent has sold wind projects to Origin they seem to think that somehow wind and gas are mutually exclusive. Again this situation is clearly stated by the AER (2009):

Page 102:

"The three largest private energy retailers — Origin Energy, AGL Energy and TRUenergy — are moving towards portfolios more balanced between generation and retail assets. In 2007 AGL Energy acquired the 1260 MW Torrens Island power station in South Australia from TRUenergy, in exchange for the Hallett power station (150 MW) and a cash sum. Origin Energy is quickly expanding its generation portfolio, commissioning the Uranquinty power station (650 MW) and expanding its Quarantine plant (130 MW) in 2008 – 09. It has also committed to a further 1250 MW of gas fired generation in Queensland and Victoria. All three businesses also have ownership interests in Australian wind farms."

(SECTION DELETED – SEE MAIN SUBMISSION SECTION 3. GHG EMISSIONS CONTEXT OF AUSTRALIAN WIND ENERGY FOR FURTHER DETAILS ON POOR GHG REDUCTION FIGURES)

6) P80 Section 4.3.1 Climate Change

Mention is made here of expected impact of climate change on water supply and other factors. The proponents have failed to research correctly the expected effects of climate change on energy infrastructure.

In Chapter 11 (Australia and New Zealand) of the IPCC Working Group II Contribution to the 4th Assessment Report *"Climate Change 2007 – Impacts, Adaptation and Vulnerability*" it should be noted from the following in Section 11.4.10 Energy on page 523 : "*Climate change is likely to affect energy infrastructure in Australia and New Zealand through impacts of severe weather events on wind power stations, electricity transmission and distribution networks*". Later in the same section an assessment of potential risks for Australia found, among other risks, that : "*increased peak and average temperatures are likely to reduce electricity generation efficiency, transmission line capacity, transformer capacity and the life of switchgear and other components*". This potential for future failures coupled with the known unreliability of wind energy further diminishes the viability or usefulness of this wind farm.

Other studies have shown that there is also the potential for climate change to impact directly on wind resource : Sailor, D.J., M. Smith, and M. Hart, 2008. "Climate change implications for wind power resources in the Northwest United States," *Renewable Energy*, 33 (11), pages 2393-2406. This paper concludes that

wind generated electricity in the area studied could be reduced by up to 40% through climate change. This research builds on their earlier study Breslow, P., and D.J. Sailor, (2002) "Vulnerability of Wind Power Resources to Climate Change in the Continental United States", *Renewable Energy*, 27 (4), pages 585-598. In this work they estimate a 1% to 3.2% reduction in wind speeds in the area studied over the next 50 years, and a 1.4% to 4.5% reduction over the next 100 years. As is well known, turbine power output is greatly affected by any small change in wind speed on the power curve, so even small reductions in future wind speeds can have a significant effect on reducing electricity generation output.

How does the proponent propose to address these issues? In addition what are the operating temperature ranges of the proposed wind turbines?

7) p89 onwards / Section 5.1.9 Ecologically Sustainable Development

The proponent claims that the proposal is an “Ecologically Sustainable Development” and that it adheres to these principles. This is a completely ridiculous contention with no basis in fact. **The completely insignificant contribution to GHG reduction and mitigation of climate change by this project invalidates any appeal to the precautionary principle.**

Industrial wind energy development is not an ecologically sustainable landscape management practice in endangered grassy woodland ecosystems and does not meet these principles. Sustainable landscape management is presented in the CSIRO publication McIntyre, McIvor and Heard (2002), and this text also has a specific focus on endangered grassy woodland ecoregions. The most recent research on an 800,000-ha section of an internationally recognised NSW endangered ecoregion is presented in (Fischer et al 2009). These two references provide key information on biodiversity and endangered species with calls for new policy supporting sustainable farming practices to turn the region from *“ecological decline to ecological recovery”.* There is no mention of installing industrial scale wind energy developments in this region as a sustainable landscape management practice from these key documents.

Fischer, J., Stott, J., Zerger, A., Warren, G., Sherren, K., Forrester, R. (2009) *“Reversing a tree regeneration crisis in an endangered ecoregion”,* Proceedings of the National Academy of Sciences USA 105, 10386-10391. Available on line at : http://www.pnas.org/cgi/doi/10.1073/pnas.0900110106

Covers the current ecological crisis in NSW and examines an 800,000-ha internationally recognised endangered ecoregion of NSW. Presents sustainable farming practices and calls for new policy supporting sustainable practice.

McIntyre, S., McIvor, J. and Heard, K (Eds), (2002) *“Managing and Conserving*

Grassy Woodlands", CSIRO Publishing.

Extensive CSIRO text on endangered grassy eucalypt woodland of Australia. Covers key areas such as biodiversity, **correct use of the precautionary principle**, sustainable practice, application principles and ecological concepts. This book is a key text for regional planning, landcare, land management, research and onground application. A key section of note in this book is on p178 "Adoption of new practices – some issues" which explains conflicts between new practices and sustainable land management. Web page relating to the book :

http://www.csiro.au/resources/ps1fs.html

The precautionary principle as it relates to endangered grassy woodlands is clearly stated in McIntyre, McIvor and Heard (2002) in the glossary on in the Preface on Page X :

"*If a particular action has consequences for the environment that are unknown, but which might be harmful, the precautionary principle dictates that the action should be avoided or limited."*

The proponent should be aware of such issues as they quote the Taralga case on p70 where one of the key topics of great interest to the Court is the intent of the developer to vandalise one ridgeline (Turbine Row 6) and other rows on native grassland designated as containing an "endangered ecological community" known as "Tablelands Basalt Forest, Endangered Ecological Community" see: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=20074

In addition on Page 202 of McIntyre, McIvor and Heard (2002) Table 9.1 details sustainable principles. Note that they state :

" Maintain local native trees for the long-term ecological health of the property and catchment."

"Always favour natural regeneration of existing trees over planting and recreating habitat."

No mention of the CSIRO text of McIntyre, McIvor and Heard (2002) is contained within the EA. How can the proponent credibly be expected to develop such a proposal with such an ignorance of accepted sustainable land management practice and principles in endangered grassy woodland ecosystems?

