Submission on proposed Regional Policy Statement for the Wellington region, 2009

Pursuant to Clause 6 of the first Schedule and Section 79 of the Resource Management Act 1991

Submission can be:

Posted to: Freepost 118112
Proposed Regional Policy Statement
Greater Wellington Regional Council
PO Box 11646
Wellington 6142

Delivered to: Ground Floor Reception, 142 Wakefield Street, Wellington

Faxed to: 04 385 6960

E-mailed to: rps@gw.govt.nz

Submissions need to be received by 25 May 2009 at 4pm

Your name and contact details:

Full name: ...Linda Hoyle

27 Bulls Run Road Pauatahanui RD1 Porirua

Telephone no.: Work: .... Home: 04 527 6822..........................

Facsimile: ....

Contact person: ...Linda Hoyle
....

Address and telephone no...
(if different from above) ....
....

Submission

1. I am a member of Moonshine Residents Association
2. The specific parts of the proposed Regional Policy Statement that my submission relates to are as follows:...

3.
4. …3.3 Energy, Infrastructure and Waste, Policy 6, Policy 38 and Method 32

(Clearly indicate which parts of the document you support or oppose, or wish to have amendments made to. Please continue on
separate sheet(s), if necessary)

2. My submission is that:

see attached

I wish Greater Wellington to make the following decision:

……3.3 Energy, Infrastructure and Waste, Policy 6, Policy 38 and Method 32 should be re written taking into account the new Governments energy policy, which centres round security of supply and affordable power generation.

Statements regarding renewable energy ie wind generation increasing security are incorrect and misleading to the general public, before such statements are made Transpower should first be consulted and correct information obtained.

Please tick applicable box(es)
I do not wish to be heard in support of my submission (This means you have elected not to speak at the hearing)
If others make a similar submission, I will consider presenting a joint case with them at a hearing

Signature: ……Linda Hoyle…… Date: ……3 June 2009

(Person making submission or person authorised to sign on behalf of person making submission

3.3 Energy, Infrastructure and waste (page 27)

This section is confusing in that lumps together transport and the need for imported oil with the electricity supply industry which is not dependent on imported oil

Clearer definition needs to be made of the energy needs for transport and the energy needs for the supply of electricity

New Zealand is not dependent on imported oil for the production of electricity

'*Traditional energy sources will not be able to meet increasing energy demand.*'

So far as the supply of electricity is concerned this statement is misleading and incorrect. Building Combined Cycle Gas turbines (CCGT) will supply New Zealand's demand for energy more reliably than the renewable energy available in the Wellington region

'Other challenges are securing clean energy at affordable prices and using it efficiently, as well as responding to impacts on the region from oil depletion and the rising costs of oil. This means looking to make better use of existing energy resources through energy conservation and efficiency, better utilising the region's renewable energy resources, and looking at ways that the impacts from oil price increases and oil depletion can be mitigated.'

"securing clean energy at affordable prices" is not the responsibility of Regional Council, this is the responsibility of Central Government and the Electricity Market.

There is a regional responsibility for making prudent energy purchases for running the local operations for which the regional and other councils are responsible, and for ensuring that energy is used efficiently for those purposes

"securing clean energy at affordable prices" by *"better utilising the region's renewable energy resources"* - the two statements are not compatible. The only industrial renewable energy supply currently available in the region is wind energy which is substantially more expensive than traditional generation. Wind will increase the cost of electricity not just because of the cost of wind but because of what it does to other generation.

"The cost of power generated by new wind farms such as Makara in Wellington which cost $440 million for 143 MW ($3100/kW), to be about 12 c/kWh at the station gate. Geothermal power costs about 8 cents. Generation from hydropower, gas or coal costs 8 – 10 cents"

(from a report by Brian Leyland attached)

http://www.wind-watch.org/news/2009/05/11/windpower-foolish-energy/

In any case as electricity from local generators goes straight into the national grid, (with the exception of the wind farm at Makara) and could equally be supplying Auckland or Wellington

"The region contains significantly greater renewable energy resources than are currently used. Wind biofuels and solar (for hot water systems) have been identified as possible renewable energy generation sources for the region."

1. Energy

The Wellington region is dependent on externally generated electricity and overseas-sourced fossil fuels and is therefore vulnerable to supply disruptions and energy shortages. However, significant renewable energy resources exist within the region."

