The Committee Secretary,
House of Representatives Standing Committee
on Industry and Resources.
P.O. Box 6021
Parliament House
Canberra ACT 2600

Submission No: 94

Dear Secretary,

**Submission to the Committee's Inquiry into developing Australia's non-fossil fuel energy industry.**

This submission addresses:

- The impacts of renewable energy projects on communities and individuals.
- The need for rigorous analysis of the CO2 savings claimed by the proponents of renewable energy projects.
- Given that present renewable energy electricity generation is more costly than conventional generation using fossil fuels, there is a need for governments to look beyond the present 'rush-to-wind' and support the development of other renewables, particularly tidal/ocean currents and solar.

I am a retired Electronics Engineer domiciled in the closely settled scenic Prom Coast area of South Gippsland in Victoria.

The intrusive visual impact of a wind farm built on the ridges of hills above the township of Toora and the noise, shadow flicker and glint that affected nearby residents galvanised many people, such as myself, to join community groups opposed to inappropriately sited further windfarm developments in the area.

In this context some might describe me as a NIMBY. As the "backyard" is a uniquely beautiful part of Victoria I am happy to accept that label. I am not a 'greenhouse sceptic' and am concerned about the unsustainable way that mankind is fouling its nest.

Wind turbines are very large structures and the latest ones are truly massive, with the swept area of the blades approaching 1 Hectare.

As the blades approach and pass the turbine tower aerodynamic forces result in the generation of impulsive noise which can be very pronounced in certain atmospheric conditions, such as on a summer evening when the air is still at ground level but there is considerable wind velocity at the turbine hub height. From personal experience I know that people can habituate to random noise e.g. from traffic on a busy road. However, impulsive repetitive noise, even at a relatively low level, can disturb sleep.

Sunlight shining through the area swept by wind turbine blades is modulated and the resultant shadow flicker can be very disturbing even through drawn dense curtains. Glint from sunlight reflected from the blades can also be more than just a nuisance.

There is a pressing need for engagement and consultation with local communities at all stages of any proposed renewable energy development such as a wind farm. However, this needs to be a genuine process with a willingness to negotiate proper compensation for those who will be adversely affected and to accommodate adequate setbacks from dwellings, sensitive sites and scenic areas. Above all, communities within and neighbouring the footprint of a proposed development and local councils should have the right to responsibly determine whether the project proceeds.

In this context, the planning approval process in Victoria does not measure up. For example, The "Policy and planning guidelines for development of wind energy facilities in Victoria" contain no prescriptive placement criteria (except prohibiting their establishment in National Parks). They effectively deny local councils any right to determine if and where a wind farm of 30 MW or greater, may be established. Where a Panels Victoria hearing is convened to consider a proponents application and objectors submissions, the hearing is required to "give due weight" to the State Government Guidelines. The proponents usually have considerable resources and can retain expert witnesses to present evidence favourable to their position, as well as lawyers to argue their case and to cross-examine objectors. The local community and councils in rural areas do not have the resources to match this State Government and corporate overkill and struggle to raise enough funds to engage one or two expert witnesses. That they are still able to contest the proponent's arguments is a tribute to their spirit, tenacity and willingness to "dig-deep". In the unlikely event that a panel hearing finds in favour of the objectors, the Planning Minister does not have to accept the recommendations.

The Victorian State Government has effectively made the Ocean Road coast and Port Phillip Bay exclusion zones for wind farms. Clearly, this was done because they would be visually inappropriate in a favoured tourist area and in Melbourne's bay precinct.

Not surprisingly all this makes a lot of people in South Gippsland feel that the whole process is a kangaroo court exercise, which disenfranchises them despite their uniquely beautiful coastal and hill country.

When applying for planning approval for a wind farm, the proponents sometimes argue that landscape sensitivity should be assessed by determinate methods i.e. by "measurement" or at best, a combination of such methods and some allowance for the subjective assessment of people living in and near the area.

The determinate method often includes arbitrary ratings of the "sensitivity" of particular landscapes. In South Gippsland this has led to assertions that the scenic hill country of the Strzleckie Ranges is largely "man-modified" and therefore has "low landscape sensitivity". The suggestion that any landscapes that are man-modified have a lower "landscape sensitivity" than natural

bushland may be a comfortable notion for those seeking an excuse to erect large structures in those hills, but a few moments reflection will reveal the absurdity of that proposition. The high sensitivity landscapes painted by Tom Roberts and other revered Australian artists that capture the essence of "Australia Felix", are often of man-modified scenes.