I would further draw the Department and the proponents attention to some key research texts on wildlife issues related to wind farms, with some brief annotations.

* Fry, D, / American Bird Conservancy (2007) Testimony of Donald Michael Fry, PHD. *The House Subcommittee on Fisheries, Wildlife and Oceans Oversight Hearing on: "Gone with the Wind: Impacts of Wind Turbines on Birds and Bats."*

Extensive testimony from the Director, Pesticides and Birds Program of the American Bird Conservancy. States the failure of collaborative efforts to address impacts of wind projects on birds and wildlife. Draws attention to the virtually nonexistent federal and state monitoring of wind energy projects. States that bird populations are at great risk, especially birds of prey and grassland songbirds. Calls for greater research and the need to answer many unanswered questions. Calls attention to the fact that many of the birds affected are already declining species, **so mortality at wind farms is significant**.

* Carrete, M et al (2009) "*Large Scale Risk-Assessment of Wind-Farms on Population Viability of a Globally Endangered Long-Lived Raptor",* Biological Conservation doi:10.1016/j.biocon.2009.07.027

Recent research paper looking at effects of wind turbines on endangered long-lived raptors. Calls for more research on long term effects of wind farms on wildlife populations. Research in this particular study shows that wind farms decrease survival rates and hence **significantly increases extinction probability**. This research also suggests that short term monitoring of wildlife impacts is not adequate to assess actual impacts of wind farms on wildlife. The negative effects of wind farms could result in **major impacts** in a few decades and jeopordize wildlife conservation worldwide. **Requests that turbines in risk zones should be located further than 15km away from nests.**

* Baerwald et al (2008) "*Barotrauma is a Significant Cause of Bat Fatalities at Wind Turbines"* Current Biology Vol18 No.16 pages R695-R696

Confirmation that bats are being killed in large numbers from barotraumas caused by rapid air pressure reduction near wind turbine blades.

* Arnett, E, (2006) "*A Preliminary Evaluation on the Use of Dogs to Recover Bat Fatalities at Wind Energy Facilities*", Wildlife Society Bulletin 34(5) pages 1440-1445

Postconstruction carcass searches for bats are used to estimate fatality rates at wind energy facilities. Due to variation in detection by human searchers fatality rates can be underestimated. This study evaluated the use of dog handler teams at wind farms to conduct carcass searches. In the trials it was found that dog handler teams fared better than just humans at locating carcasses. This research recommends further study on the use of dogs to recover carcasses.

* Arnett, E, et al (2008) "*Patterns of Bat Fatalities at Wind Energy Facilities in North America*", Journal Of Wildlife Management 72(1) pages 61–78

Widespread and extensive fatalities of bats have caused increasing concern about the impacts of wind farms on bats as well as other wildlife. This paper presents an overview of the research in North America on bat fatalities to date.

* Kunz, T et al (2007a) "*Ecological Impacts of Wind Energy Development on Bats: Questions, Research, Needs, and Hypotheses*", Frontiers in Ecology and the Environment Vol 5 No:6 pages 315-324

Summarises evidence about bat fatalities at wind farms in the USA. Identifies future research needs to help minimize adverse effects of wind energy development. Calls for future research to identify sites with highest adverse environmental impacts. Calls for policy framework requiring owners and developers to provide access and research funds for research and monitoring.

* Kunz, T et al (2007b) "*Assessing Impacts of Wind-Energy Development on Nocturnally Active Birds and Bats: A Guidance Document*", Journal of Wildlife Management 71(8) pages 2449–2486

Guidance paper for researchers, consultants, decision-makers, and other stakeholders for methods and metrics for investigating nocturnally active birds and bats in relation to utility-scale wind-energy development.

* Kuvlesky, W et. al. (2007) "*Wind Energy Development and Wildlife Conservation: Challenges and Opportunities",* Journal of Wildlife Management 71(8) pages 2487-2498

Covers many aspects of wildlife issues including; collision mortality, habitat loss, habitat alteration, and some of the future research needs.

Can the proponent comment on the above papers and explain how this wind farm development will not suffer from all of these well known wildlife problems?

8) P97 and onwards Section 6.2.2 Community Consultation

The EA states that follow up correspondence and face to face meetings with community stakeholders has taken place. Given the paucity of community consultation information present in the EA and poor correspondence I have received (my friends in Binalong have received the same poor treatment), what proof can the proponent give to show that this has taken place beyond a token gesture? I make particular note that the open house occurred on 10th Dec 2008 between 2pm and 7pm. As this is just before Christmas the majority of people did not have time to spare to attend, and in addition most of this "open house" would have occurred during working hours.

The proponent claims on p98 that at the open house there was "a larger degree of misinformation about various environmental impacts, gained from word of mouth and anecdotal information from the internet". Can the proponent provide evidence relating to this purported misinformation?

On p99 the proponent states that the Australia Institute report was given to people attending the landcare meeting. As this report is woefully out of date, was not peer-reviewed science, is poorly researched and mainly contains repeated claims from the wind industry, this represents misinformation on the part of the proponent. Can the proponent demonstrate that it has provided any independent and unbiased up to date information during its so-called Community Consultation process?

I would also point out that as of the date of this letter the Epuron website (www.epuron.com.au) still contains no information whatsoever regarding the Yass Valley WF other than the 08/10/2008 press release announcing it has commenced investigations. Epuron's "current" newsletter is still Issue 2, dated July 2008. This is pathetic. How can this be seen as valid community consultation or keeping the community informed? As of the date of this letter I have still received no further communication from Epuron regarding the Yass Valley WF.

Why has the proponent only given the public a 30 day exhibition period, again just before Christmas, which has made it practically impossible for anyone in the region to put read the EA and submit a submission? It is useful to work out the amount of time this would give an average member of the community to read the EA, research the issue and write a submission. Ignoring the photomontages the EA and the Appendices total 1,693 pages. Assuming that a member of the community works 5 days per week and has the weekend off, and is prepared to generously put in say 5 hours per evening (unlikely) e.g. 7pm until midnight, this would equal 30 days – 4 weekends = 22 days x 5 hours = 11 hours or 6,600 minutes.

