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# INQUIRY INTO RURAL WIND FARMS

**Organisation:** Pacific Hydro

**Name:** Mr Lane Crockett

**Position:** General Manager, Australia/Pacific

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# *General Purpose Standing Committee No. 5 – Inquiry into Rural Wind Farms*

## *Submission from Pacific Hydro Pty Ltd*

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**Pacific Hydro Pty Ltd**
Level 11, 474 Flinders Street, Melbourne Victoria 3000 Australia
Telephone +61 3 8621 6000 Facsimile +61 3 8621 6111
Email enquiries@pacifichydro.com.au www.pacifichydro.com.au
ABN 31 057 279 508

Pacific Hydro

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# Introduction

Pacific Hydro is Australia's leading renewable energy company with significant local and international renewable energy development and operational experience. The company is 100% owned by Industry Super Funds which presides over the superannuation of more than four million Australians.

In Australia the company has been at the forefront of the renewable energy industry over the last decade and has a substantial portfolio of hydro and wind assets, both operating and at an advanced stage of development. The company also maintains a watching brief on geothermal, wave and large-scale solar thermal opportunities.

Our four operating wind farms in Victoria are already meeting the annual power needs of 80,000 homes while avoiding the emission of more than 500,000 tonnes of greenhouse emissions each year. In addition, Pacific Hydro has 600MW of wind energy projects in the development pipeline, mostly in rural and regional areas, totalling approximately $2 billion of investment.

Australia will need to affect a transformation of our energy system in the coming decades to meet our emissions reduction targets and realise a low carbon future. Achieving this will require a plan of action that encompasses how we produce and consume energy to ensure continued growth and prosperity while delivering deep cuts in greenhouse gas emissions.

Wind energy will play an integral part in the transformed energy future, as the most commercial of the clean energy supply technologies at present. With the introduction of the expanded 20% Renewable Energy Target (RET), Australia will see a significant increase in wind energy generation in the next five to 10 years.

The RET will generate approximately $25 billion in investment in clean energy projects in Australia, and lead to approximately 12GW of new renewable energy capacity. Approximately half of this is expected to come from wind.

Rural communities stand to benefit strongly from these projects. In addition to greenhouse gas abatement, wind energy projects will help to create regional energy security, bring significant regional investment and create jobs. A recent study undertaken for the Clean Energy Council found that the RET, in combination with existing energy efficiency policy, will create 28,000 jobs mostly in rural and regional areas.

To date New South Wales has not experienced a high level of wind energy development, which has traditionally been attracted to higher quality resources in the southern states. However New South Wales stands to attract a significant level of investment in clean energy projects in the coming years as interstate markets become saturated and limitations to development in these jurisdictions make development of more marginal resources unprofitable. With this in mind, Pacific Hydro welcomes the recent announcement of streamlined planning approvals for clean energy projects in New South Wales to proactively remove barriers to investment.

Pacific Hydro provides the following information in response to the Terms of Reference set out by the Committee, and would welcome the opportunity to continue to engage with the Committee on the development of rural wind farms in New South Wales.

# 1. The role of utility scale wind generation in:

## a. reducing greenhouse gas emissions generated by electricity production

Utility scale wind generation will play a key role in Australia's energy future, as the most commercially viable of the renewable energy technologies at present. The renewable energy industry predicts that the expanded Renewable Energy Target (RET) will require approximately 12 GW of new projects installed in Australia to meet the 45,000 GWh target by 2020. Approximately half of this capacity is predicted to come from wind energy.

While wind is a naturally variable technology, it remains true that for every unit of zero-emissions energy generated by a wind farm, a unit of energy from other sources is displaced, thereby abating greenhouse emissions from energy production. However the exact abatement will depend on the energy sources in the supply mix at the time of generation and therefore vary slightly.

Pacific Hydro's 52.5MW Challicum Hills Wind Farm, located near Ararat in rural Victoria, was commissioned in 2003. In the six years of its operation, it has abated one million tonnes of greenhouse gas emissions. Pacific Hydro's current operating wind farms in Australia abate up to 670,000 tonnes of greenhouse emissions every year. Projects in our development pipeline would increase this figure by up to two million tonnes per annum.

