

## Submission to Clean Energy Finance Corporation

Expert Review

Coolah Windfarms Pty Ltd

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## **Appendices**

Appendix 1 NSW Wind Map

Appendix 2 Director General Requirements – March 2011

Appendix 3 Electricity Statement of Opportunities 2011  
( Not included as it is a well known Government publication)

Appendix 4 Gas Statement of Opportunities 2010  
( Not included as it is a well known Government publication)

Appendix 5 Press Report on Institutional Investment June 29 2011

Appendix 6 Hybrid Wind and Advance Gas Turbine Farms :  
Firm Dispatchable Power for Weak Grids. Research Report 2005

Appendix 7 Eyre Peninsula wind power plan dealt a blow. Press Report May 31, 2011

Appendix 8 Press Report on NSW Auditor General. Nov 3, 2011

Appendix 9 “Immediate LRET SRES Impacts” - Ecogen 2011, 23 Feb 2011.  
Andrew Livingston, Office of Renewable Energy Regulator  
( Not included as it is a well known Government publication)

## 1. Executive Summary

To assist the consultative process and help establish key themes for the CEFC review panel, our approach is to illustrate the significance of this project in eastern Australia part of the national electricity grid. This submission points out issues that are relevant to the CEFC in relation to the operations, market gap and over coming it, and interface with other government agencies and market organizations.

As it is a consultative process, it is the writers' intention to maintain consultation with further submissions over and above this preliminary submission.

The background to our submissions is described as follows :

1. The location of this project is at Coolah, NSW. It will be a large electricity generating project. The engineering / financial model can be duplicated since the resources at Coolah are similar at other locations in NSW and elsewhere.
2. Its primary resource is wind. The aggregate peak generating capacity of participating wind farms at Coolah has been estimated at around 2,000 MW or more making it potentially the largest wind development anywhere in the world.
3. In terms of very large prospective wind generation projects it is unique in that it is reasonably close to robust parts of the National Electricity Grid, unlike other prospective areas in South Australia.
4. The secondary resource is gas. Power generated via open cycle gas fired / gas turbine power stations will be developed in conjunction with the development of wind turbine capabilities. Existing supply may require upgrade of the existing Central Tablelands pipeline to Coolah. Addition of CSG would depend on permissible commercial development.
5. The concept of this dual development will be based on technology to ensure stand-alone or localized operations. The technology ensures coordinated and balanced control of the windfarm to produce firm dispatchable power at its juncture to the local grid. Further research into the viability of world leading large scale compressed air storage is also planned for the development.
6. The National Grid ( via Transgrid) is in close and moderate proximity to this wind corridor. Connection and extension in terms of time and costs would be comparatively lower in relation to other more remote projects.
7. The scope of this clean energy project is so large that a strategic approach to grid augmentation is likely to be required in order for the abundant wind resource. This may comprise an upgrade and local extensions to Transgrid along the NSW wind corridor to connect the Coolah project and other projects at New England and Lithgow Bathhurst as regional subsystems.
8. The implications are that provided stages of it can be brought to market soon enough, these will make a substantial contribution to the LRET with the prospect of subsequent stages being built in the next decade in line with increasing national clean energy.
9. The total potential power from both the wind and gas resources available in the regional districts of NSW will be dependent on the policies and plans of AEMO and the National Grid in retiring the high carbon emitting generators, coordinating the overall stream of wind /gas driven projects, national grid plan and meeting the local and national needs of the Australian market. Hence the

total realizable capacity of the Coolah project is codependant for the preceding reasons.

10. The Coolah business model is based on community ownership – something highly unique to a project of this size. Coolah Windfarms Pty Ltd represents the majority of the landowners and farmers in the district since the windfarm will be located on their collective lands. To realize the large financial scale of the project, seed capital would need to be raised under a public / private partnership arrangement and an initial public offering would need to be made at an early stage, most likely at development approval stage ( the first significant valuation level). The project is to be developed in stages and financing is extended to the participation in Scale Efficient Network Extension (SENE) as well as the development of the windfarm and the gas power stations. A longer term equity position of CEFC is an option and the formation of an authority ( like the Snowy Corporation) to oversee the larger project may be appropriate
11. Since Coolah is a regional development, there are implications at the infrastructure development and investment levels.

