Submission
No 91

INQUIRY INTO RURAL WIND FARMS

Organisation: Epuron Pty Ltd

Name: Mrs Donna Bolton

Date received: 21/08/2009

NSW LEGISLATIVE COUNCIL
GENERAL PURPOSE STANDING COMMITTEE NO. 5
INQUIRY INTO RURAL WIND FARMS

Submission by

Epuron Pty Ltd

21 August 2009

Table of Contents

About Epuron

Epuron welcomes the opportunity to make this submission to the Inquiry into Rural Wind Farms by General Purpose Standing Committee No. 5

This timely Inquiry has the potential to help shape legislation and policy necessary to enable NSW to benefit from the increased security, diversity and sustainability that wind and solar energy will provide. As well as clean energy, NSW is presented with a once in a generation opportunity to create hundreds of long term, high quality jobs in rural areas and to obtain wider community benefit through viable wind farm developments. NSW must seize this opportunity to attract sustainable energy projects and the employment and investment they bring.

Epuron makes this submission as a leading wind energy company in NSW. We have invested significant time and resources into exploring for wind energy resources in NSW over the last 6 years with the firm belief that wind energy has a significant role to play in providing additional power with zero greenhouse emissions and zero water consumption in operation.

Epuron Pty Ltd was founded in North Sydney in 2003 and in 2005 became a subsidiary of Epuron GmbH of Hamburg, itself a division of Conergy AG which is one of Germany's largest renewable energy companies. Our interests are in wind and solar projects. Originally known as Taurus Energy, Epuron is based in North Sydney and is currently the most experienced wind farm developer in NSW, responsible for over 70% of the approved wind power capacity in the State.

The company has achieved planning consent for five projects including the Cullerin Range, Snowy Plains, Conroy's Gap, Silverton* and Gullen Range wind farms, of which the first is now in operation. A further 450MW is currently lodged with the NSW Department of Planning as Yass Valley Wind Farm proposal. Epuron's current pipeline in NSW stands at over 2,000MW.

Epuron has installed a strategic network of wind monitoring masts across NSW, with a total of 36 masts in operation gathering vital wind resource data. This network of available resource is expanding at a rate of several new masts per year. Together with numerous data sets acquired from third parties, Epuron now holds the most comprehensive high quality wind data record across the State. This resource database alone represents an investment of several million dollars, and is the most comprehensive data collection ever undertaken into wind resources in NSW.

Epuron has grown from 2003 when there were two in the company to its current size of 20 employees, with the majority of this growth in the last two years in response NSW and Federal government policy and legislation. Alongside the direct employment of individuals Epuron also engages consultants and contractors in a wide range of disciplines, most of whom are based in NSW, many in regional areas.

EPURON
POWER FOR PORTFOLIOS

* Silverton wind farm is a joint venture with Macquarie Capital Wind Fund

Executive Summary

With the passage of Renewable Energy Target (RET) legislation in the Australian Parliament this week ensuring 20 percent of Australia's stationary energy will come from renewable energy sources by 2020, this Inquiry into rural wind farms in NSW is well positioned to highlight the key facts about wind energy and distil important information about the potential future contribution of wind energy to NSW electricity supply.

The newly legislated renewable energy target of 45,000GWh is likely to result in an addition of over 5,000MW of wind energy nationally. NSW consumes around 35% to 40% of the electricity generated in the National Electricity Market and has excellent wind resources over large areas, as well as a strong and wide-reaching electricity transmission system. Accordingly, NSW should aim to generate 35% to 40% of the RET within our borders to capture the benefits of clean energy and of jobs and new investment, particularly in regional NSW.

If NSW does capture such a share of the RET it could result in the installation of over 2,000MW of wind energy.

Currently in NSW there is 187.36MW of installed wind capacity. This total is comprised of:

Wind Farm	**Installed Capacity (MW)**
Capital	140.7
Cullerin	30
Crookwell	4.8
Blayney	9.9
Hampton	1.2
Koorang	0.6
CSIRO Newcastle	0.16
TOTAL	**187.36**

From 187MW to potentially over 2,000MW is a significant journey of investment, planning, connection, construction and above all commitment.

There can be little doubt about the advantages of installing wind energy in NSW. They include:

- *Significant reductions in GHG in NSW;*
- *Reliable, diverse, secure generation capacity;*
- *Private investment in generation capacity;*
- *Large scale investment in regional NSW;*
- *Significant jobs in regional NSW in construction and operation;*
- *Efficiencies in the transmission system including reduced losses.*

Underpinning all of the potential development opportunities created for NSW by the RET is the finding that around 80 per cent of all residents and voters want NSW to make the transition to renewable wind energy.

We are available to address any issues raised in this submission in more detail, if required, or to appear at any hearing.

Terms of Reference and Responses

1. a. The role of utility scale wind generation in reducing greenhouse gas emissions generated by electricity production

Key points:

- **Every MWh of electricity generated in a wind turbine in NSW will remove the need for an equivalent amount of energy to be generated somewhere else.**
- **In NSW, 90% of electricity is generated in coal fired power stations. Therefore every MWh of wind energy displaces, on average, 0.9MWh of coal fired electricity.**
- **This means 967kg of greenhouse gas emission is avoided by every MWh of wind generated.**
- **The installation of sufficient large scale wind farms will reduce the market for new coal fired power plant and associated emissions.**
- **Additionally an amount equivalent to 15% of Sydney's potable water supply is used for cooling in fossil fuel power stations.**

There is an allegation from opponents that electricity generated from wind energy does not displace electricity from other sources and therefore does not meaningfully reduce GHG emissions. This is a fallacy.

Wind generation is an efficient and reliable energy player within the National Electricity Market (NEM) and displaces generation on a MWh by MWh basis.

How does it work? There is variability of supply and demand across the NEM minute by minute, day to day and across the seasons and this is managed in the NEM by generators bidding to supply for each dispatch period. The NEM is managed by AEMO, the Australian Energy Market Operator. AEMO must ensure sufficient power generation is available at each instant in time to meet demand on a lowest available cost basis.

The market works by generators bidding in to have their output accepted. As wind energy is often sold under contract to retailers in "off-market trades' the price is agreed and the wind operator bids into the market at zero dollars for the relevant dispatch periods.[1] AEMO stacks bids from generators in ascending order which means that wind farm bids (at zero dollars) are generally assured of being dispatched. The net effect of this is to reduce the amount of electricity required to be dispatched from other sources. That is, wind energy displaces generation from the top of the dispatch stack i.e. the most expensive bids. When this happens the generators that are displaced reduce their output meaning one MWh of wind output leads to one MWh less output from another source. If the displaced generators rely on fossil fuels this will reduce emissions.

Wind energy is often considered to be reduced load rather than generation because its distributed nature in the grid means that it feeds the load closest to it resulting in a lowered demand to be met by the larger centralised generators.

Wind energy can be dispatched onto the grid in the manner described above until around 25% or 30% of the total electrical capacity connected to the network is wind. The current market system can therefore absorb the entire Renewable Energy Target of 9,000MW being met by wind on the grid without any extra costs being incurred.

Reducing GHG emissions

To calculate the extent to which greenhouse gas emissions are reduced by wind generation it is necessary to review which generators are displaced. Wind does not displace other renewable generators such as hydro as they also bid into the market at

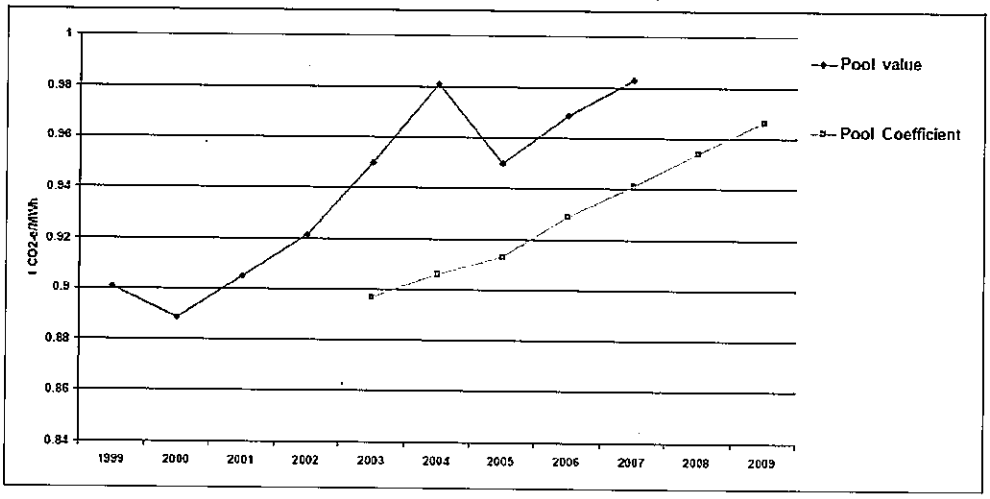
zero dollars. As 90% of generation in Australia is from fossil fuel generators it is most likely that a fossil fuel generator will be displaced.