A report by MMA undertaken for the Victorian energy market found that for every 100MW of wind energy installed, between 0.23 and 0.31 million tonnes of greenhouse gas emissions were abated per annum[1]. Over the 20-25 year life of a wind farm, this would equate to approximately two million tonnes of greenhouse gas abated.

## b. producing off peak and base load power

Australia is uniquely positioned to support world-leading levels of naturally variable energy sources into the National Electricity Market (NEM).

The NEM is a sophisticated forward looking market with a range of control systems to manage the supply and demand balance. This balancing of power generation, power flows and electricity demand has been undertaken successfully in Australia for decades through the market dispatch system. It requires sophisticated levels of forecasting to ensure that the competing market generators always supply sufficient energy to meet demand.

Unlike in many international jurisdictions, Australia has been able to securely manage the scheduling of energy supply to meet both base and peak loads through a robust energy market which addresses supply in half hour and five minute pre-dispatch scheduling.

Successive Australian federal governments have dedicated significant funding into a state of the art wind energy forecasting system to ensure that the electricity market participants in Australia have the best possible forecast information on which to compete to meet demand at all times of the day.

This world class forecasting system has allowed Australia to learn from the mistakes of some European countries where rapid wind energy build rates were not supported by precautionary forecasting and information control systems that are

[1] MMA (2006). Assessment of Greenhouse Gas Abatement from Wind Farms in Victoria.

required to manage large volumes of naturally variable generation. This created a significant unknown volume of intermittency in the power system of these countries, most notably in Germany.

Australia's very sophisticated and robust energy markets will be able to support large volumes of wind energy in the energy supply mix, due to following initiatives:

- The forward information from the market provides detailed five minute and half hour pre-dispatch schedules, allowing generation to be brought online rapidly to meet fluctuations in demand or changes in wind energy;
- Semi-scheduling requirements for wind generation incorporates an aspect of power system operational control ensuring that the network security is maintained;
- Sophisticated forward markets including 10 year planning horizons to ensure that appropriate generation capacity is brought online to meet growing demand in the longer term;
- Introduction of the Australian Wind Energy Forecasting System which forecasts wind energy patterns to all dispatch, pre-dispatch and forward market timeframes with up to 94% accuracy; and
- The market is run by the system operator making the NEM a unique combination of both market response and power system control (in many other countries the energy market has been separated from the system operation introducing a disconnect between the system security and the market).

The combination of these elements means that Australia is able to support very high levels of penetration of wind energy in the market, supplying both base and peak loads.

## 2. Locating rural wind farms to optimise wind resource use and minimise residential and environmental impacts

The economics of wind farming is driven by the nexus of wind resource and proximity to the high voltage electricity transmission network (typically within 15km). Since the transmission network exists to serve demand, and since demand is geographically driven by human settlement, it is inherent that wind farm development will tend to occur where there is some level of human settlement and therefore land use.

As a pioneer of wind farming in Australia, Pacific Hydro has played a key role in developing Australia's world class planning guidelines. This was primarily through our Portland Wind Energy Project in Victoria which was taken through an Environmental Effects Statement (EES) in 2003. The Portland EES was in many respects the progenitor of the current Victorian State Government.

The planning and development of wind farms in Australia is guided by jurisdictional planning laws which require developers to meet rigorous standards in regard to environmental and residential impact. These standards have typically evolved with the maturation of wind farming in Australia, including learnings from the European experience where wind adoption began two decades earlier.

Planning regulations require developers to address the environmental, visual, noise, cultural heritage and residential impacts of a wind farm to ensure appropriate development.

Pacific Hydro has always taken great care to engage at an early stage with the communities where we propose a wind farm development. At all of our development sites, many in rural areas, we enjoy broad support for our proposed projects. In our experience, particularly in the early years of wind build-out in Australia, wind farming was quite novel and many communities had less awareness and appreciation of utility-scale wind farms. However, after we had communicated clearly the details of the project, and also shown that there are strong regulations in place to ensure residential and environmental impacts are minimised and managed, we found that community support grew and consolidated in favour of the project.