Anyone researching the assessment of landscape value and the impact of wind farms on landscapes can find material that will support a particular point-of-view. A common theme in the writings of landscape architects and "experts", allied to the wind industry, is that modern wind turbines are large through technical necessity and are stark elegant aesthetically pleasing structures, that should be placed in the landscape as features in their own right; albeit, in a manner that is "sympathetic with landforms". Some are honest enough to say that they have to be made prominent features, because their size precludes them from being placed in a way that can be effectively shielded by other elements in the landscape. It is sometimes tacitly admitted that in areas where community perceptions are that landscape is of intrinsically high aesthetic value, the only way that planning acceptance can be obtained, is if the landscape can be rated as having *low sensitivity*.

The contrary arguments are that as there are differing opinions about the efficacy of different deterministic methods, heavy weighting should be applied in favour of the subjective assessment of landscape sensitivity by people living in or near the area.

The sharp drop in the value of dwellings in an area threatened by a wind farm is often disputed by the proponents, despite the clear evidence to the contrary and the difficulty in finding a buyer, even at a heavily discounted price. Understandably, this is the cause of much anguish and anger in the community concerned.

The decrease in the value of the properties near a wind farm reduces the rate income that the local council derives from them. The Victorian State Government prevents local councils levying reasonable commercial or industrial site rates on wind farms that would compensate for this. To maintain its income, the council then has to increase the rates levied from the rest of the ratepayers in the municipality.

Most of the above mentioned concerns would be mitigated by appropriate placement guidelines for wind farms and other renewable energy systems with the emphasis on their location in sparsely populated areas with relatively low scenic appeal.

In contrast to wind turbines the various kinds of solar collector systems usually extend only a few metres above ground level and are not grossly visually intrusive. The focussed mirror solar systems can be taller but are generally less than 30 m above ground. 'Solar chimney' systems can be very tall structures but the absence of moving blades and the fact that such installations usually involve only one system, greatly lessens their visual impact compared with a wind farm. Large-scale solar systems are ideally suited for semi arid locations away from the coast where there is the maximum likelihood of uninterrupted sunlight.

Australia has an abundance of sparsely populated windy and sun-drenched

areas that are not too far from settled areas. Given a national investment in transmission line infrastructure, particularly DC transmission to minimise losses, renewable energy installations could be placed without marring landscapes and blighting the lives of people living nearby.

It is regrettable that renewable energy has become the plaything of political groups. At one extreme, self-proclaimed environmentalist groups with an anti-capitalist agenda and at the other some politicians with a penchant for 'gesture politics' who want large visible evidence that they are 'doing something about climate change'.

In this context the rationale for the construction of renewable energy projects such as wind farms is that a substantial reduction in overall CO2 emissions from power generation will be achieved. This carries the implication that such a *common good* should override the concerns of adjoining residents about the blighting of their visual environment and the negative effects on their well-being.

There are authoritative independent overseas studies and reports that show that the reduction in CO2 emissions achieved by electricity generating systems that include a substantial wind power generation (WPG) component, has been less than the optimistic forecasts of the wind industry and the politicians supporting it.

The Victorian State Government's "Policy and planning guidelines for the development of wind energy facilities in Victoria" previously specified a substitution method for calculating CO2 emission savings. Under the formula the wind power station forecast output in Megawatt hours was based on its maximum possible ("nameplate") output multiplied by a Capacity Factor (% of nameplate output achieved over a defined period). The output in megawatt hours derived in this way was then to be multiplied by 1.3 tonnes which is the notional amount of CO2 produced by a coal-fired power station to produce one Megawatt hour. The state government has since published a study that it commissioned which implies that 1 Mwh generated by a wind turbine saves 0.88 tonnes of CO2 that would otherwise be emitted by the rest of the electricity generation system. This study is based upon modelling and contains a number of caveats including the possibility that coal consumption will not be significantly reduced.

Given that wind farms have now been in operation for several years it is hard to understand why hard data cannot be produced to allow the straightforward calculation of the rate of fossil fuel consumption per megawatt hour generated before the introduction of wind and the change in this rate when wind power output is dispatched.

Under MRET, and like schemes, electricity distribution companies are required to accept the output of approved renewable energy generators or pay a substantial equivalent MWhr penalty. This means that the output of Wind Power Stations is not constrained by the distributors and is determined solely by wind conditions.

Coal or oil fired steam turbine base load Power Stations do not reduce their fuel consumption in direct proportion to the drop in demand when other generators on-line in the system suddenly increase their output. Fuel

consumption cannot be just "turned on and off" because of the inherent long system ramp up and down times. Hydro generators can generally respond quickly to changes in demand. The ability of gas turbine generators to respond quickly to changes in demand depends on their type and system configuration.

There will be a reduction in CO2 and other emissions due to the inclusion of wind generation (WPG) in the generation mix because of the reduction of the output from the other generators. However this reduction is considerably less than that calculated by a simple substitution method, because even though the conventional plant is producing less electricity, the conversion efficiency has been adversely affected by the intermittent nature of WPG.