The following submission directly and indirectly touches on the 8 questions and the terms of reference which are sought to be answered. The project description at Coolah is used throughout to illustrate the answers.

## **2. Introduction**

The authors have read the Request For Submission for the Expert Review into the establishment of the Clean Energy Finance Corporation and wish to make the following submission.

The submission will take the form of a general description of the Coolah Cassilis district in respect of its potential for windgenerated electricity and the potential involvement of the gas reserves located west of Boggabri and Narrabri. The questions will be answered with particular reference to the Coolah Cassilis area and the perceived financial problems in bringing about development in the region. An attempt has been made to give realistic revenue projections for the operation together with revenue limitations unless certain problems are overcome. An adjunct gas powered electricity generating system would overcome the low reserve conditions created by wind.

### **3. Description of Area**

Coolah Wind Farms Pty Ltd was specifically formed to facilitate all aspects of a very large scale community wind farm development in the Coolah/Cassilis valleys at the top of the Great Dividing Range Central West NSW.

Coolah is ideally suited for wind farm development having several hundred kilometres of ridges running north south across the general prevailing north west/south west direction of wind. The area also experiences wind from the northeast and southeast. The site is large and therefore generous setback distances can be accommodated , mitigating noise and visual amenity impacts.

The ridges are substantially cleared and are accessible for heavy lifting equipment required for lifting the turbines into position. No major environmental issues impacting the scale of the development have been identified to date.

Existing on site anemometry indicates long run average wind speeds in the order of 8 metres per second at 80m hub height with an average capacity factor anticipated to be around 35%

In order to bring this world class wind resource to market a significant investment will be required by way of grid connection and it is this aspect which will initially requires considerable funds to ascertain the viability of the entire venture.

It would appear at this early stage that as many as 1000 (One Thousand) turbines may be able to be accommodated on the Coolah ridges making the whole operation potentially the biggest in the world with peak output exceeding 2000 megawatts. It is noted that new generation turbines are now coming into the market with generating capacities of 3 MW.

For a wind project of this size it is well understood that the intermittency of generation may create significant challenges for grid management in the vicinity and to this end discussions have been initiated with local gas producers with an aim co-siting open cycle gas turbine generating plant that can help improve the overall dispatch profile from the development. The grid connection study that incorporates the requirements of the Australia Energy Market Operator (AEMO) will be extensive and its cost will reflect the paramount importance of complying with its rules. A large grid connection is available some 50 kms to the south of the district on the Wellington to Wollar line.

#### **4. Wind Farm Development in Coolah Cassilis District**

Due to the size of the development there are potentially 150 (One hundred and fifty) separate landowners involved which may expand further due to easements associated with power lines, work stations, concrete batching plants and roads. A number of developers have been attempting to sign up landowners with agreements however there is strong support for a community development approach – even at the large scale contemplated. We believe this will be the first time something like this has been attempt anywhere in the world, yet we believe it is the right approach given the backlash wind developments have experienced elsewhere. It is for this reason that Coolah Wind Farms Pty Ltd has been formed. It is planned to allocate shares to trusts covering every ratepayer in the Coolah Cassilis district and to all residents. It is also planned to allocate shares to the Coolah District Development Group Inc and local Aboriginal Land Councils.

A small parcel of shares would initially be allocated to all participating landowners and further shares would be allocated to reflect an equitable arrangement based on number of wind turbines hosted on each parcel of land. This latter allocation will most likely occur after completion of micrositing. Further allocation of shares would be made in consideration for power line easements, switchyards, concrete batching plants, construction and maintenance sites and roads and any other necessary infrastructure .

It would be the objective of Coolah Wind Farms Pty Ltd to apply for and obtain a Development Consent from the NSW Department of Planning. The DGR's – Director General's Requirements are considerable and are annexed at the end of the submission.

## 5. A Financial Model to Achieve a Viable Wind Farm

Some quite intensive wind testing has already been carried out in NSW - *Appendix 1* NSW Wind Map

The initial results have been most encouraging and the following are some indicative financial parameters which require refinement as the project progresses. This will be assisted by the so called Meso Scale Modelling from the CSIRO towers which have been present for some years in the district. The following is a financial blueprint for development. The next generation wind turbines are 3MW but this exercise is based on 2.1 MW Suzlon turbines.