The question then is the amount of carbon dioxide equivalent that would be emitted by each of the generators displaced. An indicator used to determine the amount of GHGs emitted per MWh of electricity supplied to the NSW grid is the Annual Pool Value[2]. The table below shows that the Annual Pool Value is calculated by dividing the total energy supplied to the NSW grid by the total emissions in that year. To account for one-off highs or lows that may be experienced in a particular year the Pool Coefficient is determined. This value is calculated by averaging the five Annual Pool Values from previous years, with a lag of two years. So the NSW Pool Coefficient for 2009 is the average of the Annual Pool Values from 2003 to 2007.

NSW Annual Pool Values and Pool Coefficients (2003-2009)2

Year	Total NSW emissions (tCO2-e)	Total NSW Sent Out Generation (MWh)	Annual Pool Value tCO2- e/MWh	Pool Coefficient tCO2- e/MWh
2003	63,431,793	66,800,866	0.950	0.897
2004	65,979,036	67,276,401	0.981	0.906
2005	65,896,606	69,341,455	0.950	0.913
2006	70,010,515	72,222,646	0.969	0.929
2007	69,810,669	71,015,242	0.983	0.941
2008	TBA	TBA	TBA	0.954
2009	TBA	TBA	TBA	0.967

Historical NSW Pool Value and Pool Coefficient (1999-2009)2



The 2009 Pool Coefficient value indicates that presently for every megawatt-hour of electricity supplied to the NSW electricity pool, 967 kg of green house gases are emitted. Therefore for every megawatt-hour of electricity generated at a coal power station 967 kg of green house gases are emitted and therefore 967 kg of GHG are **not emitted** for each MWh that wind displaces fossil fuel generators.

To meet the State's energy demands forecast for the next ten years an additional 1,500 MW is required at a minimum. Using the 2009 Pool coefficient value an extra 1,450 tonnes of GHG will be released into the atmosphere every year.

The development of rural wind farms meeting the same installed capacity would see the avoidance of these emissions.

Water and other emissions savings

It should also be noted that installation of wind energy also significantly increases the available potable water in the state.

An amount equivalent to 15% of Sydney's potable water supply is used in cooling for fossil fuel generation. In operation wind energy uses no water. There is therefore not only savings in GHG emissions but also significant savings in potable water associated with wind farm generation.

For one project – Silverton Wind Farm – the 598 turbines proposed would produce approximately 3,500,000 MWh of renewable electricity per annum, this is 4.5% of the State's current power needs or sufficient for the average consumption of around 437,500 homes and this would result in savings in water consumption of approximately 4,600 million litres per annum of potable water which would otherwise be required to produce the same amount of electricity from coal-fired power stations.

Other emissions avoided by this one wind farm include avoiding the release of 18,760 tonnes of sulphur dioxide, 8,365 tonnes of nitrogen oxides and 535,000 kilograms of particulates.

An additional factor to be considered is the assertion that wind energy has significant emissions arising from manufacture, transport and erection. This assertion is sometimes used to diminish the GHG savings derived from wind energy. This argument is a distraction as Life Cycle Analysis (LCA) studies show that a wind turbine's life cycle energy use is paid back within 6 to 7 months of operation.[3] Given the size of wind turbines and the technologies used in their construction and operation these emissions are small compared to those associated with the construction and operation of other types of generators particularly large fossil fuel and nuclear generators.[4]

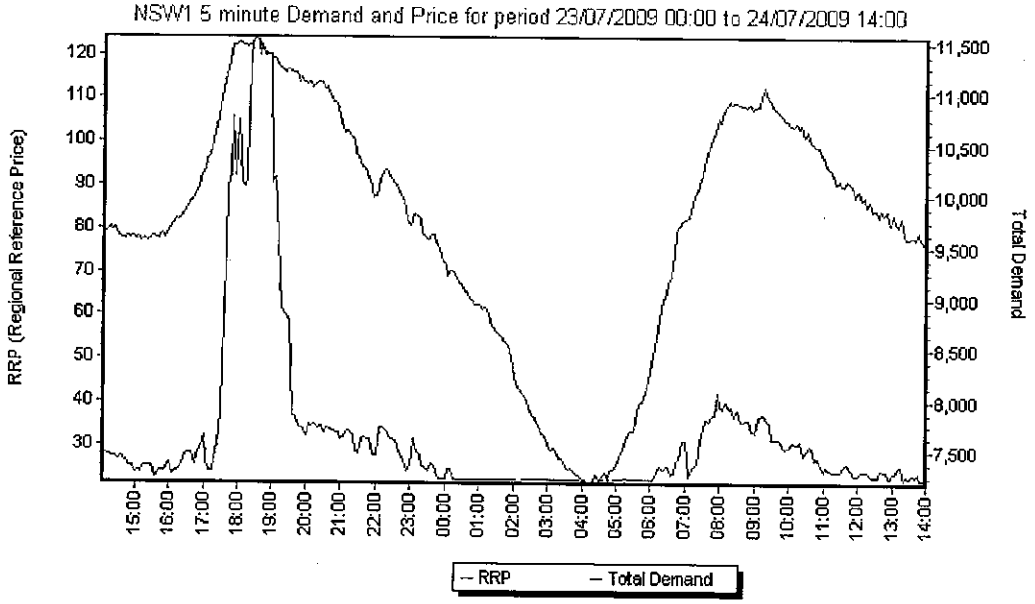
1. b. The role of utility scale wind generation in producing off peak and base load power

Key points:

1. **Wind Energy makes significant contributions to base load and peak electricity demand**
2. **Wind Energy can easily be facilitated in the NSW power system**
3. **Wind Energy should be an integral part of any diverse and secure energy system.**

1. Wind Energy makes significant contributions to base load and peak electricity demand

- The term "base load power" refers to the lowest amount of electricity needed to meet the demand of consumers. The graph below shows electricity demand in NSW over a 24 hour period on 24 July 2009. The approximate base load in NSW is 7000MW leaving significant 4500MW of variable load.



NEMCO Live Market Data, www.nemmco.com.au, accessed 24/07/09

- A base load power plant such as a coal fired power station, is one that provides a steady flow of power *regardless* of total power demand by the grid. [5]

- Coal fired power stations are therefore limited in their ability to vary their output and match the daily fluctuations in energy demand. The current market is designed around getting demand to meet supply and not supply to meet demand. The main initiative being applied by retailers is offering reduced cost electricity to consumers when demand is lower.

- Energy generated from renewable technologies, such as solar and wind, are variable with their output and if they have a correlation to energy demand patterns, their output can follow the daily variations in demand.

- The aggregated wind energy resource in NSW combines to give a positive correlation between wind output electricity demand. This means wind generators in NSW are capable of meeting **both** peak and base load demand.[6]

- In the study "Load Carrying Capability of Wind Farms in NSW", P. Hamer 2008, for the modelled installed capacities of Wind Energy described in Table 1, the positive contribution to winter and summer peaks are displayed in Figures 1 and 2.