This gives the total time for reading, researching the issue and writing a submission as 3.89 minutes per page, for a document the proponent has spent more than a year putting together. And based on the barely legible dates on the barely legible maps & images could have consulted with the community on some of these issues.

How can the proponent possibly think this is an adequate amount of time for members of the community to research such a complex issue while managing their daily lives?

9) P45 & onwards Section 3.3.3 Wind Turbine Layouts

The turbine layouts completely violate the SEDA (2002) planning 5r-8r spacing rule which for the example turbine given, REPower MM92, would require the following spacing's :

5 x 92m = 460m
8 x 92m = 736m

For the worst case given the turbines under consideration this is the Vestas V112 which would require the following spacing's :

5 x 112m = 560m
8 x 112m = 896m

Can the proponent redo the layout based on the correct spacing? This of course will reduce the number of turbines, and hence also reduce the amount of electricity generated and GHG emissions reduction even further. There is no mention of this key planning text in the EA, and I can only assume the proponent is unaware of this important text :

SEDA (2002) "NSW Wind Energy Handbook 2002" published by Sustainable Energy Development Authority of NSW, ISBN 0-7313-9191-8

10) P107 to p110 Seen Area Analysis

The Seen Area Analysis images contain no place names, and again the legibility of these images are extremely poor. It is possible however to make out the date that these images were made, 25/11/2008. This shows that proponent had all the turbine layouts finalised before the wind monitoring phase. In relation to the turbine layouts in Section 3.3.3 the dates for that drafting are 24/07/2009, which is EIGHT MONTHS AFTER the Seen Area Analysis was made. This curious sequence of dating is further compounded by the Substation and Control Building locations, which were drafted on 07/04/2009 (before the turbine layout draft), and the access road diagrams where drafted on what appears to be 24/07/2009. How can the proponent claim to have done a valid Seen Area Analysis when the presented turbine layouts are dated after this analysis was made? In addition, why did the proponent not show these layouts and the Seen Area Analysis to the community, as part of the consultation process? What was the date of erection of all of the wind monitoring masts at Yass Valley WF and when did data recording begin for each mast? Can the proponent provide any credible wind resource data and wind rose for each mast to show that the claims made are justifiable?

11) P256 Section 8.13 Life Cycle Analysis (LCA)

On p256 the proponent states that LCA is *"based on a careful accounting of energy and material flows associated with a system or process".* After making this statement the proponent then merely states the results from 3 overseas studies which bear no resemblance to the project in question. This is even more baffling as later in the EA on p268 the proponent states that : *"A detailed LCA is*

presented in Section 8.13." However, no such analysis / careful accounting has been presented.

The proponent begins by quoting Schleisner (2000) and the results of a study published in 2000. No mention is made however of the assumptions in this study or its context. All energy sources were assumed under Danish conditions, i.e. coming from Denmark for a wind farm in Fjaldene, Jutland. The wind farm in this study consists of 18 x 500kW turbines for a total installed capacity of 9MW. The wind farm sensibly uses a high spacing between turbines of 580m between rows and 188m between turbines. The turbine height is mere 41.5m to give an idea of how well separated they are.

In terms of the disposal of elements at the end of the Fjaldene wind farms life, the energy use is not calculated for oil and other products. Due to lack of data, energy consumption & emissions are estimated only for the manufacture of glass & polyester, not for fibreglass. Due to the nature of Danish electricity plants calculated emissions for these items have been reduced by a factor of 50%

The proponent then jumps to Martinez et al (2009) which refers to a wind farm in Munilla in Spain, although no indication as to which wind farm in Munilla is given. This is because this analysis also makes a number of assumptions that the proponent neglects to mention, and is not an LCA of a "wind farm", but an LCA of a wind turbine.

In fact the proponent also makes no mention of the study by Martinez and colleagues in the International Journal of Life Cycle Assessment (14):52-63, in their paper *"Life-cycle assessment of a 2-MW rated power wind turbine: CML method"* again note the use of the term wind turbine, rather than the term wind farm. Note that in this journal an energy payback time of 0.58 years was suggested for the 2MW turbine in question.

In the Martinez studies mentioned above a number of assumptions were made as detailed in their papers and I will outline some (not all) of these below.

For that study the turbine (a Gamesa G8X) was manufactured in Spain and shipped to its final destination in Spain a sum total of 156km. Can the proponent provide information pertinent to an LCA relating to the transport of materials to the manufacturer, composition of materials, manufacturing location of the turbines, method/distance of transportation to the shipping port, shipping distance and also method/transportation from shipping to their final destination at Yass valley WF?

No account was made in referenced LCA's of the associated access roads on the wind farm site, new powerlines, transmission, substations and infrastructure, this represents a significant addition given the size of the wind farm being

proposed. Can the proponent provide an LCA for these important items?

No account has been taken in the referenced LCA of environmental damage e.g. to human health & welfare, noise, ecosystem health, water systems, wildlife impacts etc. in an LCA context. Can the proponent provide an LCA for these important items?

Maintenence operations only pertaining to this paraticular wind farm in Spain were accounted for. Can the proponent provide an LCA for these important items?

Possible emissions from concrete foundations during project lifespan have not been considered & it is assumed the foundation will be removed at the end of its useful life. As the proponent states on p76 that all below ground structures will not be removed these must be accounted for in the LCA. Can the proponent provide an LCA for these important items?

The referenced LCA assumes that decommissioning will take place, however as the proponent has stated incorrectly that scrap value will cover decommissioning this remains an outstanding issue of critical importance. See my previous submission for details. In addition the proponent states on p256 that *"the value of materials able to be sold for reuse can be used to offset the cost of decommissioning the wind farm…"* which contradicts the proponents claim that scrap value will cover the decommissioning cost. Can the proponent come up with as realistic decommissioning plan and bond to cover these costs?

Blade size in the referenced LCA study is 39m, modern turbines are getting larger and blade size is increasing. The blades are made of environmentally unfriendly prepreg and are sent to landfill or burnt when at the end of their useful life, these represent a significant part of the LCA figure. The entire fleet of Suzlon blades (1251 blades) in the USA had to be replaced recently due to a fault in the design. Can the proponent provide an LCA for these important items?