This statement is misleading, as all of New Zealand is dependent on electricity that is produced elsewhere and feed into the national grid,

Again it is misleading to say that the Wellington region is dependent on overseas-sourced fossil fuels, as this is true of New Zealand as a whole. However there are still huge coal reserves in the South Island (some of which is being exported) and untapped gas fields off our shores. It is a commercial decision whether to make better use of these resources, at least until we can find a more affordable method of renewable generation.

"Policy 6: Recognising the benefits from regionally significant infrastructure and renewable energy - regional and district plans

(b) The social, economic, cultural and environmental benefits of energy generated from renewable energy resources including:

(i) security of supply and diversification of our energy sources;
(ii) reducing dependency on imported energy resources; and

(iii) reducing greenhouse gas emissions."

(b) the social, economic, cultural and environmental benefits of energy generated from renewable energy resources including

This statement does not acknowledge the disadvantages and adverse effects of the construction of commercial wind farms in the region especially to the amenity values of communities affected. (In some cases the adverse effects may well outweigh any benefit of such construction). What are the cultural benefits to be gained from generation of energy?

"(i) security of supply and diversification of our energy sources;"

See attached report

"(ii) reducing dependency on imported energy resources; and"

CO2 EMISISONS SAVINGS

It is remarkably difficult to calculate the amount of CO_2 which is liberated from power stations which is operating as back up generation for renewable energy Wind power is supported by thermal generation. Fossil fuelled capacity operating as reserve and back up is required to accompany wind generation and stabilise supplies to the consumer. That capacity is placed under particular strains when working in this supporting role because if is being used to balance a reasonably predictable but fluctuating demand with a variable and largely unpredictable output from wind turbines. Consequently operating fossil capacity in this mode generates more $CO_{2\ per}$ kWh generated that if operating normally

In publications from RES (www.res-nz.co.nz FAQ) it has been quoted that 1000MW of wind power will generate 3.24TWhr per year which would save 3,020,000 tonnes of CO_2 . This is presuming that wind generation displaces only coal fired electricity generation.

RES are stating that 1 MWhr of coal fired electricity produces 930kg of CO_2 , RES also stated that windfarms on average produce 35% of their theoretical maximum output over the period of a year (which is a generous figure).

It can be seen from the above statements that an average the proposed Puketiro Windfarm will only produce 150 * 0.35 = 52.5MW, therefore if we compare the that with a modern Combined Cycle Gas Turbine (which produces 370 kg of CO_2 per MWhr [UK office of Science and Technology]) these units have an availability of 95%.

RES assume in the FAQ that wind replaces coal, therefore when wind is not generating it is replaced by coal a fact that cannot be stated with any degree of certainty.

For 150MWhr of load on the system we can say on average that, the Puketiro wind farm will be able to supply only 52.5MWhr, the rest will be supplied by coal fired generation and will produce around 90 tonnes of CO2.

This is shown by

Wind will produce around 52.5MWhr (150 * 0.35 [availability] = 52.5) the remaining power will be produced by coal meaning 150 – 52.5 = 97.5MWhr

97.5MWhr of coal fired generation will produce 97.5 * .93 = 90.88 tonnes of CO_2

If the same 150MWhr of load is supplied by the Combine Cycle Gas Turbine defined above it will produce 150 * 0.95 (availability) = 142.5MWhr, meaning that only 7.5 MWhr will be produced by coal fired generation therefore the total CO2 produced would be;

(142.5 * 0.37) + (7.5 * .93) = 59.7 tonnes of CO_2

This means that a Combined Cycle Gas Turbine will produce 65% less CO_2 than wind power/coal combination.

If as suggested by the NZWEA wind generation and hydro and dovetailed together and water saved in the lakes there will be no CO_2 saving as hydro is already CO_2 neutral. CO_2 emissions could only be saved if coal fired generation is displaced.

"Explanation

Energy generated from renewable energy and regionally significant infrastructure can provide benefits both within and outside the region. Renewable energy benefits are not only generated by large scale renewable energy projects but also smaller scale projects. Renewable energy means energy produced from solar, wind, hydro, geothermal, biomass, tidal wave and ocean current sources. Imported energy resources include as oil, natural gas and coal."

See attached report and also the attached report of Brian Leyland regarding the cost of wind power

'When considering the benefits from renewable energy generation the contribution towards national goals in the New Zealand Energy Strategy (2007) and the National Energy Efficiency and Conservation Strategy (2007) will also need to be given regard.'