In addition by being a reasonably late adopter of wind energy technology Australia has been able to 'leapfrog' some of the teething problems of wind turbine technology (particularly in regard to noise) and adopt the best technology available, as demonstrated by modern wind turbines producing a barely audible 'whisper' of noise at 500m thanks to streamlined blades and attention to gearbox design. Australia has also benefited by being able to import the toughest regulations to be found globally (e.g. in respect of noise regulations) and proceed with confidence knowing that there is a body of proven experience to draw upon for many of the planning and practice issues in Australia.

Finally, the adoption of wind power in rural areas takes a positive step towards alleviating the impact of drought on rural farming communities. It addresses a global environmental problem which is causing hardship to Australia's primary producers, as well as providing a lifeline of new economic activity to regions under economic stress.

# 3. The impact of rural wind farms on property values

There has long been debate about the effect of wind farms on property values, with the perception that "industrial" development in otherwise "pristine" rural landscapes may have an adverse impact on resale values.

Studies undertaken to quantify the impact in a range of countries actively involved in wind energy development have found no conclusive evidence of a negative effect.

Analysis of properties within a five mile radius of the Kittitas Valley Wind Farm in Washington, USA, found no evidence of an effect on property values[2]. The study reported that while views of the development would have no negative impact, the economic benefit to the county from the wind farm construction would have significant positive benefits for the community. An earlier study undertaken for the Renewable Energy Policy Project in America found that property prices within the five mile zone of a range of wind farms tended to go up rather than down as a result of the wind farms[3].

Evidence from a similar study undertaken by the United Kingdom's Royal Institution of Chartered Surveyors was ambiguous, with some negative impact on terraced housing within a mile of wind farm developments, but no impact on detached housing[4]. There was no evidence of any effect on property values beyond a mile radius.

In Australia, studies undertaken by the Australian Wind Energy Association (now a part of the Clean Energy Council) revealed no evidence of change in property prices as a result of wind farms. At the Salmon Beach Wind Farm in

[2] ECONorthwest (2006). The Economic Impacts of the Proposed Kittitas Valley Wind Power Project in Kittitas County, WA
[3] Renewable Energy Policy Project (2003), The Effect of Wind Development on Property Values
[4] Royal Institution of Chartered Surveyors (2007), What is the Impact of Wind Farms on House Prices?

Esperance, WA, of 15 properties evaluated, only one decreased in value after the construction of a wind farm, but this was related to subdivision activity rather than proximity to the wind development[5].

In Pacific Hydro's experience, rather than having a negative impact on property values, wind farms provide rural communities and land holders with a mechanism to drought proof agricultural tenements through lease agreements with wind developers. In addition, due to strict planning regulations wind farms may provide a benefit to rural landscapes by preventing other development initiatives.

# 4. Mechanisms for encouraging local ownership and control of wind technology

The final design and control of a wind energy development is influenced by a range of elements including planning permit conditions, local topography and community sentiment. In the design of a new project, a developer will have regard to all these elements to reach a balance between what is commercially viable and what is acceptable to the community hosting the project.

Community engagement is therefore an important element of any responsible wind energy development in that it allows the community to have input on aspects of the wind farm such as turbine placement, lighting and environmental concerns. Recognising this important aspect of community control, Pacific Hydro is committed to extensive community engagement in the development of all our new projects.

While our business model does not include locally owned projects, Pacific Hydro supports community project development as they increase public acceptance and understanding of wind energy technology and thereby remove barriers to wind energy developments in the vicinity.

# 5. The potential role of energy generated by rural wind farms in relation to the Australian Government's proposed Renewable Energy Target

The Federal Government's expanded RET is expected to require approximately 12 GW of new renewable energy capacity installed in Australia in the coming decade. Pacific Hydro and the renewable energy industry expects between 6-8 GW of this to come from wind energy developments. This represents a significant increase in installed wind energy capacity in Australia, the bulk of which will be made in the first five to 10 years of the scheme.

Given the nature of the wind resource the bulk of these wind farms could be expected to be in rural and regional areas. However this will depend on access to adequate transmission grid infrastructure, which can be limiting in rural areas due to their location at the end of regional transmission and distribution lines. As the energy supply system is transformed for a low carbon future, and distributed energy supplies become more mainstream, we would expect to see investment in upgrade and extension of these limiting networks more often prioritised by governments.

