

**Alternatives to Wind Power.**

WEL say that they have investigated alternatives to wind power. This is not true to any real extent. None of the staff of WEL or their consultants can answer even the simplest questions on obvious alternative renewables suitable for the area west of the deviation.

I have asked both the previous and current CEOs of WEL to provide information and data on the renewable they have studied but have refused even an outline.

I gave details in my submission of one alternative that was ignored.

Mr. Underhill said in a reply to one of your questions on the 19th that they had looked at wood chip generation and that there was enough wood available for “only a few kilowatts”.

Just east of the deviation is an area of 350 hectares of 12 yr pines They need a good thinning and pruning so there is the first 50000 tons of fuel. That is enough for around 85000 MWH 8 months output for the Te Uku wind turbines. More than a few kilowatts I think.

Unlike Mr. Underhill I have looked at the potential wood fuel output for the area west of the Waipa and around the Aotea and Whangaroa catchments. There is about 500,000 tons of thinning and waste available immediately. About 1.2 million tons per year could be available with about 3-4 years warning, without affecting agricultural output!

1.2 million tons/yr is 2000 GWH/yr or the same as 15 yrs output from the wind project. Not a few kilowatts again.

Wood availability is not a problem.

Here are some obvious alternatives in roughly order of economic worth.

I had intended to go into detail about these alternatives but the very short time (5 days) available to prepare this evidence has precluded this.

If the commission is in any doubt that these are real, practical alternatives I have a large amount of detailed information available on all of these options and their means of implementation which I am happy to share. Perhaps Connell Wagner would like to buy the information off me as Mr. Walter said they couldn't find an economic alternative to imported wind turbines

**Alternatives.**

Any of the following requiring wood fuel have this priced at \$70 per dry(15%) ton as this price would guarantee supply. All prices in NZ dollars.

**Aotea Harbour Tidal Barrage.**

Average power output and type	6.7 MW	Predicable intermittent
Availability	60%	
Installed cost	11.2M\$	
Installed Cost per MW average output	1.67M\$	
Total Cost	11.2M\$	
Total cost in foreign exchange	1.3M\$	
Domestic content	88%	
Total power per year	59GWH	
Net Cost of power	\$30 MWH	
Effect on grid	Stability enhancement, embedded.	
Environmental effects	Small negative. Small positive may be possible.	

Wood chip internal combustion Microgeneration. (typical installation).

Average power output and type	0.2 MW On Demand
Availability	95%
Installed cost	\$70000
Installed Cost per MW average output	0.35M\$
Total Cost for 5 year life	0.39M\$
Total cost in foreign exchange	0.09M\$
Domestic content	76%
Total power per year	1.3 GWH
Net Cost of power	\$60 MWH
Effect on grid	Stability enhancement, embedded.
Environmental effects	Big positive, lots more trees.

Siemens AG Power Generation Group. Wood chip steam plant.

Average power output and type	44 MW On Demand
Availability	98%
Installed cost	195M\$
Installed Cost per MW average output	4.4M\$
Total Cost for 20 year life (probably longer)	632M\$
Total cost in foreign exchange	320M\$
Domestic content	49%
Total power per year	308 GWH
Net Cost of power	\$102MWH
Effect on grid	Large stability enhancement.
Environmental effects	Positive, more trees.

I can't see why WEL continue with this wind power project. All the above will be eligible for more price support than wind turbines so that can't be the reason.  
 If they want a big prestige project then the Siemens plant is the obvious candidate. This would also provide power independence for the Waikato for the foreseeable future. And it is cheaper to install.  
 The microgen would provide a big cash injection to the local economy.

**Carbon and nuclear derived energy balance.**

Mr. Burchett makes some very wild claims as to the Carbon emission/sequestration status of the Te Uku wind power project. He implies that 168,000 tons of carbon emission will be saved per year and that this will be a short term gain. I assume he means it will go immediately into carbon credit.

I will calculate this from standard publicly available figures and then compare it to the alternatives already mentioned.

I will assume that the turbine itself is built using all non nuclear power, in fact a significant part of the power to manufacture the materials comes from nuclear power.

Manufacture of turbine head and tower	2180 tonnes CO2
Transport to NZ	110 tonnes CO2
Mounting and construction	<u>1400 tonnes CO2</u>
Total per turbine	<b>3690 tonnes CO2</b>

**Project total 103320 tonnes CO2 emitted**

Most of this will be emitted a year before the first KW is supplied.

As too which type of power will be displaced. It is not clear how the increase of wind power will displace other generation. It will certainly not displace Huntly as this capacity will be vital to balance the grid if there is much wind power on it.

There is currently 2107 MW Max power of wind turbines (including this project) either built, under construction or under consent process in NZ. This is a number that the current grid configuration cannot possibly handle.

With modifications and upgrade, which will be expensive. The grid may be able to cope with this quantity of erratic power but only with all of New Zealand’s fast response generation on line as well.