Wind turbine lifetime is assumed to be 20 years or greater however no manufacturers warranty is mentioned, which are apparently about 2 years. Can the proponent state what the manufacturers warranty periods are and what they relate to?

One replacement generator assumed in turbines lifetime, however, according to Allianz insurers, gearboxes in wind turbines are often replaced within the first 5 years. Wind turbines can stand idle for up to 18 months waiting for replacement parts, this can affect LCA. Jan Pohl of insurance firm Allianz in Munich, who faced about 1000 claims in 2006 stated : "an operator has to expect damage to his facility every four years, not including malfunctions and uninsured breakdowns." The Capital wind farm at Bungendore is suffering many problems

relating to its installed turbines, many of which are not working properly, as the Department will be aware. Can the proponent provide a realistic estimate of maintenance issues for the LCA?

The referenced LCA does not take into account the emissions generated by fossil fuel power stations required for backup. This has been acknowledged recently as having a significant effect on LCA. See for example the peer-reviewed papers :
Katzenstein, W & Apt, J, "Air Emissions Due To Wind and Solar Power", Environmental Science & Technology (2009) Vol 43 No 2 pages 253-258
&
Katzenstein, W & Apt, J, "Incorporating Wind into a Natural-gas Turbine BaseloadPower System Increases NOx and CO2 Emissions from the Gas Turbines", (2008), Fifth Annual Carnegie Mellon Conference on the Electricity Industry, Future Energy Systems: Efficiency, Security, Control available on line at :
http://www.ece.cmu.edu/~electriconf/2008/PDFs/6-2%20Katzenstein%20and%20Apt.pdf

The Martinez LCA paper itself calls for further research. In other words, its a first effort LCA for a Gamesa G8X 2MW wind turbine manufactured 156km from its final destination, but in terms of this translating to an LCA for wind farms in general around the globe, it has limited use.

The proponent then continues on in this section to quote figures from Vestas / Elsam Engineering A/S (2004) regarding LCA of the V80 and V90 turbines. Firstly they quote the LCA of a V80 at Tjaeborg wind farm, but fail to mention that this is actually a "test site" in Denmark and that the assumptions and caveats mentioned above also exist in this study, and that the turbines in question are also manufactured and installed in Denmark (**not half way around the planet which would also require modification to the LCA figures**). Indeed in the document itself it states for example in the summary on pages 4 & 5 of Elsam Engineering A/S (2004) :

"The LCA does not include the financial and social factors, which means that the results of an LCA can not exclusively form the basis for assessment of a product's sustainability.

It also means that an LCA does not give detached, scientific and final answers as to the environmental properties of a product, as an LCA does not include all the impacts on the surroundings caused by a product in connection with use (e.g. noise, use of area, impact on animal life, etc.) To obtain a more complete environmental description, LCA must be combined with other environmental assessments as for instance environmental consequence assessments (e.g. Assessment of Impact of the Environment, AIE), risk assessment and

environmental management.

Some of the most essential limitations of LCA are:

• Many selections and assumptions are to be made (e.g. selection of system boundaries and datasources), which might be subjective.
• The accuracy of an LCA will depend on the access to or the existence of relevant and liable data.
• Models used for mapping or assessing the environmental impact are restrained by their conditions and will not necessarily be accessible for all potential impact categories or applications."

These same caveats stated by Vestas apply to the Danish made V90 turbine LCA which is then mentioned by the proponent.

What the proponent has presented as an LCA in this EA is meaningless. Can the proponent provide a credible and detailed LCA of this project in its entirety?

12) p20 Appendix 1 Landscape Topography Turbulence Issues & their relation to Noise Issues

The terrain where the proponent has located turbines is steep (greater than 10 degrees), as evidenced by the topographic layout on p20 of Appendix 1. Noise levels are certified by the wind turbine manufacturer assuming optimal operating conditions; a perfect linear intersection velocity with the surface area of the blade. Once the blade incorporates turbulence (from either a sudden increase in gradient – also known as shear, tall tree plantations, inadequate spacing or atmospheric turbulence), then extreme variances in pressure over the surface area of the blade are created. This results in vibration and therefore operating inefficiencies, the potential for blade damage and noise issues. Noise level certification becomes invalid when operating conditions are breached.

The Vestas V90 wind turbine specification document (Vestas 2009) recommends that turbines not be placed on slopes greater than 10 degrees within 100m of a turbine (see Section 1.3 Terrain Conditions). A spacing of 5 rotor diameters is recommended at Section 1.4 Climatic Conditions. At Section 2.1 Wind Climate, it also mentions that the turbulence % maximum is 20%. The wind speed data for the Victorian Government's recently approved Winchelsea Wind Farm, one of the few sites at which wind speed data was ordered to be released by VCAT, showed a night time turbulence pattern of over 20% for 75% of the time over a 12 month period and slopes greater than 10 degrees. Other industrial wind power stations have been built on slopes greater than 10 degrees and spacing issues are very much apparent. Basic manufacturer specifications are not taken into consideration by the proponent and noise standards deliberately

exclude low frequency noise. This problem of turbulence is well known and is discussed in the freely available CSIRO publication on wind resource assessment, Coppin, Ayotte and Steggel (2003).

Coppin, P. A., Ayotte, K.A. and Steggel, N. (2003) "Wind Resource Assessment in Australia – A Planners Guide, CSIRO Publishing. Available on line at :

http://www.csiro.au/resources/pf16q.html

This is a key text for wind resource assessment in Australia and for some reason the proponent is completely unaware of its existence, as I can find no mention or reference to this text.

The Vestas document I refer to above is :

Vestas (2009) "*General Specification V90 – 1.8/2.0 MW 50Hz OptiSpeed – Wind Turbine",* Vestas Wind Systems A/S

A specification document from Vestas for the V90 1.8/2.0MW wind turbine. The V90 also has an operating temperature range from -20C to only +30C as detailed in this document. Why is the proponent not aware of these important issues?