[5] AusWEA (date unknown), Fact Sheet 12: Wind Farms and Land Values

To date New South Wales has experienced a relatively slow uptake of wind energy opportunities, due to a lower quality wind resource than the southern states. However recent changes to planning provisions in New South Wales, and the relatively strong energy network infrastructure will mean that New South Wales attracts a greater share of wind energy investment in the short to medium term off the back of the expanded RET

# 6. Other relevant matters

Access to transmission infrastructure will be a key limitation for development of utility-scale rural wind farms in the short to medium term. This has been brought about by chronic under-investment in maintenance and extension of the transmission and distribution systems by successive state and federal governments.

Existing market rules require that any generator seeking to connect to the network must pay for any new infrastructure up to the point of connection or any augmentation of the network required to safely deliver the extra capacity into the NEM. This creates a situation in which there is no mechanism available to develop new large-scale transmission in remote areas. The costs are prohibitive for the private sector under the conventional monopoly rate of return regulations that persist in Australia that effectively create a first mover disadvantage, while the Government has been reluctant to build infrastructure where it believes it may crowd out more efficient private investment. This stand-off has resulted in continual under-investment in upgrades and expansion.

A mechanism to overcome this stand-off is required, which shares the cost and the risk of large-scale investment in transmission infrastructure between governments, consumers and generators. This issue is the focus of the current Australian Energy Market Commission Review of Energy Market Frameworks in light of Climate Change Policies.

Further barriers to wind energy development exist in lengthy and onerous planning approvals processes in many jurisdictions. The New South Wales Government is to be congratulated for their recent streamlining of planning processes, guaranteeing a four month turn around for renewable energy projects which classify as critical infrastructure.

# Conclusion

Wind energy will play a key role in Australia's energy future. As the most commercially competitive renewable energy technology, installed wind energy generation capacity will grow significantly in the coming decade under the expanded 20% Renewable Energy Target, with approximately 6-8 GW of new wind energy capacity forecast. When installed, this could abate over two billion tonnes of greenhouse emissions per annum.

In the current energy system wind penetration can reach up to , as it has in South Australia, before greater control measures will be required in the NEM to accommodate the naturally variable generation. Australia is well equipped to deal with this challenge however, having an energy market design and forecasting systems which are second to none in their ability to securely manage wind energy as part of an overall supply mix which is able to meet base load while fluctuating to meet changing consumer demand.

Australia's sophisticated and robust energy market is able to support very high levels of wind generation due to:

- The forward information from the market provides detailed five minute and half hour pre-dispatch schedules, allowing generation to be brought online rapidly to meet fluctuations in demand or changes in wind energy;
- Semi-scheduling requirements for wind generation incorporates an aspect of power system operational control ensuring that the network security is maintained;
- Sophisticated forward markets including 10 year planning horizons to ensure that appropriate generation capacity is brought online to meet growing demand in the longer term;
- Introduction of the Australian Wind Energy Forecasting System which forecasts wind energy patterns to all dispatch, pre-dispatch and forward market timeframes with up to 94% accuracy; and
- The market is run by the system operator making the NEM a unique combination of both market response and power system control (in many other countries the energy market has been separated from the system operation introducing a disconnect between the system security and the market).

Increasing installed wind energy capacity is not expected to lead to landscape or environmental degradation however as development of wind farms will continue to be strongly regulated by environmental planning laws. These laws will also ensure that wind farms continue to have minimal noise, visual and cultural heritage impacts.

An increase in wind farming in Australia is also unlikely to have any impact on rural property values, with no evidence to date across a range of countries that wind farming has any significant impact on the property market. On the contrary, it is Pacific Hydro's view that as wind farms become more common place the benefits to rural and regional communities will become more apparent. The benefits of rural wind farms are already understood and appreciated in the communities in which Pacific Hydro works, brought about in part by our extensive consultation processes which allow individuals and communities some control over elements of wind farm development.

There is a bright future for wind farming in Australia. With its relatively robust energy networks and low levels of current penetration, New South Wales stands to reap many of the benefits which will be realised under the expanded 20% RET, including significant investment, energy security, regional development and the creation of tens of thousands of jobs.