Each 2.1 MW turbine should produce the following power.

$$2.1 \quad \times \quad \begin{array}{c} \text{Hours in} \\ \text{Year} \end{array} \quad 8760 \quad \times \quad \begin{array}{c} \text{Capacity} \\ \text{Factor} \end{array} \quad 0.4 \quad = \quad 7358 \text{ MW hours per year}$$

An initial 200 turbines operation with a combined power price of \$100 per MWhr would produce gross revenue of 147m per year.

The operational costs are small.

	\$m
Lease payments 2.5% of gross power of 147	3.67
Technicians one per seven turbines 28 x 100,000	2.80
Maintenance & Office	1.00
	7.49

The upfront costs are large as is the enormous capital cost.

200 turbines installed at 4m per unit	800
Grid Connection	150
(Assumed cost per 200 turbines units, but subject to a grid study)	
Total	950

It is proposed to raise half of this amount by way of new equity by way of initial public offering on the stock exchange.

The other half is to be borrowed.	475
Interest on \$475 at 8%	38



Total Interest and Operational Cost 45.47

At \$100 per MW the \$147 gross revenue allows the covering of cash interest and running costs without any consideration of depreciation, loan repayments, tax or dividend policy.

The equity cost is considerable at 10% dividend which is greater than the interest cost but it is considered prudent of predictions do not go according to plan.

It is envisaged at the Development Application stage some 210 m shares would be issued to landowners and other initial investors for the 1000 turbine sites established. The issuing of these shares is based on an accepted standard within the industry of each megawatt approval to be valued at \$100 000.

There would need to be 475 million new shares of \$1 issued at the time of flotation on the stock exchange making a total of 685m \$1 shares. A 10% dividend would absorb \$68.5m.

It is proposed to err on the side of caution with an excess equity base to provide a balanced debt equity position for expansion.

The worst case scenario sees the electricity price fall to \$60 per MW/hr and the wind at 30% capacity

The revenue per turbine would be  $2.1 \times 8760 \times 60 \times 0.3 = \$331,128$

A turbine operation would yield annually in revenue \$66.2m. This is still enough to cover the expected interest and operational costs of \$45.47m. Dividends would have to be suspended.

The issues surrounding the assumptions will be discussed in the answer to the questions.

It should be pointed out that this method of financing wind farms is totally different from the traditional existing method where a superannuation fund buys an annuity for a cash sum to allow development with an energy company guaranteeing the annuity payments. It is considered inappropriate for the annuity model to be used in a project of this size. Our IPO model allows for sensible equity and debt raising for expansion.

This model will rectify some weak features that other types of proposals employ.

- Some wind development companies have a very low capital base – some as little as \$ 10 paid of capital.
- Existing agreements require landholders to sign further unspecified and undisclosed security agreements which will be secured over the landholder leases.
- Sell out of power rights, cash flow rights and renewable energy credits (REC).
- Refusal by some existing mortgages to sign consent agreements on the basis that their existing security would be diminished and compromised.

## 6. Gas Augmentation to Improve Financial Stability

It is proposed that a feasibility study be commissioned to identify the case for an open cycle gas turbine to be sited near the wind farm to improve dispatchability of generation as a whole. The open cycle characteristics will enable responsiveness to compensate for a significant amount of intermittency from the wind farm output. A benefit will come from future conversion to combined cycle generation should operational constraints change. See *Appendix 6*

Economic parameters are generally as follows :

### Combined Cycle Gas Turbine

Costs are around \$1.5m/MW and \$100/MWh .

Emissions intensity of around 0.4t CO<sub>2</sub> per MWhr.

Efficiency reaching 60%.

Capital costs \$2.5 m/MW with carbon capture & storage.

There are CCGT units emerging with enough ramping ability to enable them to work in conjunction with wind generation.

### Open Cycle Gas Turbines

The responsiveness is greater.

Costs are around \$1.0m/MW and \$200/MWh.

Emissions intensity around 0.5 to 0.6 t CO<sub>2</sub> per MWhr.

Efficiency reaching 35%.