Mr Burchett claims that the Hydro Stations will be kept spinning in motor mode (using power) but my conversations with engineers at Transpower suggest that Huntly and the Gas turbine capacity will be the main balance. We may have the ridiculous situation that our green and renewable hydro plants are not being used and venting water because there is a lot of wind power on line.

And just in passing, if we are so short of electricity why have the government just contracted a vast amount at low price for aluminium smelting. This is only done in countries with cheap power to spare.

So if this project replaces any power it will be gas turbine, thermal or hydroelectric. I will assume half gas 30% thermal and 20% hydro.

This gives an emission displacement of 0.1 tons of CO2 per MWH. From the Ministry for the Environment figures.

Per annum this is  $132412 * 0.1 = 13241$  tonnes of CO2 per annum displaced.

Therefore this project will take  $103320 / 13241 = 7.8$  years to get into carbon credit. This is within the range of 3-10 years that is commonly expected (except by wind power lobbyists).

However this is not the end of the story. It is not proper to discount how these projects will be paid for.

Over US\$200M will need to be earned to pay for these turbines. For GDP to remain constant an increase in foreign currency dollar or Euro earnings will be needed of the order of US\$10M per year.

The only practical mechanism open to NZ at the moment in an expansion of dairy output. This is currently usually done by felling central exotic forest to free up the now fertile land that it is on.

About 275 Hectares of deforestation will be required for each turbine. From MAF figures this is:

$275 * 800 = 220000$  tonnes C per turbine = 6.16 million tons carbon = 22 million tonnes CO2 emission.

Life time rate  $21850000 / 2648000 = 8.25$  tons CO2 = **2.27 tons C emitted per MWH.**

### **Carbon Balance of alternatives.**

Time limits apply again, I have more data on this subject as well.

#### Aotea Harbour Tidal Barrage.

Construction 13000 tonnes CO2 emitted.

Power is high quality and reliable so would replace all forms of generation. A general average figure will be used (excluding the awful wind power one!)

$$59000 \text{ MWH} * 0.4 = 23600 \text{ tonnes CO2 per year.}$$

Therefore the Aotea tidal barrage will go into carbon credit in about 6 months and displace 6500 tons of carbon emission per year thereafter.

$$\text{Rate } 6500 / 59000 = .11 \text{ tons C saved per MW}$$

#### Wood chip internal combustion Microgeneration. (typical installation).

Construction and transport 4.6 tonnes CO2 emitted.

In operation about 5 hectares of forest would have to be planted to supply the wood.

This in the time to first harvest this would sequester about 600 tonnes C.

Ongoing operations would continue sequestration from root and debris of about 80 tonnes C per year.

Therefore if fuel trees were planted at the same time as ordering the equipment it would be in credit immediately and would sequester at the rate of about 110 tons C/yr

Power is high quality and reliable so would replace all forms of generation. A general average figure will be used.

$$1300 \text{ MWH} * 0.4 = 520 \text{ tons CO2 per year.}$$

The total positive carbon balance of this project is 253 tons C positive per year.

$$\text{Rate } 0.4 \text{ tons C saved per MW}$$

#### Siemens AG Power Generation Group. Wood chip steam plant.

Construction and transport 86000 tonnes CO2 emitted.

In operation about 2000 hectares of forest would have to be planted to supply the wood.

This in the time to first harvest this would sequester about 220000 tonnes C.

Ongoing operations would continue sequestration from root and debris of about 35000 tonnes C per year.

Therefore if fuel trees were planted at the same time as ordering the equipment it would be in credit immediately and would sequester at the rate of about 35000 tons C/yr

Power is high quality and reliable so would replace all forms of generation. A general average figure will be used.

$$308000 \text{ MWH} * 0.4 = 123200 \text{ tons CO2 per year.}$$

The total positive carbon balance of this project is 68800 tons C positive per year.

Even if dairy land was formed to pay for this an equal area on poor land could be planted to provide fuel.

$$\text{Rate } 0.22 \text{ tons C saved per MW}$$

## **Summary.**

There is no possibility of any national or public benefit from WEL's Te Uku wind power project.

By objective measure it looks like an economic and power supply disaster as well as an environmental disaster.

Importing and placing these wind turbines will cause significant economic damage to New Zealand.

Operating these wind turbines will cause disruption to electricity supplies and deliver relatively small amounts of power.

The manufacture, transport, placement, and financial arrangements for these wind turbines will cause large emissions of carbon dioxide. This is contrary to stated government policy.

Far better alternatives exist for renewable electricity generation. At least four options exist that:

Cause far less environmental damage, and may even cause environmental improvement.

Generate Electricity far more cheaply and with a much higher domestic content.

Enhance the quality of supply and stability of the national grid.

Both save Carbon emissions and sequester Carbon from the atmosphere.

The Te Uku wind power project does not have an advantage in any of these areas over any of the options.

The application should be refused on the grounds of its potential damage to the economy of New Zealand.