13) Noise Assessment

The Capital wind farm at Bungendore and the Cullerin Range wind farms are suffering noise problems , as the Department will be aware. The sections on Noise Assessment use the same fundamentally flawed methodology. Research demonstrating these flaws is presented in Kamperman & James (2008), and also in James' Statement of Evidence in 2008 regarding the development at Mills Creek, NZ. Both are listed below. Kamperman and James examined a number of noise assessments in Europe, Canada and USA which had received noise complaints after construction. Some important excerpts from their Noise-Con 2008 conference paper :

"After reviewing the materials in the tables; we have arrived at our current understanding of wind turbine noise and its impact on the host community and its residents. The review showed that some residents living as far as 3 km (two (2) miles) from a wind farm complain of sleep disturbance from the noise. Many residents living one-tenth this distance (300 m. or 1000 feet) from a wind farm are experiencing major sleep disruption and other serious medical problems from nighttime wind turbine noise. The peculiar acoustic characteristics of wind turbine noise immissions cause the sounds heard at the receiving properties to be more annoying and troublesome than the more familiar noise from traffic and industrial factories. Limits used for these other community noise sources do not appear to be appropriate for siting industrial wind turbines."

"The common method used for establishing the background sound level at a proposed wind farm used in many of the studies in Table 1 was to use unattended noise monitors to record hundreds often (10) minute measurements to obtain a statistically significant sample over varying wind conditions or a period of weeks. The measured results for daytime and nighttime are combined to determine the statically average wind noise as a function of wind velocity measured at a height of ten (10) meters. This provides an enormous amount of data but the results have little relationship to the wind turbine sound immission or turbine noise impact in nearby residents. The purpose of this exhaustive exercise often only demonstrates how much noise is generated by the wind. In some cases it appears that the data is used to 'prove' that the wind noise masks the turbine's sound immissions."

The most glaring fault with this argument is shown during the frequent nighttime conditions with a stable atmosphere when the wind turbines generate the maximum electricity and noise while the wind at ground level is calm and the background noise level is low. This is the condition of maximum turbine noise impact on nearby residents. It is the condition which most directly causes chronic sleep disruption. Furthermore, this methodology is usually faulty, as much of the wind noise measured by unattended sound monitors is the wind noise generated at the microphone windscreen resulting in totally erroneous results."

* James, R (2008) "*Testimony before Wellington City Council RE: noise at Meridian Energy wind project proposal*" Available on line at :

http://www.windaction.org/documents/18014

Expert testimony of Richard James to Wellington City Council on 2nd September 2008 in regard to modeled noise predictions for a Meridian Energy Ltd. wind energy facility in New Zealand. Covers real measurements, computer modeling, dBA and dBC, WHO, Appendix includes some of his co-authored papers including his Noise-Con 2008 paper with Kamperman.

* Kamperman, P & James, R (2008) "*The 'how to' guide to criteria for siting wind turbines to prevent health risks from sound*", V2.1 published by Industrial Wind Action. Available on line at :

http://www.windaction.org/documents/17229

Community noise experts George W. Kamperman and Richard R. James present guidelines for siting industrial wind turbines. This paper focuses on preventing health risks due to sound emissions from the turbines. This paper offers important background information that should be read by all those involved in the siting and approving of wind energy facilities.

* Kamperman, P & James, R (2008) "*Simple guidelines for siting wind turbines to prevent health risks*", 2008 International Noise Conference (Noise-Con), Dearborn, Michigan. Available on line at :

http://www.windaction.org/documents/17095

Reviews sound studies conducted by consultants for governments, wind turbine owners, and local residents for a number of sites with known health or annoyance problems. The purpose is to determine if a set of simple guidelines using dBA and dBC sound levels can serve as the 'safe' siting guidelines.

In addition the ray tracing software used to predict sound propagation is also fundamentally flawed.

* Frank H. Brittain, F & Hale, E (2008) "*Some limitations of ray-tracing software for predicting community noise from industrial facilities*", 2008 International Noise Conference(Noise-Con), Dearborn, Michigan. Available on line at :

http://www.windaction.org/documents/18087

This paper covers limitations and problems with the sound propagation standard (ISO 9613-2). **A key point with relation to wind energy developments is that the ISO 9613-2 model can give no estimation of its own accuracy beyond 1km, yet it is routinely used for distances exceeding 1km.**

* Van den Berg, G. P. (2006) "*The Sounds of High Winds: the effect of atmospheric stability on wind turbine sound and microphone noise*" PhD thesis available online :

http://dissertations.ub.rug.nl/faculties/science/2006/g.p.van.den.berg/

* Van den Berg G.P. (2004) "Effects of the wind profile at night on wind turbine sound", *Journal of Sound and Vibration* 277 (4-5), pages 955-970.

* Van den Berg G.P. (2007) "Wind profiles over complex terrain." *Second International Conference on Wind Turbine Noise, Lyon, France*.

The research of van den Berg shows that there are significantly higher levels of noise pollution at night than are experienced in the daytime, and the effects of complex terrain such as hills are different to flat terrain. Sound levels can be up to 15dB higher at night relative to the same reference wind speed in daytime. These papers also discuss the flawed methodology of wind induced microphone noise during background sound monitoring.

I request that the Noise Assessment be redone by the proponent to take these effects into account. Myself and a number of other people pointed out these issues at the recent NSW Rural Inquiry into Rural Wind Farms, and the recommendation on p117 states :

Recommendation 17
That the Minister for Planning ensure that the Environmental Assessment process for wind farm development applications requires comprehensive assessment of potential noise impacts. Both day and night time noise modelling and noise modelling in relation to temperature inversions and the van den Berg effect should be taken into account.

In the Appendix 2 Noise Assessment and its associated Appendices there is also further evidence of strange dates on images :

Appendix K Noise Maps for Copabbela 1 & 2 are both dated 31 March 2009
Appendix M Surrounding Road Network for Yass Wind Farm is dated 29 / 02 / 2009

The same applies for the Marilba Hills Appendices. The Appendix doc itself was drafted on 2nd April 2009, and the report was issued to the client, Epuron, on 22 April 2009. All of these images show the turbine layout. How were these noise modelling studies achieved when the date of the turbine layout as mentioned in Note 10 (above) was several months later the same year? Why were the results of the noise modelling study not presented to the community as part of the consultation process?