Table 1 Modelled Generation for Distributed Wind Power in NSW

Scenario	Goulburn	Yass	Far West	Upper Hunter	Northern Tablelands	Monaro	Total
RET Target	1000MW	500MW	1000MW	300MW	350MW	350MW	3500MW

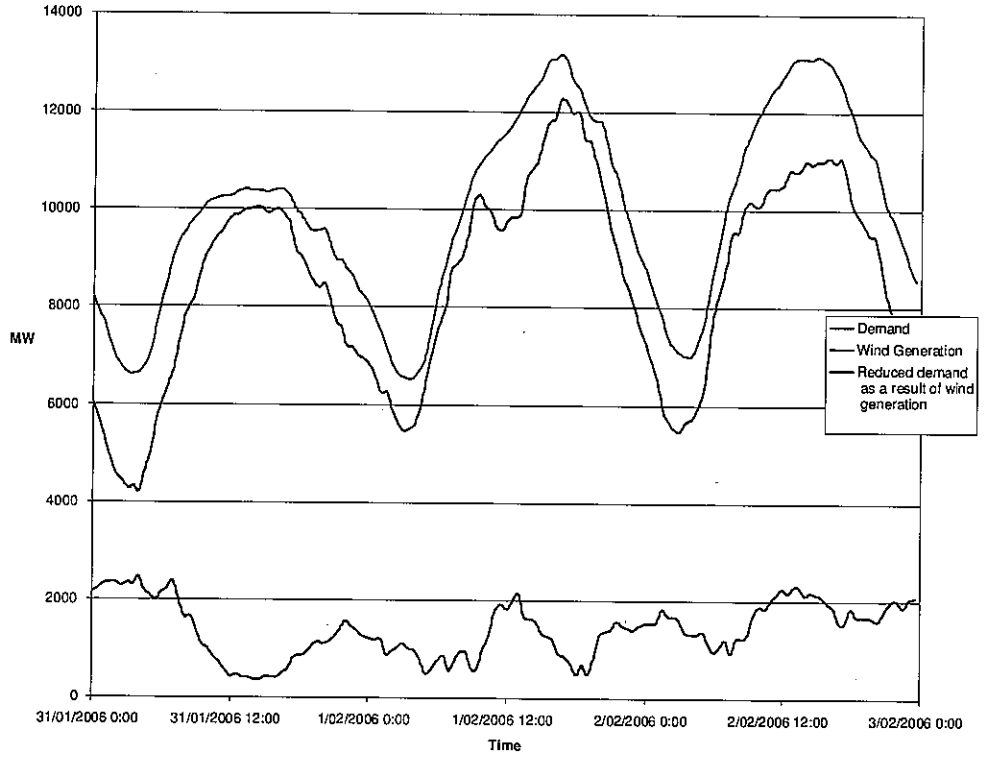


Figure 1: Wind Contribution to Summer peak demand 2006

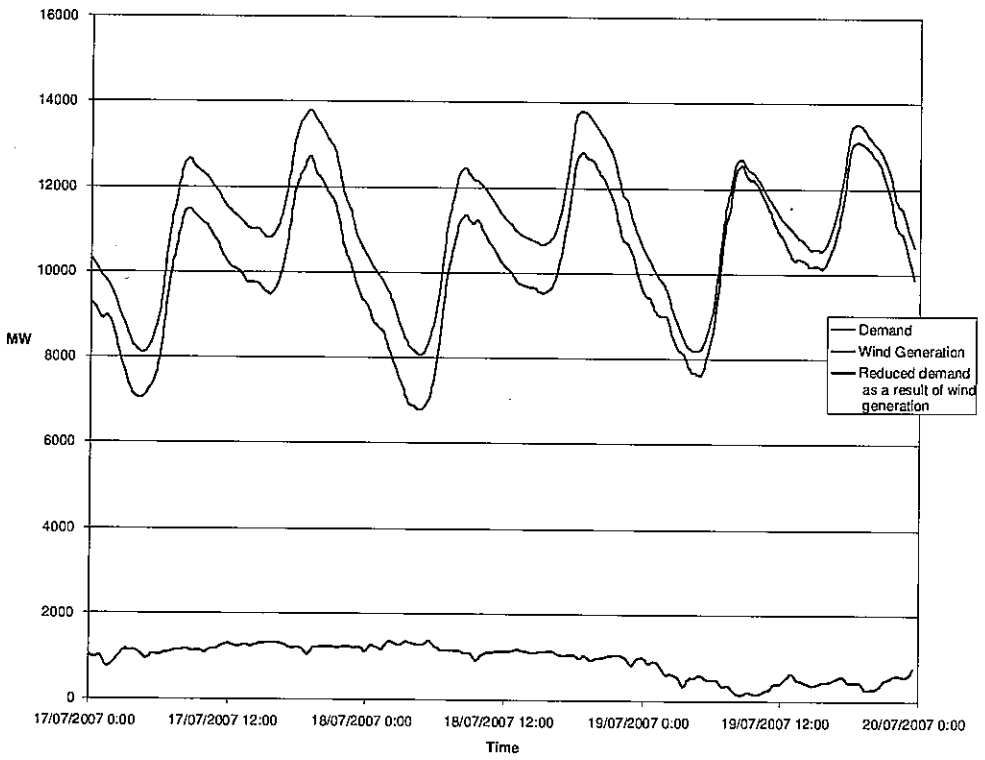


Figure 2: Wind Contribution to Winter peak demand 2006

- The results from the same study showed that for historical data from 2004 – 2007, using a simple Loss of Load Expectation calculation, that wind farms in NSW could displace fossil fuel generation by between 21-28% of their nameplate rating, as shown in Table 2.

Table 2: Total Displaced Fossil Fuel Generation 2004-2007

Scenario	Installed Capacity	% of Capacity Reduction on Peak		% of Capacity Displaced Generation	
		Average	Minimum	Average	Minimum
RET Scenario	3500MW	25.41%	16.11%	33.96%	25.34%

2. Wind Energy can easily be facilitated in the NSW power system

- It is only when wind energy reaches over 20 per cent of the market share that there is likely to be a requirement for advances in management of distributed and intermittent power sources and making the grid more flexible in its receipt of intermittent power.
- Wind energy is semi-scheduled which means it is accepted into the market whenever it is generating and receives the pool price set by other bidders into the market.
- Flexible generators such as gas fired power stations cooperate well with variable generators such as wind. In NSW new generation is currently moving to building gas peaker and intermediate plant with 2000MW of peakers in operation or planning,
    - Uranquinty 640MW open cycle gas fired power station - in operation
    - Tallawarra 400MW combined cycle gas fired power station - in operation
    - Leaf's Gully – 360MW open cycle – planning approval granted August 09
    - Munmorah – 700MW upgrade of existing plant using coal or gas generation - Director General's requirements issued July 09
- Modern integrated networks are designed to cope with 'shocks' such as the sudden loss of large thermal power stations and with uncertainties in consumer demand. [7]. No special backup provisions need to be made for wind energy. All generating plants make use of a common pool of backup plant that is typically around 20% - 25% of the peak demand on the electricity network.

Conclusion

Utility scale wind generation in NSW currently supplies off-peak and baseload power, it can easily be accommodated in the NSW power system and has the capacity to provide NSW's proportion of the RET – 35% - 40% of the target or 4000MW of installed capacity.

Wind Energy should be an integral part of any diverse and secure energy system.

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

Key points:

1. **The location of wind farms is driven by technical considerations**
2. **Wind Farms need access to suitable land in areas with a good wind resource**
3. **Potential impacts from any wind farm proposal are thoroughly assessed**

4. **Wind Farm Precincts created in response to the opportunities presented by the RET**

5. **Wind farms are in suitable wind resource locations with acceptable impacts**

1. The location of wind farms is driven by technical considerations

Requirements for location of wind farms are driven by technical considerations including:

- Areas of high average wind speeds and predictable wind resources are necessary to ensure economic viability
- Adequate land and supportive landowners
- Proximity to the electrical grid to allow export of generated electricity
- Suitable terrain allowing constructability

Further investigation into other key environmental, social and community considerations is undertaken to ensure no significant issues exist prior to the commencement of the planning studies and the associated significant investment. This includes ensuring the proposal meets planning criteria.

The Part 3A (Major Projects) planning process applies to wind farm projects and provides an integrated, thorough, rigorous and responsive assessment of environmental and community impacts. It is a transparent process that provides engagement and consultation with stakeholders and the community during the investigation and assessment of the proposal. This process has been tested by the Land and Environment Court.

Epuron submits that the Part 3A planning process provides a robust and comprehensive assessment of wind farm proposals and that no changes to the process are necessary. However the improved delivery of proposals under Part 3A to reduce delays and costs are necessary to ensure NSW attracts investment in renewable energy under the RET.

The integrated planning provided under Part 3A is necessary to ensure economically significant proposals are consistently assessed. Local government DCP's can be inconsistent with established State and Federal policies and can be problematic for all stakeholders including the local community.

The NSW State Government has implemented policy initiatives to encourage investment in wind energy in NSW that are required under the federal RET. The new policy considers and responds to community impacts.

Research consistently shows strong support (approximately 80% support) for wind energy development in rural communities, including data from local council's own polls. The few loud voices opposing wind farms are disproportionate to the actual views of the entire community.