As a lay person I obviously do not have the resources to model the effects of WPG on the Victorian system and 'doors shut' when one tries to get hard data . However, extrapolation from an overseas study of a system not too far different from the Victorian situation, suggests that the savings in CO2 will be around 0.6 tonnes for every MWh of electricity produced from wind. It also suggests that as WPG is increased to the current State government target the CO2 reduction will fall to around 0.5 tonnes per Mwhr.

The same oversees study shows that as increasing amounts of wind are added to the system, *generation adequacy level* criteria allows the removal of some conventional thermal generation plant. The quantity of plant removed is described as the *Capacity Credit* that is attributable to wind. However, the contribution to adequacy of additional amounts of wind decreases progressively. With increasing amounts of wind capacity the total plant increases significantly but the amount of non wind plant falls by a relatively small amount and reaches a saturation level. Thus it may be said that the *Capacity Credit* for WPG rises more slowly with increasing amounts of WPG and tends to saturate. The study is included in the references that I have listed, but for space and copyright reasons, I cannot reproduce large segments of it in this document. It modelled different size total generation systems, of which the smallest was a "5000 MW. peak" system. The Capacity Credit for wind in that system with increasing amounts of wind was tabulated in the table reproduced on the following page 6:

| "5000 MW. peak System" | | | |
|---|---|---|---|
| **Wind Capacity (MW)** | **"Non-Wind"Capacity (MW)** | **"Capacity Credit" (MW)** | **Total Capacity (MW)** |
| **0** | **5732** | - | **5732** |
| **500** | **5561** | **171** | **6061** |
| **1000** | **5449** | **283** | **6449** |
| **1500** | **5392** | **340** | **6892** |

The modelling of a "6500 MW. peak System" with a much larger WPG component, showed the following results:

| **Wind Capacity (MW)** | **"Non-Wind"Capacity (MW)** | **"Capacity Credit" (MW)** | **Total Capacity (MW)** |
|---|---|---|---|
| **0** | **7354** | - | **7354** |
| **1500** | **7022** | **332** | **8522** |
| **2500** | **6925** | **429** | **9425** |
| **3500** | **6858** | **496** | **10358** |

The power in wind is a cubic function of the air velocity so that the output of wind turbines is very sensitive to changes in wind speed. A doubling of the wind speed from 5m per second to 10m per second can increase the power from 6% to 73% i.e. more than a twelve-fold increase.
In the absence of storage this makes the generation from wind turbines subject to the capricious nature of wind flow. This means that the rest of the generation system must be able to absorb this variability and maintain a constant output for consumers. This reduces the CO2 savings that can be achieved as outlined above. Clearly if other renewables can be included in the generation mix which do not suffer from such fast changing variability in output, the savings in overall emissions would be greater.

The output of solar generation systems can vary with diurnal changes in sunlight intensity and cloud cover but most collector systems have long thermal time constants and lend themselves to thermal storage which greatly reduces their volatility. In short, they are a dependable renewable source and given Australia's high-intensity sunlight resource should surely get priority in development support and transmission infrastructure decisions.

As an island nation with substantial ocean tidal flows in many areas that are relatively close to major coastal centres we will clearly benefit if we also prioritise renewable energy generation from this resource.

The CSIRO and various government bodies have extensively measured the ocean currents flowing in Australian waters many of which are relatively close inshore. The volume and speed of some of these currents is astonishing. Although tapping them is not easy, technologies for doing so are now well advanced. Given the high density of water compared with air (1.0 versus 0.0013), simple calculations show that there is a prodigious source of energy out there. Surely Australia would greatly benefit from an R&D program on this under the auspices of the CSIRO and in partnership with an overseas group or groups already well advanced in the technology.

The high relative cost of renewable electricity-generating systems means that most have to be heavily subsidised either directly by governments or by tax credits or, as in Australia, by mandating the acceptance of their output by distributors resulting in a consumer subsidy. Carbon credit and cap regimes will raise the cost of fossil-fuel generation and reduce the present large cost differential between generation by base load fossil-fuel power stations and renewable sources. However, the government is clearly mindful of the substantial impact that increases in electricity tariffs will have upon the economy and the more disadvantaged members of the community, especially the elderly.

In this context there is clearly a limit to the amount of money that the nation can commit to renewable energy and it is surely reasonable to suggest to the committee that the present 'rush to wind' should be subjected to a much more rigorous analysis of its long-term cost benefits relative to other renewables.

Thank you for your time in considering my submission.

My contact details are:

[redacted]

Yours sincerely,

Peter Wingett.

References: Please see following page 8.

References:

**Acknowledgements and References:**


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**NB.** This submission is being forwarded as an attachment to an e-mail. A hard copy with the above references on CD-ROM, follows by post.