In both of the Noise Assessments and in the main EA the hub height of the Vestas V90 3MW turbine is incorrectly stated, and both figures are also different. The proponent is clearly confusing the hub height of the offshore V90 3MW with the onshore V90 3MW. The height is clearly stated as 105m in Table 1 of Page 9 in the LCA document of the V90 3MW available at :

http://www.vestas.com/Files/Filer/EN/Sustainability/LCA/LCAV90_juni_2006.pdf

THIS CLEARLY INVALIDATES THE NOISE STUDY AND THE EA COMPLETELY.

On Page 35 Section 6.7 of the Noise Assessment reference is made to Vibro Acoustic Disease and a claim that no reputable study has been made. The proponent is clearly unaware of the following peer-reviewed research :

Pathologist Nuno Castelo Branco MD has been conducting extensive research on Vibroacoustic Disease (VAD) since 1980, including in relation to wind turbine generators. VAD is detailed in Castelo Branco NAA, Alves-Pereira M. (2004) "Vibroacoustic disease", *Noise & Health* 2004; 6(23): pages 3-20. VAD

specifically related to industrial wind turbines is reported in Castelo Branco NAA, Alves-Pereira M. (2007) “In-Home Wind Turbine Noise Is Conducive to Vibroacoustic Disease*”, Second International Conference on Wind Turbine Noise, Lyon, France*. The VAD study in relation to wind turbines discusses a rural property in an agricultural area occupied by 2 adults and a 10 year old child, with four 2MW wind turbines which began operation in Nov 2006. A section from the paper follows, note that ILFN stands for Infrasound and Low Frequency Noise, and WT stands for Wind Turbines :

“ILFN levels contaminating the home of Case 2 are amply sufficient to cause VAD. This family has already received standard diagnostic tests to monitor clinical evolution of VAD. Safe distances from residences have not yet been scientifically established, despite statements by other authors claiming to possess this knowledge. Acceptance, as fact, of statements or assertions not supported by any type of valid scientific data, defeats all principles on which true scientific endeavor is founded. Thus, widespread statements claiming no harm is caused by in-home ILFN produced by WT are fallacies that cannot, in good conscience, continue to be perpetuated. In-home ILFN generated by WT can lead to severe health problems, specifically, VAD. Therefore, real and efficient zoning for WT must be scientifically determined, and quickly adopted, in order to competently and responsibly protect Public Health.”

Can the proponent comment on the above papers and explain how this wind farm development will not suffer from all of these well known noise problems, which still require further research? Is the proponent planning to instigate a research program for these ongoing noise issues?

14) P253 Section 8.12.3 Local Climate Impact

The proponent appears to be vaguely aware of the important issue of local climate change effects from wind farms, but inexplicably plays down this effect when incorrectly referencing the results of Baidya Roy, S, & Pacala, S. (2004). According to this paper warming and drying effects are “most intense in the early hours”, and in general the papers results have “significant implications” in the authors own words. The results showed that wind farms significantly slow down the wind at turbine hub-height and create additional turbulence. The effect leads to a warming and drying of the surface air. The paper also calls for further research.

Keith, D et al. (2004) is another peer-reviewed research paper examining the effect of industrial scale wind turbines on changing global climate due to “slowing” the wind by extracting kinetic energy. This paper also reported on the effect of wind producing local climate change, and the need for more research on these effects.

David W. Keith, Joseph F. DeCarolis, David C. Denkenberger, Donald H. Lenschow, Sergey L. Malyshev, Stephen Pacala and Philip J. Rasch (2004). *"The influence of large-scale wind-power on global climate."* Proceedings of the National Academy of Sciences, **101**: 16115-16120.

Professor Keith has stated on his website that : "significant *local* climate change could occur in areas where wind farms are concentrated even if wind supplies a small fraction of global electricity demand." (his emphasis)

Kirk-Davidoff & Keith (2008) in their latest peer-reviewed research paper further demonstrate that "large-scale deployment of wind power may alter climate through alteration of surface roughness".

Kirk-Davidoff, D & Keith, D. (2008) "*On the climate impact of surface roughness*", (2008). Journal of Atmospheric Sciences, 65: 2215-2243.

Such research into significant changes of local climate includes:

i) temperature
ii) wind speed and direction
iii) cloud cover
iv) rainfall
v) wake turbulence

Further research in this area is ongoing and the full range of implications on local climate effects as yet are unknown. What peer-reviewed scientific evidence can the proponent provide to support their unsubstantiated claim on p254 that :

"This impact would be ongoing but negligible"

&

"No adverse climate change impacts related to the operational phase of the wind farm would result"

Can the proponent comment on the above papers and explain how this wind farm development will not suffer from all of these well known research problems, which still require further research? Is the proponent planning to instigate a research program for these ongoing scientific issues?

15) Health Issues

Regarding the proponents glossing over of health issues, I would direct attention to the following references and comments:

* Health Canada (2009) "*Health Canada's response to the Digby Wind Power Project*

Addendum, Digby, Nova Scotia", Safe Environments Program, Regions and Programs Branch, Health Canada. Available on line at :

http://www.wind-watch.org/documents/health-canada's-response-to-the-digby-wind-power-project-addendum-digby-nova-scotia/

Document requested by Nova Scotia Department of Environment for Health Canada to review the project with respect to human health. Health Canada reviewed the project report and commented on noise and health issues, and highlighted misleading statements by the developer. In particular regarding health effects they specifically remark :

"The final sentence in Appendix B states that "there is no peer-reviewed scientific evidence indicating that wind turbines have an adverse impact on human health". In fact, there are peer-reviewed scientific articles indicating that wind turbines may have an adverse impact on human health. For example, Keith et. al. (2008), identified annoyance as an adverse impact on human health that can be related to high levels of wind turbine noise. In addition, there are several articles by Pedersen (and others) related to wind turbine annoyance (as referenced below). The relationship between noise annoyance and adverse effects on human health is also further investigated in the manuscript by Michaud et. al (2008).

- *Health Canada advises that this statement be revised to indicate that there are peer-reviewed scientific articles indicating that wind turbines may have an adverse impact on human health.*

References:

Howe Gastmeier Chapnik Limited (HCG Engineering). 2006. Environmental Noise Assessment Pubnico Point Wind Farm, Nova Scotia. Natural Resources Canada Contract NRCAN-06-00046.