Wind Farm Siting - Wind Resource

Wind energy has been utilized for many centuries (since the 7th century AD) to power sailing vessels and windmills to mill grain or drive pumps. Wind turbines, using the same principals, convert the stored energy in the wind into electricity and that electricity is exported to the electrical network to be used in industrial, commercial and residential applications.

A wind farm must produce enough electricity from the wind to be economically viable and therefore must be located where there is a high average wind speed.

Wind speed is the most important pre-condition to the location of a wind farm. As coal power plant is built close to coal mines so wind farms must be located to optimize wind resource.

2. **Wind Farms need access to suitable land in areas with a good wind resource**

Access to suitable land in areas with a good wind resource is necessary to ensure an economically viable wind farm can be established with the necessary size and scale.

Wind energy developments require significant capital investment with significant fixed cost items mainly related to the substation and grid connection. Therefore the generation capacity must support the fixed, up-front capital costs associated with connection.

Most land secured for wind energy development is via long-term lease arrangements over privately owned freehold, generally broad scale farming and grazing properties. These properties are generally cleared grazing properties free of large areas of native woodland and are surrounded by low population density.

Grid Connection

A vital requirement of a wind farm is access to the electricity network, generally the transmission network (>132kV) owned and operated by Transgrid or the distribution network (<132kV) owned and operated by Country Energy. Access to this network defines the corridor around the wind resource where wind farm companies focus their site selection effort.

Other siting criteria

Having selected a site on the basis of the broad criteria mentioned above, further work is undertaken on site suitability. By a series of iterative desktop and on-ground work the feasibility is determined prior to the commencement of the development process. As significant investment is required to measure the wind speeds at a site and to undertake the environmental assessment, renewable energy companies undertake a review of potential risks.

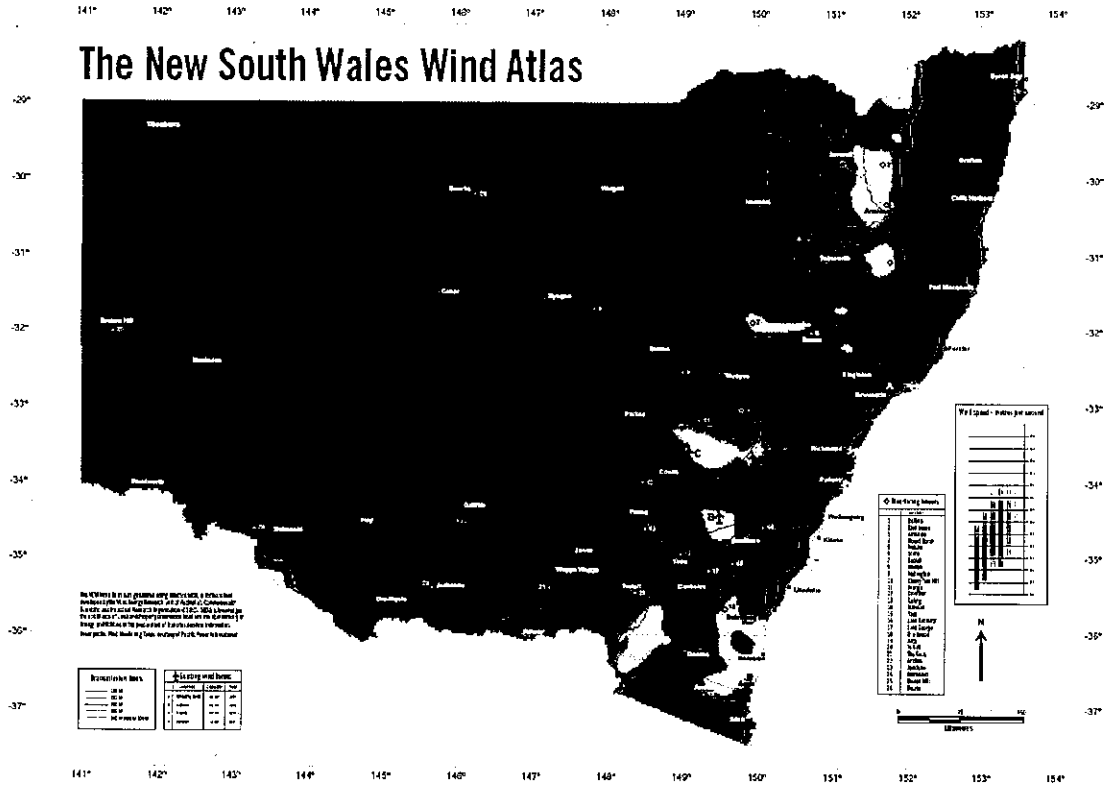
This includes a high-level assessment of the site that explores:
- consultation with landowners, relevant responsible authorities and other stakeholders
- potential environmental constraints including native vegetation, flora and fauna
- identification of potential native title constraints
- planning and approval requirements and constraints
- future land use of the property and surrounding land
- preliminary assessment of environmental constraints
- landscape issues
- compliance with noise criteria
- technical and contractual aspects of the proposal
- identification of constructability issues.

Ultimately sites that optimise wind resource use and minimise environmental and community impacts are the sites that are preferred.

Physical location of potential wind farms in NSW

Average wind speeds are typically greater in areas of higher topography. In NSW, sites that meet most of the key criteria are generally located off the eastern coast on the ridgelines of the Great Dividing Range. The SEDA wind map and more recently the renewable energy atlas show the higher wind areas that intersect existing power line infrastructure.

As the siting of wind farms is limited, some regions have automatically become hubs for wind energy projects, such as the Southern Tablelands. Currently in the Southern Tablelands region there are 3 operating wind farms (Crookwell 1, Cullerin Range and Capital), 7 approved and 1 seeking approval from the Department of Planning.



3. **Potential impacts from any wind farm proposal are thoroughly assessed**

Planning Process

In NSW, wind farm applications with a capital investment value of greater than $30M are assessed in accordance with Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act). Part 3A integrates the assessment and approval regime for all Major Projects that needed the approval of the Minister for Planning, previously dealt with by Parts 4 and 5 of the Act. However, even under Part 4 of the Act, the Minister could "call-in" state significant projects for assessment and approval.

The Part 3A Major Project planning process responds to the economic importance of significant proposals to NSW and ensures a thorough and rigorous assessment of environmental, community and planning issues. One of the key features of the Part 3A process is the ability of the Director-General to define the scope and requirements of the environmental assessment by issuing Director General's Requirements (DGR's). DGRs direct proponents on the focus of studies required and result from agency and stakeholder consultation aimed at adequately addressing environmental, community and planning considerations.

The integrated assessment engages the community which has the opportunity to provide input to the proponents during the preparation of the environmental assessment (as generally required in the DGR's) and to the Department of Planning following public exhibition of the environmental assessment.

Potential impacts from any wind farm proposal are thoroughly assessed and this includes those impacts that relate to residential amenity including noise impacts, visual impacts and shadow flicker. The DGR's define the assessment required and the criteria applied. These are existing planning guidelines that have been used across many wind farm projects across many jurisdictions. For example, the operational noise criteria applied to wind farms in NSW is the South Australian EPA guidelines defining 35dB(A) or

background noise plus 5dB(A) at relevant receivers. These guidelines are comprehensive and strict, requiring tighter controls than other noise guidelines including Victoria and New Zealand, which use 40dB(A) or background plus 5dB(A). Visual assessments are required to follow the *Wind Farms and Landscape Values, National Assessment Framework.* Shadow flicker criteria (<30 hrs/per annum at any residence) is based on the Victorian policy and planning guidelines.

The adequacy of the planning and assessment process in relation to wind farms has been tested in the NSW Land and Environmental Court (Taralga Landscape Guardians Inc v Minister for Planning and RES Southern Cross Pty Ltd (2007) NSWLEC 59). The Commissioners of the court accepted the environmental assessment and approved the proposal, even reinstating turbines that had been removed by the Minister in the determination.

Local Government Involvement

Local councils, while not a consent authority for Part 3A Major Projects are considered a major stakeholder and consulted throughout the planning and assessment process. Councils participate in the Planning Focus Meeting (PFM), provide input to the DGR's and submit comments on the Environmental Assessment. Proponents consult closely with Local Councils, as does the Department of Planning.