A further opportunity for innovation that Coolah Wind Farms proposes to explore is the scope for a utility scale compressed air storage system which may be able to be supplemented with other storage technologies as recently explored in conjunction with CSIRO at the much smaller Hampton Wind Farm

## **7. Make Up of Board Coolah Wind Farms Pty Ltd**

It is envisaged that the board of Coolah wind Farms Pty Ltd will be expanded to include the following disciplines.

- a) Legal
- b) Accounting
- c) Engineering
- d) Environmental Consultants
- e) Local Business Leaders
- f) Landowners
- g) Nominees from Clean Energy Finance Corporation

## 8. Answers to Specific Questions

These answers should be correlated with the generic description of the district and the intended operation of Coolah Wind Farms Pty Ltd and requirements of the Australian energy Market Operator AEMO as outlined in *Appendix 3 - Electricity Statement of Opportunities 2011* and *Appendix 4 - Gas Statement of Opportunities 2010* together with other State Planning Instrumentalities.

### Question 1

#### **How do you expect the CEFC to facilitate investment?**

It is specifically stated that the CEFC will not give grants. The only investment is by way of direct investment in equity in Coolah Wind Farms Pty Ltd. Perhaps the use of convertible notes could be utilized so that debt should be rolled over into equity at the Corporation's option.

### Question 2

#### **Are there principles beyond financial viability that could be used to prioritise investments such as emissions impact or demonstration effect?**

It is essential in answering this vital question that Electricity Statement of Opportunities AEMO 2011 – *Appendix 3* be read especially pages xxvii to xxx in conjunction with Gas Statement of Opportunities AEMO 2010. Table 1 on p 8

All credible forward projections of Australia's electricity generation mix show that gas and wind generation will dominate new plant built to 2020. It is the potential combination of these technologies in one geographical location at a large enough scale to underpin investigations into world leading energy storage innovation that makes this opportunity unique.

The conclusion in respect of wind is particularly illuminating.

While wind generator represents a significant part of the committed and proposed generation the contribution from wind towards deferring Low Reserve Condition Point approximating only 10% of the installed capacity (at most) based on the calculated seasonal contribution factors. It is for this reason that Coolah Wind Farm Pty Ltd seeks expansion into gas. This Gas Statement of Opportunities – *Appendix 4* on page 8 states that Emission targets under a fast rate of change will be 25% below 2000 levels by 2020.

### Question 3

**What are the opportunities for CEFC to partner with other organizations to deliver its objectives?**

It is obvious that the Corporation should take very early equity positions in respect of wind and gas to allow the considerable cost of preliminary matters to be met. The corporation may have arrangements with organizations such as the Future Fund of Australia to take out their investments or have arrangements with an underwriter to take out the Corporation at the IPO stage.

**Question 4**

**How could the CEFC catalogue the flow of funds from institutions?**

The institutions have displayed a liking for clean energy related investments see Appendix.

The principal hurdle to be overcome are the most onerous Director General Requirements from the State Planning Authorities. Reproduced in *Appendix 2* is the list of matters to be provided for the NSW Planning in respect of the Coolah District Wind Farms. There are an additional 20 Government and Non Government Agencies who must be consulted. The cost of this compliance and associated consultants reports could easily approach \$3 million.

These are statutory road blocks which have been put in place to protect the community and must be complied with.

The Corporation can provide these monies by way of equity investment to fast track the Planning Approval stage. Once the planning approval stage is complete by the granting of a Development Application the value of this DA is said to be worth \$100,000 for approved megawatt. The corporation can recoup this initial investment at the IPO stage or have some arrangement with an underwriter for its investment to be taken out.

**Question 5**

**What experience have firms in the clean energy sector had with trying to obtain finance, have term, cost or availability of funds been the inhibitor?**

Clearly the securing of up front capital is a major barrier for renewable energy projects and the scale of the project contemplated makes this particularly onerous. Coolah Wind Farms Pty Ltd have approached the following –

- a) Regional Development Australia – precluded because the company is perceived to be a commercial organization interested in eventually producing profits.
- b) Renewable Energy Venture Fund/ Australian Centre for Renewable Energy. Submission 15<sup>th</sup> Nov 2010 – no reply or even acknowledgement.

## c) Trading Banks

No funds available until all Development Approvals in place, contracts signed for power purchase agreements and guarantees given by energy companies and turbine suppliers.