Keith, S. E., D. S. Michaud, and S. H. P. Bly. 2008. A proposal for evaluating the potential health effects of wind turbine noise for projects under the Canadian Environmental Assessment Act. Journal of Low Frequency Noise, Vibration and Active Control, 27 (4): 253-265.

Michaud, D., S. H. P. Bly, and S. E. Keith. 2008. Using a change in percentage highly annoyed with noise as a potential health effect measure for projects under the Canadian Environmental Assessment Act. Canadian Acoustics, 36(2): 13-28.

Pedersen, E., and Halmstad, H. I. 2003. Noise annoyance from wind turbines – a review. Swedish Environmental Protection Agency, Report 5308.

Pedersen, E. and Persson Waye, K. 2008. Wind turbines – low level noise sources interfering with restoration? Environmental Research Letters, 3: 1-5.

Pedersen, E., and Persson Waye, K. 2007. Wind turbine noise, annoyance and selfreported health and wellbeing in different living environments. Occup. Environ. Med. 64: 480-486.

Pedersen E. and Persson Waye, K. 2004. Perception and annoyance due to wind turbine noise – a dose-response relationship. J. Accoust. Soc. Am. 116: 3460-3470.

World Health Organization (WHO). 1999. Guidelines for Community Noise. Eds. B. Berglund, T. Lindvall, D. H. Schwela. WHO: Geneva.

Van den Berg, F., Pedersen E., Bouma, J., and R. Bakker. 2008. Project WINDFARMperception. Visual and acoustic impact of wind turbine farms on residents. FP6-2005-Science-and-Society-20 Project no. 044628: 1-99

Can the proponent comment on the above references supplied by Health Canada and explain how this wind farm development will not suffer from all of these well known problems, which still require further research? Is the proponent planning to instigate a research program for these ongoing health issues?

Some further annotated references on health issues are :

* Pedersen, E, (2007) "*Human response to wind turbine noise - perception, annoyance and moderating factors*", Doctoral Thesis (Medicine) Inst of Medicine. Dept of Public Health and Community Medicine, Göteborg University. Sahlgrenska Academy, Sweden. Available on line at :

http://gupea.ub.gu.se/dspace/handle/2077/4431

The PhD thesis of Dr. Pedersen is a culmination of a number of papers including those cited above by Health Canada and reports key findings on negative health risks of industrial wind turbine noise.

* Minnesota Department of Health Environmental Health Division (2009) "*Public Health Impacts of Wind Turbines*" Report requested by Minnesota Department of Commerce Office of Energy Security May 22, 2009. Available on line at :

http://www.windaction.org/documents/21436

Health report "white paper" evaluating possible health effects associated with low frequency vibrations and sound arising from large wind energy conversion systems (LWECS).

* McMurtry et.al. (2009) "*Community-based health survey, Ontario*" Report for Wind Concerns Ontario. Available on line at :

http://www.windaction.org/documents/22261

"This community based surveillance activity was conducted under the guidance of Dr. Robert McMurtry, the Former Dean of Medicine at the University of Western Ontario. The health survey revealed that out of 76 respondents, 53 people now living near different wind power facilities in Ontario reported that industrial wind turbines were having a significant negative impact on their lives. The adverse effects range from headaches and sleep disturbance to tinnitus (ringing in the ear) and depression."

Some excerpts from the abstract of the report gives a summary of the responses to the survey :

“It is now emerging that whenever industrial wind turbines have been located near peoples' homes, family members are reporting adverse health effects. Some of these families have been forced to abandon their homes in order to protect their health. This phenomenon is occurring world wide, not just in Canada.”

“Researchers and victims have reported altered living conditions, loss of enjoyment of homes and property, and ill health as a result of industrial wind turbines. The adverse health reports are consistent globally and across 3 continents.”

“Major wind turbine projects were launched in 2006 in Ontario and within a short time, reports about ill health started to appear. In January, 2009, Wind Concerns Ontario solicited volunteers to conduct a health survey. Distribution of the community-based self reporting health survey started in March 2009.

The findings of the health survey were presented on April 22, by Dr. Robert McMurtry, former Dean of Medicine at the University of Western Ontario, to the Ontario Government's Standing Committee while it was examining Bill 150, the Green Energy Act. With the efforts of volunteers and a nominal budget from donations, the health survey revealed that out of 76 respondents, 53 reported at least one adverse health effect they suspect is related to industrial wind turbine exposure. The average number of symptoms per individual reported was 5.

The health survey is ongoing and as result the number of 53 victims has since risen to 86 as responses continue to be submitted.

Sleep disturbance was the most common complaint. Other health complaints include inner ear problems, mood disturbances, cardiac arrhythmias, and headaches. Several suffered acute hypertensive episodes which are most serious and worrisome.

Comments provided by respondents are both revealing and disturbing. No authority or compassionate member of our society can ignore the moving descriptions of the victims' experiences. They describe disturbed living conditions, loss of quality of life and enjoyment of their home and property, financial loss and the negative impact to the health of their families, including children. These comments are included in this report.

This community-based self reporting survey fills a void regarding the lack of a Canadian vigilance and surveillance program for industrial wind turbines. The willingness of the victims to participate in the survey serves to reinforce the critical need for a robust vigilance program which encourages victims to self report suspected adverse health effects from these industrial wind turbines. In addition, long term surveillance is required. There are unanswered questions about infants, children, and the unborn whose mothers are exposed, family members and workers such as farmers and technicians who live and work in close proximity to the wind turbines.

When uncertainty exists and the health and well-being of people are potentially at risk, it is appropriate to invoke the precautionary principle. Until these authoritative guidelines

are put in place based on the best available evidence, the Province of Ontario ought not to proceed with any further development of industrial wind turbines.

The development of these guidelines must be based on a rigorous epidemiological evaluation of the adverse health effects of industrial wind turbines."