The involvement of local councils with wind farm proposals has been problematic in certain instances where the local councils are conflicted with respect to representing a community that has a range of opinions. The community perception studies undertaken in NSW and elsewhere (including by local NSW councils themselves) show overwhelming support for wind farm development in their local area. Most studies show approximately 80% community support for wind farms and the Upper Lachlan Shire Council's own survey showed 70% support from a poll of the residents during the last council elections. However the minority that are opposed to wind farms are vocal which has resulted in local councils being conflicted between representing the silent majority of the community or the vocal minority.

The other key issue is that some local council's have DCP's relating to wind energy development that creates problems for the renewable energy companies, council, the community and the Consent Authority. While DCP's are not planning instruments, they are designed to provide guidance to renewable energy companies and community in relation to planning wind farms in the local government area. Some DCP's provide unreasonable and unachievable requirements that are inconsistent with State and Federal policy. Many of the requirements are prescriptive and have no sound basis. An example would be the imposition of a setback distance between wind turbines and residences which in one DCP is 2km. This distance has no sound technical or planning basis and creates an impediment to the development of wind farms.

The DGR's provide thorough assessment of the key issues, including visual and noise impacts, on a responsive basis to ensure sound planning outcomes. That is, noise and visual studies assess the residential amenity and consider site specific factors relating to project design and minimisation of overall impacts. It is not reasonable nor is it sound planning practise to apply prescriptive requirements that have no sound basis and these requirements in some DCP's provide false expectation to local communities and create conflict during the planning process.

4. Wind Farm Precincts created in response to the opportunities presented by the RET

In response to the substantial opportunities created by the new federal Renewable Energy Target (RET), the NSW State Government developed initiatives and policy to ensure that the investment, jobs and associated economic benefits from the RET would flow into NSW. Part of those initiatives relate to streamlining the planning process and reducing costs to attract that investment.

Earlier this year (27 February 2009) the NSW Premier, Nathan Rees, announced the Government's intention to establish renewable energy precincts to drive wind power investment in NSW. The Premier more recently announced (17 Aug 2009) the wind energy precincts are:

New England Tablelands	Upper Hunter
Central Tablelands	NSW / ACT border area
The South Coast	Cooma / Monaro

In the Premier's announcement, entitled 'NSW PREPARES FOR CLEAN ENERGY REVOLUTION'[9] he states: "As priority projects significant wind farms, anywhere in NSW, will see fast tracked planning decisions and fees waived." "NSW is prepared to do the heavy lifting and help the nation meet the 20 per cent Renewable Energy Target by 2020," said Mr Rees.

The announcement states that wind farms that are at least 30 megawatts will be treated as critical infrastructure with fees waived from August 2009 to 30 June 2011. It adds there will be:

- **four month turn around** - Clean energy projects anywhere in the state qualifying as critical infrastructure will have planning process managed by the department's 'go-to' people within 4 months;

- **financial incentives** - Critical Infrastructure fees will be waived (projects of 30 Megawatts or more) from August 2009 to 30 June, 2011; and

- **better community partnerships** - New dedicated environment staff for each precinct to drive our clean energy agenda and work with the community.

In addition the Government is consulting with the sector to explore ways to further improve the process for future projects noting:

- Precinct Advisory Committees in each of the six precincts will be established to provide us directly with advice.
- The Department of Environment and Climate Change will be responsible for the committees and they will include community members and representatives from Local Government.

"I am committed to doing what it takes to see more projects get off the drawing board and onto the grid," said Mr Rees.

This initiative by the NSW Government is welcomed. Epuron looks forward to further dialogue with the government to ensure the intent of the announcement is carried through in the practical application of its measures.

5. Wind farms are in suitable wind resource locations with acceptable impacts

Wind farm sites are sought where there is a good wind resource and opportunity to connect to the grid. Having found a technically good site it is then a matter of determining impacts, including residential and environmental impacts and ensuring they will be at an acceptable level. This level is not subjective – it is not the level demanded by opposing neighbours or considered suitable by enthusiastic developers. It is a level determined by planning and court precedent, by technical guidelines for noise, by independent experts for visual impact and biodiversity and by assessment by government agencies through their input into director general's requirements and adequacy tests against those requirements. Ultimately the Minister for Planning determines if the developer has adequately minimised residential and environmental impacts.

The identification of renewables precincts in NSW which aim to facilitate and enhance the development of wind farms and the infrastructure associated should assist NSW to meet its potential share of the RET market. They will also serve to advise communities of the potential for wind farms in their locality.

3. The impact of rural wind farms on property values

Key points:

1. **Community concern about property values are not based on factual evidence – numerous studies confirm that no quantitative study anywhere has ever shown measurable reduction in property values.**
2. **After a wind proposal has been announced but before it is approved or built, uncertainty may adversely affect perceptions.**
3. **There is good evidence, including from Jamestown, SA, that the regeneration of previously declining rural communities can be catalysed by wind jobs.**
4. **There is also the opportunity for proximity to a wind farm to add value to property.**

1. Community concern about property values are not based on factual evidence – numerous studies – from NSW; Scotland and the US all confirm that no quantitative study anywhere has ever shown measurable reduction in property values.

These studies include the following:

United States Report Sterzinger et al. 2003

This report examined 24,300 property transactions from 10 locations over 6 years. There was no evidence to suggest wind turbines situated within a 5 mile radius had a negative impact on property prices."

The report was an empirical review where data from 10 wind farm sites was collected and subjected to a statistical regression analysis to determine price changes in three ways:

- How property values changed over the entire period of the study for the view shed and comparable region;
- How prices changed in the view shed before and after the projects came on-line; and
- How property values changed for both the view shed and comparable community but only for the period after the project came on-line.

This study concluded that there is no support for the claim that wind development will harm property values.

United Kingdom Dent and Sims 2007

This study looked at 919 residential property transactions at three locations in Cornwall, within 5 miles of wind farms. The results were analysed and local estate agents were interviewed to understand the underlying reasons for any variation in property prices.

The results were generally inconclusive, with terrace and semi-detached houses within a mile of a turbine significantly lower in price than similar houses located further away. Detached houses and all property greater than a mile from a turbine showed no clear linear relationship between physical distance and transaction price. Upon investigation with local real estate agents it became clear that the lower prices of terraced and semi-detached houses within 1 mile of a turbine were ex-defence housing properties and were less desirable, confounding any conclusion about wind farm effects.

The study concluded that the relationship between property price and distance from turbines was inconclusive however, it suggested that factors other than wind farms had a more significant effect on property prices. It also concluded that the 'threat' of a wind farm may have a more significant impact than the actual presence of one. This finding agrees with perception studies undertaken by others.

Victoria Australia Smith et al 2004

In Victoria Australia, the Bald Hills Wind Farm Panel Inquiry examined the issues of property devaluation for neighbouring properties in a similar manner; property valuers and real estate agents provided submissions and appeared before the Panel Inquiry as expert witnesses. The Panel Inquiry report concluded that:

> "All that appears to emerge from the range of submissions and evidence on valuation issues is the view that the effect of wind energy facilities on surrounding property values is inconclusive, beyond the position that the agricultural land component of value would remain unchanged. On this there appeared to be general agreement."

Crookwell, Australia Henderson and Horning 2006

The Crookwell wind farm was developed in 1998. Sales transactions over a 15 year period were searched (1990 to 2006). Properties that surround the development and have some direct impact from a valuation perspective were investigated (principally aesthetic influences including, visual, noise and shadow effects).

The context of the study was a general trend of larger properties being sold and broken up into smaller lots commencing in the late 1990's, with very few sales occurring in the period prior to the development of the wind farm. This trend is an example of the changing nature of land use in the area, from commercially operating grazing land to a more passive rural residential use. Market forces appear to value the rural residential amenity above that of the agricultural productive capacity of the land.

It is clear that the underlying agricultural productive capacity of the land and the surrounding property subject to the wind farm is not in any measured way affected by the development of the Crookwell wind farm, meaning there has been no reduction in values. Indeed the property subject to the development enjoys additional revenue (leasing agreements) and additional benefits including improved access, erosion control and passive wind protection for stock from the sub stations and turbine tower structures. Henderson and Horning concluded, the revenue stream from the wind farm plus the underlying agricultural production from the land may well outbid the subdivision potential for the site.

2. In the short term, after a wind proposal has been announced but before it is approved or built, it has been proposed that uncertainty can adversely affect perceptions.

However, this effect in Scotland[10] was observed to go away in a relatively short time. This study found:

- People who lived in their homes before the site was developed say that, in advance of the windfarm development, they thought that problems might be

caused by its impact on the landscape (27%), traffic during construction (19%) and noise during construction (15%). However, only 12% say the landscape has been spoiled, 6% say there were problems with additional traffic, and 4% say there was noise or disturbance from traffic during construction.