**Question 6****What non-financial factors inhibit clean energy projects?**Structural

Landowners and farmers on whose land the wind turbines will be hosted are becoming increasingly more educated about their rights. Traditionally landowners have signed agreements with developers to lease land portions of their property. They sign away the rights to take the eventual power, the future cash flows and renewable energy credits in return for future rentals. These rights are on sold to a power company with an institution such as a superannuation fund purchasing an annuity to allow the capital cost of the wind farm to be financed. See *Appendix 5*. The landowner loses all rights yet may be obliged to sign further unspecified finance deeds to secure finance for the overall development on the leased portions of land. These traditional arrangements have caused some problems with existing mortgagees who do not want existing security lessened.

Planning

Landowners feel they should have some say in respect of planning powers. Local Government Councils will need to develop Local Environment Plans (LEP's) which may vary from Council to Council. The state government may invoke state wide planning controls and procedures.

Safeguarding Integrity of Electricity Market

The Australian Energy Market Operator (AEMO) has rules and regulations to protect the integrity of the energy market. Traditionally these are based on stable coal fired power generation but renewable energy such as wind causes fluctuations and changes to the reserve position. See *Appendix 7*. This must be managed responsibly and carefully whilst at the same time not excluding renewable sources such as wind. The rules should be the same across all states incorporating Ausgrid and its members.

NSW	Transgrid
Queensland	Powerlink
Victoria	SP AusNet
South Australia	Electranet
Tasmania	Transend

## Question 7

### **Are there special factors which inhibit energy efficiency projects?**

One of the fundamental problems afflicting energy efficiency projects is the dichotomy between the increase in retail power prices with the fall in wholesale power prices. The reason for this apparent contradiction has been the implementation of green schemes by state governments and the under investment in maintaining the power grid. In *Appendix 8* a report by the NSW Auditor General into the sale of the retail power industry found that wholesale power prices fell by 16.9% from an average \$44.19 per MW hour in 2009-10 to an average of \$36.74 per MW hour in 2011. It is for this reason this reason that the Federal Government has introduced Renewable Energy Credits (RECS) whereby the Energy Retailers must surrender RECS for no value in respect of 20% of their sales or pay a default payment to the Australian Government Office of the Renewable Energy Regulator.

Regrettably the price of these RECS has fallen as the manufacturers of solar voltaic and solar hot water systems aggressively sold these credits down to such an extent that they did not give the large scale manufacturers of renewable energy such as wind farms the monetary return to justify investment. Whilst the small scale RECS are no longer interchangeable with the large scale RECS as from 1<sup>st</sup> January 2011 the RECS held by the retailers are not known to the market. It would help if the Office of the Renewable Energy Regulator could make available the quantum of RECS held by the energy retailers to the market that an accurate price could be quantified. Refer to *Appendix 9*

If overseas renewable energy markets there have been numerous instances of fraud and the stealing of credits in one market and their sale in another. It is vital that the integrity of the REC market be kept intact and to this end the powers of the Renewable Energy Regulator should be strengthened.

## Question 8

### **How do you see the CEFC fitting with other government initiatives on clean energy?**

It is important that the Corporation understand the multitude of disciplines and the other Government agencies involved in clean energy. The list is extensive but not limited to the following.

- a) State Departments of Climate Change and Energy
- b) Australian Energy Market Operator
- c) State owned power transmission authorities.
- d) Local Government and Local Environment Plans
- e) State Planning Authorities
- f) Railways and Roads and Traffic Authorities

## 9. Terms of Reference

This is a very broad area and we only work to re-iterate principles already made in this submission

- a) There should be Electrical Market specialist appointed to the Board so that the Corporation can function as a key player in the integrated development of an Energy Market.
- b) This may involve the development of Public Private Partnership or the development of partially owned State and Federal Corporations with Private Investors such as Snowy Hydro Corporation.
- c) Investment will flow from the private sector, if the Corporation attends to proving the vital initial matters necessary to be addressed in the complex area of renewable energy.
- d) The renewable energy targets will be met if there is a concentration on wind and gas energy. The blending and integration of these two types of power will give the optimum outcome and the Corporation should seek to manage the combination of the two energy streams. A whole new technology will be established in supplying the energy market.
- e) The Board should identify inconsistencies in Government policy and should be able to criticise Federal, State and Local Government policies when the inconsistencies are detected.