* Pierpont, N, (2006) "*Wind Turbine Syndrome*" Testimony before the New York State Legislature Energy Committee March 7, 2006. Nina Pierpont MD, PhD has done extensive research into the health effects of industrial scale wind turbines. This work has received world wide attention. Available on line with numerous other papers / reports and a draft of her forthcoming book :

http://www.windturbinesyndrome.com

* Nissenbaum, M (2009) *"Affidavit of Michael A. Nissenbaum, M.D."* State of Maine Board of Environmental Protection re : Record Hill Wind Project. Available on line at :

http://www.windaction.org/documents/23332

Affidavit by Dr. Michael Nissenbaum submitted in support of an appeal filed with Maine's Board of Environmental Protection against a proposed project that will include 22 industrial scale turbines sited in Roxbury, Maine. Dr. Nissenbaum asserts that industrial wind turbines can cause adverse effects on human health.

* Northern Maine Medical Center (2009) "*Health Concerns and the Need for Careful Siting of Wind Turbines*" Press Release March 4, 2009

Medical Staff of Northern Maine Medical Center unanimously approved this press release and requested a moratorium on "wind farm" developments. Three excerpts from this press release :

"We echo the concerns of the Medical Staff of Rumford Community Hospital as regards an increasing body of literature and reports from Canada, the USA, and particularly from Europe suggesting that the deployment of industrial wind facilities in close proximity to places where people live, work or attend schools results in negative health effects, including and especially sleep deprivation and stress."

"These effects arise not only from audible noise frequencies but also from persistent inaudible low frequency noise waves of a cyclical nature which are felt, but not heard. There are a growing number of scientific observations and studies suggesting that people living up to 2 miles away from these industrial wind farms may be affected."

"In light of these growing, serious medical concerns, we propose a moratorium on the building of any such "wind farms" until more research is done on the health impact that such facilities will have on the communities surrounding such technology. These communities and the Maine DEP and Health Services must be allowed time to study and learn from the European and Canadian experiences, as well as from the many affected families in Mars Hill, Maine, and put into place appropriate regulations and ordinances, prior to expanding the wind industry in the State of Maine."

* Hanning, C, (2009) "*Sleep Disturbance and Wind Turbine Noise*" Self published (June 2009) available on line at :

http://www.windaction.org/documents/22602

Hanning's is one of the most recent health reports pertaining to sleep disturbance from industrial wind turbines. Dr Christopher Hanning MD founded, and until retirement, ran the Leicester Sleep Disorders Service, one of the longest standing and largest services in the United Kingdom, and has 30 years of experience in the field.

* Phipps, R (2007) *"Evidence of Dr Robyn Phipps in the matter of the Moturimu wind farm application*", Testimony before the Joint Commissioners in the Matter of the Moturimu Wind Farm Application, New Zealand. Available on line at :

http://www.windaction.org/documents/14619

Extensive testimony by Dr Robyn Phipps and evidence presented of a **peer reviewed** survey of visual and noise effects experienced by residents living near the Taraua and Ruahine ranges wind farms. **Of the households surveyed in the analysis 80% considered that the wind turbines were intrusive and 73% thought that they were unattractive. Over 52% of households located between 2 to 2.5km and 5 to 9.5km heard wind turbine noise, and 25% could hear wind turbine noise greater than 10km from the wind farm.** There are many more disturbing findings in this survey.

* Harding, G, Harding, P and Wilkins, A (2008) "*Wind turbines, flicker, and photosensitive epilepsy: Characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them*" Epilepsia 49(6) pages 1095-1098

* Castelo Branco NAA, Alves-Pereira M. (2007) "*In-Home Wind Turbine Noise Is Conducive to Vibroacoustic Disease*", Second International Conference on Wind Turbine Noise, Lyon, France.

The definitive paper on Vibroacoustic Disease (VAD) as a result of exposure to low frequency wind turbine noise pollution.

* Castelo Branco NAA, Alves-Pereira M. (2004) "Vibroacoustic disease", *Noise & Health* 2004; 6(23): pages 3-20

* Alves-Pereira, M & Branco, N (2007) "*Industrial Wind Turbines, Infrasound and Vibro Acoustic Disease (VAD) PRESS RELEASE*", May 31, 2007 Center for Human Performance, Portugal. "*The Center for Human Performance is a civilian, non-profit organization dedicated to research in vibro-acoustic disease. CPH was founded in 1992 and has been the organization which coordinates all the different teams that work on vibro-acoustic disease research, and that include (in Portugal) the cardiology and pulmonary departments of the Cascais Hospital, the neurophysiology department of the National Institute of Cancer, the department of human genetics of the National Institute of Public Health, the department of speech pathology of the School of Health Sciences of the Polytechnical Institute of Setúbal, among several others over the past 25 years."*

A brief excerpt from the VAD press release :

"*These results irrefutably demonstrate that wind turbines in the proximity of residential areas produce acoustical environments that can lead to the development of VAD in nearby home-dwellers."*

Can the proponent comment on the above papers and explain how this wind farm development will not suffer from all of these well known problems, which still require further research? Is the proponent planning to instigate a research program for these ongoing health issues?

16) Concluding comments

The poor quality of this Environmental Assessment beggars belief and I am shocked the NSW Department of Planning has even accepted this EA for consideration. **It is particularly alarming as such a project will contribute practically nothing whatsoever to the mitigation of climate change or the reduction of GHG emissions.**

If such a series of documents were submitted at a university for assessment as part of professional training I doubt an examiner would have got past the Executive Summary before sending it back for a complete re-write.

The importance of Critically Endangered Box-Gum Grassy Woodlands and its biodiversity deserves more research and consideration than this shoddy piece of work has put forward. I have not the time to comment in detail on the Biodiversity report at the present time, but this section is appalling. In particular : What possible use are the "offsets" put forward by the proponent if they are in the middle of the wind farm, where no sane species of wildlife will be choosing to live should this proposal be built?

The communities of Harden / Yass Shire's and the Australian people deserve better also. The photomontage's are extremely poor and violate all planning requirements for clarity, many of them having cloudy backgrounds in an attempt by the proponent to disguise the true impact. I request that all photomontage's be redone. What is most alarming is the impossibly small amount of time that the public has to research and comment on such a ridiculous proposal, especially given the extremely poor community consultation by Epuron.

I reserve the right to provide to the Department further detailed comment on these and other aspects of the Yass Valley Environmental Assessment subsequent to today. I strongly urge the NSW Dept of Planning to reject this proposal.

Yours sincerely
Dr David Burraston PhD