- People living closest to the windfarms tend to be most positive about them (44% of those living within 5km say the windfarm has had a positive impact).

- those who most frequently see the windfarms in their day-to-day lives tend to be most favourable towards them

3. There is good evidence, including from Jamestown, SA, that the regeneration of previously declining rural communities can be catalysed by wind jobs.

Jamestown experience

The Suzlon story from Jamestown in South Australia shows the value that can be added to a community. Having set up a 'hub' to service the Suzlon turbines installed at a number of wind farm sites in the Hallett/ Jamestown area, Suzlon created an increase in employment at existing local companies alongside its own direct employment.

Suzlon are credited with reviving Jamestown, as one local noted – 'Wind is our non farm related boost and it's brought our kids back'. Suzlon directly employs 54 local people and in 2007 and 2008 spent $6 million in the local post code areas not including wages or expenditure on accommodation and food for visiting Suzlon staff.

Jamestown is a success story of increasing numbers of individuals and families returning to the small community and increasing opportunities for families and young people where previously there was little. While the impact on property values is not known the community and social value is undisputed and it would be reasonable to expect property prices to be stable or rise due to increased demand. In addition, in some communities the creation of a source of income and jobs not directly related to agriculture and rainfall has an important effect on confidence.

4. There is also the opportunity for proximity to a wind farm to add value to property.

Community concern about property values are not based on factual evidence – numerous studies – from NSW; Scotland and the US all confirm that no quantitative study anywhere has ever shown measurable reduction in property values.

It is worth noting that even if there were objective evidence of property devaluation, under the Environmental Planning & Assessment Act, property devaluation is not grounds for refusal of an application.

There is also the opportunity for proximity to a wind farm to add value to property. Those properties which include wind turbines have additional revenue adding to their value and those properties surrounding a wind farm that are involved in tourism can also benefit from the proximity. As in the case of Jamestown, local employment may create demand for residential property which is a key factor in determining value. In addition wind farm initiatives such as Solar Silverton – see below – can also add value to a property through the addition of sustainable improvements such as solar water heaters, solar photovoltaic panels generating electricity and income and additional water tanks.

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

Key Points:

1. **Local ownership of wind farms is hard to achieve and a high risk investment for individuals.**
2. **The installed cost of each wind turbine generator is $5-6 million.**
3. **Community funds as a mechanism for community involvement.**

1. Local ownership of wind farms is hard to achieve and a high risk investment for individuals.

Australia generally has the opportunity to do what Europe does. With wind farms the model is quite different between the two continents with significant numbers of very small wind farms installed across Europe where in Australia's large areas of flat land there are larger scale wind farms.
Local ownership whether by investment by individuals within a community or collective investment carries risk. However, there are mechanisms other than ownership to achieve community involvement, that don't require up-front investment and risk to be carried by the community

Australia's best known example of the kind of community ownership achieved in some parts of Europe and the US is Hepburn Wind Park. The 4MW, two turbine wind park[11] has taken over four years and thousands of hours work by volunteers and supporters to reach 92% of the capital required. Subject to reaching its investment target it aims to move to construction in 2010.

Although this wind farm is community driven and owned there remained local objectors who opposed the project and appealed the planning approval to the Victorian Civil Appeals Tribunal (VCAT). The approval was upheld at VCAT. This appeal to VCAT is a reminder that 100% local ownership and control is no guarantee of total community acceptance.

The Hepburn Wind Park is an excellent project and it is at a community ownership scale of 2 wind turbines or 4MW. However, to achieve the installed capacity of wind that is required in Australia under the RET it would be possible to install 4000MW or 2000 wind turbines in NSW alone.

While owning a share in a wind energy project is an obvious way in which an individual or a group can participate in the benefits of the project[12] with dividends directly related to the performance and profitability of the wind farm. It is nonetheless a high risk investment. Large scale construction contracts and wholesale electricity prices are not risk free ventures for private capital.

To achieve the installed capacity of wind that is required wind farms in Australia will be closer in scale to wind farms in the United States rather than to those in Europe and accordingly are multimillion dollar ventures. They are financed either off the balance sheet, generally of retailers, or by project finance. Neither of these financing models of larger scale projects e.g. 30MW or more are particularly friendly to small scale local ownership or involvement other than through community funds and other similar initiatives.

In Australia the price of electricity is very competitive which leads to a competitive wind energy price and market. Large scale companies are accustomed to the risks involved

in a competitive market but individual investors are generally more risk averse than infrastructure companies.

2. The installed cost of each wind turbine generator is $5-6 million.

The installed cost of each wind turbine generator is $5-6 million. For a 100 wind turbine wind farm that is a $500 million investment. To achieve even 2000MW of wind energy in NSW could involve an investment of around $10 billion. This scale of investment, let alone the pace to market required to achieve this installed capacity, all points towards large banks, super funds and retailers financing these wind farms. Individuals wishing to have shares in larger-scale wind farms than Hepburn Wind may also consider buying shares in existing companies such as retailers or banks which own wind farms.

3. Community funds as a mechanism for community involvement

Experience in a number of local communities has lead Epuron to the understanding that individuals and local communities near a proposed wind farm seek certainty on a range of matters. Community members with and without land in the wind farm want to know as precisely as possible what the impacts and the benefits of the wind farm will be. Through land agreements and community benefits wind farm companies tend to offer low risk solutions to individuals such as guaranteed or floor payments for land use or commitment to a fixed sum, escalated by CPI, as a community fund, regardless of annual wind and revenue. This provides some certainty for communities and enables better organisation and planning of the use of this fund.

Epuron is a specialist renewables company with wind farms in many countries around the world. It is keen to encourage investment in renewable technologies but it does not advocate high risk for individuals or community groups.

The issue of local control of wind technology within the Term of Reference is not clear. If by this it is meant control of the wind farm then this is unlikely as in any large scale investment this will always be in the hands of the owner and is beyond the control of all but the key investors, albeit within the bounds of the agreements, consents and governing legislation.

Community benefits are common practice in Australia for most major projects and for each wind farm need to be considered in context. Community fund donations are made voluntarily by wind farm companies in response to each wind farm.

Community benefits are often donations to a community fund but can also respond to issues raised by specific communities. One example of a community benefit which addresses the often raised request for free electricity is the solution devised for the Silverton community which is in a semi arid outback location. Part of the renewable, sustainable solution linked to the development of the Silverton Wind Farm was the Solar Silverton programme[13].

This programme is an offering of solar water heaters, solar power systems (photovoltaic) and energy efficiency packages for residences surrounding the site and in the Silverton village.

The Solar Silverton program will commence at start of construction of the wind farm and be completed within two years of completion of construction. Under the program, the Proponent offers residents within ten kilometres of the wind farm a clean energy package including an energy audit which might result in solar water heating, photovoltaic panels generating electricity and a water tank. As a result, residents would benefit from energy cost reductions and also an improved property value for their home. In addition, the solar facilities would provide a visible example of the benefits of the wind farm.

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

Key issues:

1. **The Renewable Energy Target has now been legislated and must be delivered across Australia.**
2. **The Renewable Energy Target is technology neutral, but market based so its effect is to feed the electricity source with the lowest cost generation into the NEM.**
3. **Premier states that: NSW is prepared to do the heavy lifting and help the nation meet the 20 per cent Renewable Energy Target by 2020.**

The RET will deliver significant opportunities for wind energy across NSW. Wind energy is likely to supply the greater part of the target. Wind energy was the most successful technology under the previous RET.

Renewable Energy Target is technology neutral, but market based so its effect is to feed the electricity source with the lowest cost generation into the NEM

At present out of all the commercially viable renewable energy technologies wind energy has the lower costs associated with generation. Therefore further development of wind farms in NSW will be key to reaching renewable energy targets.

Comparison of Energy Technologies

	Technical Maturity	Co_2 Intensity (kg/MWh)	Water Use (l/MWh)	Cost ($/MWh)
Coal	Mature	969	1,300,000	31 – 40
Natural Gas	Mature	500	~ 260,000 - 520,000	37 - 44
Hydro	Mature	4 - 10	Significant enviro issues	27 - 282
Wind	Mature	7	Nil	75 - 90
Solid Biomass	Mature	Possibly negative under some circumstances	~ 2000 (wet) ~ 700 (dry)	47 - 120
Solar Thermal	Demo	~ 3	~ 2000 (wet) ~ 150 (dry)	120 - 150
Solar PV	Mature	~ 3	Nil	400 - 800
Geothermal	Research	~ 3	high	Large range
Nuclear	Mature	~ 3	1,100 – 1,850	50 - 80
Ultra Clean Coal	Demo	770 - 825	Unknown	Unknown

From Inquiry Into Electricity Supply in NSW, Prof Anthony Owen, September 2007

As the consumer of about 35% of Australia's electricity, it is reasonable for NSW to generate a comparable fraction of the nation's renewable energy target. NSW is fortunate to have massive wind resources, a strong and widespread electricity grid and skilled engineering and construction companies. Rural wind farms in NSW therefore have a very significant role to play in meeting the national target.

The RET target of 45,000GWh will result in an additional 9000MW of wind energy. If NSW matched its share of the market this would result in 4000MW in NSW. Using calculations from Passey 2003[14] this would result in one job in operation and maintenance per 5MW or 800 long-term (20+ years) jobs in regional NSW.

Premier states that: NSW is prepared to do the heavy lifting and help the nation meet the 20 per cent Renewable Energy Target by 2020.

The same week submissions into this enquiry closed NSW Premier Nathan Rees stated. (17 August 2009): "NSW is prepared to do the heavy lifting and help the nation meet the 20 per cent Renewable Energy Target by 2020".

The Premier's announcement included the identification of clean energy precincts across the state which align with the state's wind resource.

New South Wales currently enjoys a large share of proposals for renewable energy but is behind other states in the implementation of projects. This means that there is still considerable resource and connection opportunity in NSW and the State is set to make considerable gains from the RET.

6. Any other relevant matters

(a) Community Support

People's perception of wind farms is strongly positive

Studies undertaken in the Southern Tablelands region, within Australia and overseas indicate an increasing level of public support for wind farm developments. Perception studies continually show that in many Australian and overseas examples, between 60-70% of people find wind turbines an attractive element in the landscape, with up to 15% of respondents undecided and 20% dislike wind farms.

Public opinion research on wind farms in New South Wales has been limited. Although community consultation is undertaken as part of the planning process for wind farms, this consultation is mostly qualitative in nature, in that it seeks the views on a number of aspects of the wind farm development from specific stakeholders, including the local community, and those further away, as well as the views of special interest groups, government agencies and local government involved or impacted by the development.

Some social research has been undertaken by government agencies as well as by wind farm companies, to ascertain people's perception and response to wind farms in the New South Wales and Victorian landscapes and the outcomes of this research is consistent.

A study was commissioned by Epuron and conducted by ERM, to ascertain the Southern Tablelands region's view towards wind farms. The study was conducted in July and August of 2007. The study area included the Goulburn – Crookwell – Yass regions (Southern Tablelands) which is one of the new renewables precincts recently announced

Results showed a discernable rise in the level of public acceptance, with almost 9 out of 10 (89%) of respondents supporting development of wind farms in the Southern Tablelands. Furthermore 71% of respondents would support a wind farm development within 1 km of their residence, and 67% found wind farms to be visually appealing.

A more recent random phone survey of 300 residents of the Goulburn - Crookwell – Yass region was undertaken by REARK Research (on behalf of Epuron) in July 2007 to determine the community perception of wind farm developments in the Southern Tablelands.

The survey matched the demographic profile of the area based on the census records and had a sampling precision of 5.7% at the 95% confidence level. The Gullen Range wind farm is located within the area surveyed.

The outcomes from this study show:

- 80% of respondents are concerned, right now, with the threat of global warming and its impact on the environment; 16% said they were unconcerned
- 9 in 10 respondents had seen a wind turbine, and more than 8 in 10 had seen the Crookwell wind farm. Awareness of wind turbines was very high
- 90% of respondents were aware of announcements of wind farms to be built in the Southern Tablelands
- 89% of respondents were in favour of wind farm projects being developed in the Southern Tablelands, 5% were opposed
- 83% of respondents stated *"I would be happy to see a wind farm built on farm land near where I live"*
- When respondents were asked regarding the acceptability of a wind farm near where they lived, 87% supported a wind farm within 25 kilometres, and 71% of respondents favoured a wind farm within one kilometre of their home
- In considering multiple wind farms in their local rural area, 3 out of 4 respondents accepted two 'typical' wind farms (15 to 80 turbines), and 2 out of 3 respondents accepted three typical wind farms in their local area

This study shows the adult residents in the survey area are concerned about global warming and are aware of the alternatives available. The study also shows respondents know and understand what a wind turbine is and how wind farms appear in the landscape; respondents are generally supportive of wind farms.

Moreover when it comes to locating wind farms, respondents are supportive (rather than averse) to having wind farms in their immediate locality, and a majority still approving of a wind farm within one kilometre of their home.

It is suggested that respondents feel the creation of wind farms is positive and this study shows that many are prepared to embrace them in their local area.

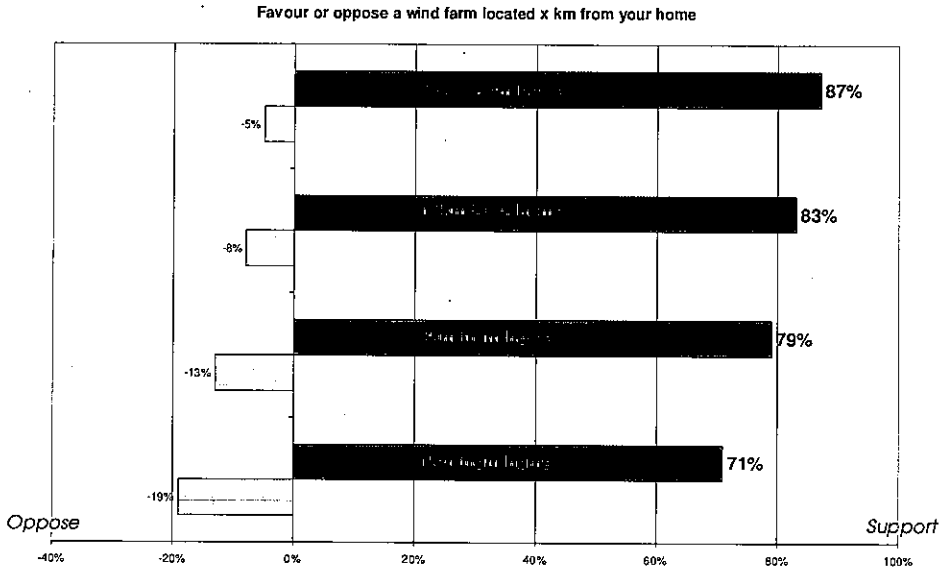


Figure 6.1 Community support for wind farms located near their home

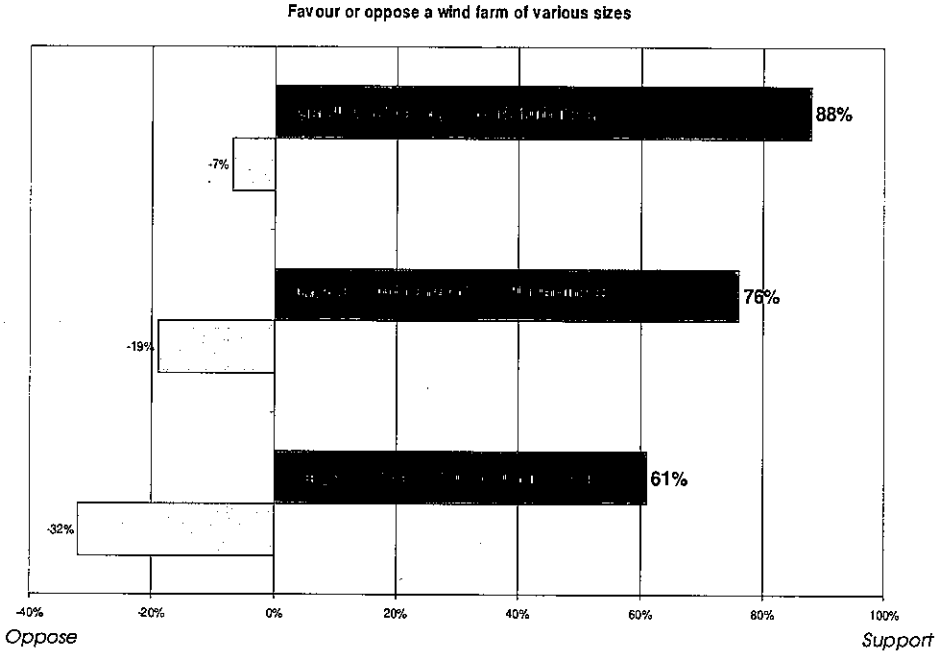


Figure 6.2 Community support for wind farms of various sizes

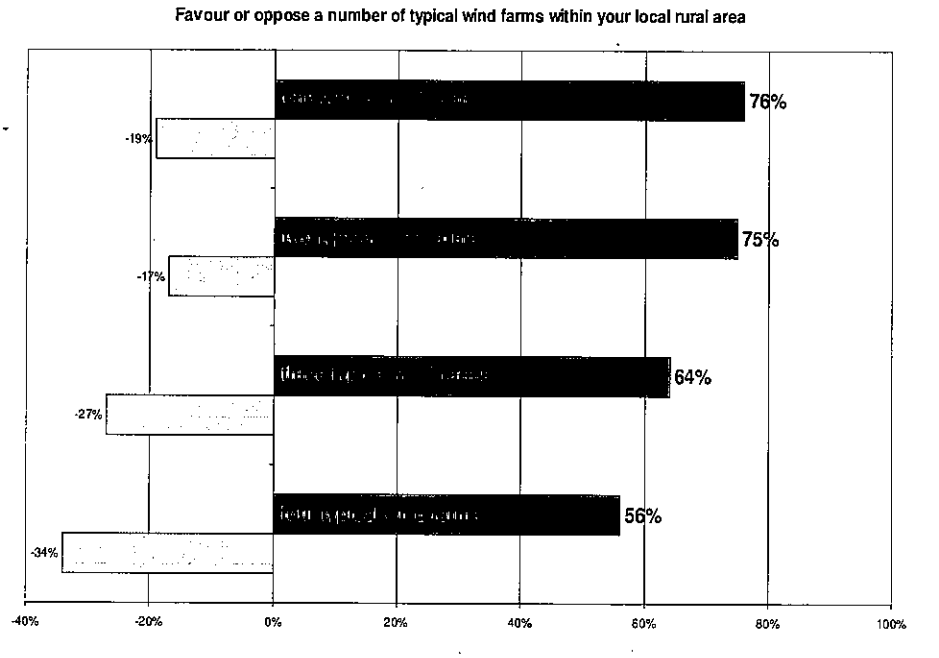


Figure 6.3 Community support for multiple wind farms within their local area

(b) Transmission Limitations

NSW has a strong transmission network which makes it attractive for the development of wind energy, a good example being the transmission corridor between Sydney and the Snowy Hydro area.

To capitalise on the opportunities such corridors present significant further detailed transmission planning is required to encourage and enable connection of renewable assets.

Most wind farms in NSW will connect into TransGrid's transmission network. In light of the RET and the expected on-going installation of renewable generation in NSW, primarily around the newly identified clean energy precincts, there is a pressing requirement for transmission planning which will facilitate the expected new renewable generation. Such work should identify the likely technologies connecting into precincts based on resource and connection and should put in place options for design and funding of transmission upgrades to enable such projects.

Such planning and implementation will ensure that wind farms are not unreasonably burdened with first mover penalties to finance significant transmission infrastructure from which others will benefit at cost. Such first mover penalties may also make otherwise good projects unviable.

One high priority outcome would be to ensure that TransGrid is adequately resourced to both plan for and process the connection of the large number of wind farm connection applications it will receive.

(c) Retailers share and location in the market

NSW energy retailers should encourage jobs and investment in their own state by purchasing renewable energy in their own state. While power purchase agreements are market driven, targeting the low hanging fruit, there should be a requirement for at least 50% of each retailer's obligation to be sourced in their own state.

(d) NSW projects should be powered by renewables.

The development of rural wind farms in NSW should be viewed as an opportunity to contribute to building the State's resilience. There are many examples from around the world where wind farms have been used to power green projects. An iconic example is the "Ride the Wind" scheme in Calgary[15], where the City's entire light rail system is powered by a wind farm located in the south of Alberta.

Similar Power Purchase Agreements (PPA) are being picked up by governments all over the world. A local example is the Kurnell Desalination Plant's PPA with the Capital Wind Farm in Lake George, south of Goulburn. Through top-down advocacy and Public-Private Partnerships (PPP) between government agencies and wind farm developers, further PPAs such as these would help facilitate sustainable development in NSW and contribute to economic, environmental and social planning goals.

(e) NSW Planning

Fees

The state government has this week announced a temporary suspension of the imposition of a critical infrastructure fee on wind farm projects meeting the critical infrastructure threshold of 30MW. Initiatives such as this are welcomed.

The base planning fee onto which any critical infrastructure fees are charged is however, not fair and equitable. The basis of the planning fee is the capital value of the project and Epuron takes this opportunity to again state that this is not a fair and reasonable methodology for the application of fees to renewable energy developments. Renewable technologies do not use 'costed' fuel but do use sophisticated equipment to harness the 'free' fuel applicable such as wind and solar. This results in considerably higher capital costs but no ongoing fuel costs. The planning fees which relate to the capital cost do not recognise this fact and unfairly burden renewable projects.

Process

The Part 3A process does work. It is slow but it is transparent and allows community and stakeholder input at numerous stages. It allows for a thorough and rigorous assessment of project applications. The role of the new committees proposed as part of the renewables precincts is unclear and should be defined in the context of the Part 3A process.

Conclusion

NSW has an excellent wind resource and the potential to be a significant participant in the development of large scale renewable energy projects in Australia and in the world.

As a leading wind farm company in NSW Epuron will be in the vanguard of shaping this renewed electricity model for the State. Epuron takes seriously its role in the delivery of significant wind energy projects under the RET to assist NSW to capture its share of this market.

Utilising the existing planning process wind farm proposals with acceptable environmental and community impacts will help to secure a clean reliable, secure and cost-effective electricity supply for NSW. The RET will be the catalyst for providing opportunities for NSW to establish sustainable energy projects which will bring substantial employment, investment and economic growth to regional NSW.

With the firm majority of respondents to surveys being in favour of wind energy developments NSW is poised to take full advantage of the global, national and state drive to bring about a cleaner, greener future for all. The State is moving towards securing a more diverse and resilient energy supply and in so doing will open the door to the investment which will provide valuable jobs in rural communities across NSW.

---

[1] Wind Farms, The facts and the fallacies. Andrew Macintosh & Christian Downie, The Australia Institute Discussion paper 91, Oct 2006

[2] Greenhouse Gas Reduction Scheme (GGAS), 2008 *FS-Comp-PoolCoeff*, November 2008 www.greenhousegas.nsw.gov.au/documents/FS-Comp-PoolCoeff-Nov08.pdf

[3] Vestas Life Cycle Analysis studies. http://www.vestas.com/Default.aspx?ID=200&q=LCA

[4] Wind Farms, The facts and the fallacies. Andrew Macintosh & Christian Downie, The Australia Institute Discussion paper 91, Oct 2006

[5] Inquiry into Electricity Supply in NSW, Prof Anthony Owen, September 2007

[6] Load Carrying Capability of Wind Farms in NSW, P. Hamer 2008

[7] MANAGING VARIABILITY A report to WWF-UK, RSPB, Greenpeace UK and Friends of the Earth EWNI David Milborrow 24 June 2009 http://assets.wwf.org.uk/downloads/managing_variability_report.pdf

[8] http://www.planning.nsw.gov.au/mediarelplan/fs20090817_891.html Media Release - Minister's Office, Sydney: 17 August 2009, NSW PREPARES FOR CLEAN ENERGY REVOLUTION

[9] Scottish Executive- Mori Public attitudes towards wind farms. A Survey of Local Residents in Scotland, Simon Braunholtz, 2003 www.scotland.gov.uk

[10] http://www.hepburnwind.com.au/index.htm

[11] Delivering community benefits from wind energy development: A Toolkit A report for the Renewables Advisory Board July 2009 edition http://www.berr.gov.uk/files/file38710.pdf

[12] http://majorprojects.planning.nsw.gov.au/files/24463/Main%20Report%20-%20Part%201.pdf See page 75 of the Silverton Wind Farm EA on the Dept of Planning web site.

[13] Driving Investment, Generating Jobs: Wind Energy as a Powerhouse for Rural & Regional Development in Australia, Dr Robert Passey, March 2003

[14] http://www.calgarytransit.com/environment/ride_d_wind.html