We suggest that the Regional Council consults with the current government to determine whether the strategies are likely to change, given the greater focus now on security of supply and economics

"Method 32: Identify sustainable energy programmes Policy 65

Identify sustainable energy programmes, to improve energy efficiency and conservation, reduce emissions of carbon dioxide and minimise the region's vulnerability to energy supply disruptions or shortages."

See attached report and above comments which comments on the above issues.

A more realistic and reasoned approach should be taken with regard to renewable energy; renewable energy should not be pushed at all costs.

The statement "identified as possible renewable energy generation sources for the region" is misleading and implies that the electricity generated would be utilised in the region and that therefore there would be some regional advantage, e.g. lower costs to consumers. Whereas in practice large scale electricity generation would be input to the national grid and there would be no direct local advantage.

"There is also the potential for small scale renewable energy generation including small-scale hydro in the region. Tidal currents in Cook Strait and, to a lesser extent, wave action in Cook Strait and off the Wairarapa coast are also significant renewable energy resources, but technological advances are required to realise this potential."

We certainly support the region encouraging research efforts to explore the potential for using local resources for generating electricity, such as harnessing tidal power. We have also undoubtedly failed to make sufficient use of some technologies such as solar water heating, although significant deployment comes down to affordability, which would probably require major central government expenditure or direct incentives of some kind. However we are doubtful about the potential for affordable electricity generation from small-scale renewal energy plants in the region, such as small-scale hydro, other than for direct local use by e.g. individual farms and homes.

"The National Policy Statement on Electricity Transmission (2008) sets out objectives and policies to enable the management of effects on the electricity transmission network under the Resource Management Act. The Statement recognises that efficient and secure electricity transmission plays a vital role in the well-being of New Zealand and makes it explicit that electricity transmission is to be considered a matter of national significance."

We fully support a goal of ensuring that electricity is able to be distributed securely to and in the region, whilst minimising the impact on the environment, including private property and amenity.

"The regionally significant resource management issues for energy, infrastructure and waste are:

New Zealand's Electricity Problems

The North Island electricity system has an electricity capacity shortfall. This means that total installed power of all the generators plus the inter connection to South Island may not be able to meet the electricity demand at the time of the peak demand, this at around 18:00 during winter.

South Island Energy Problem

The South island electricity is supplied by Hydro generation and one wind farm generation plus transfer of electricity from the North Island via the "Cook Strait cable". There is sufficient generation produced by hydro to meet the demand at peak time. During the last few years there has been insufficient rainfall and hence there is not enough water available in the lakes of the South Island to supply the energy needs of the South Island for the remainder of the time and therefore the South Island is reliant on the fossil fuel generation in the North Island to supply their energy requirements.

There appears also to be a pattern in New Zealand's weather system that during a dry year there is little or no wind, hence wind generation will not solve this problem.

Wind Generation in New Zealand

Introduction

Following a request to Transpower we have been given the output from all the wind farms in New Zealand for the last 3 years. This report details the variability of the wind output over the last 3 years and concentrates on the output from wind last year when there were power shortages in New Zealand.

With this report we will supply the data given to us by Transpower, the New Zealand transmission grid owner and operator,

Background

Whenever a wind farm is going through the consenting process the company building the wind farm makes the following statements: -

The wind farm will increase security of supply in New Zealand

The wind farm will reduce system losses

The wind farm is 90% efficient

90% of the time a wind farm will produce electricity

The average output from the wind farm will be 40% of installed capacity

This report will use the figures supplied by Transpower to show what these statements mean.

Increase Security of supply in New Zealand

The New Zealand Energy Strategy 2007 (p 99) states;

"Reliable access to energy resources is essential to a vibrant economy. The government has a programme of fostering greater efficiency and maintaining security of supply at fair and efficient prices."

The electric power grid's primary purpose is to efficiently provide reliable electricity on demand to its customers 24/7, 365. This means the grid must match reliably aggregate production and consumption instantaneously and continuously.

The importance of maintaining security of supply has been highlighted in Government draft Energy Strategy the New Zealand Energy Strategy to 2050 Powering Our Future

"Maintaining security of energy supply at competitive prices is essential for a modern economy". (Page 59)

The importance of the security of supply issue in relation to wind farm developments is highlighted several times in the NZES

Ensuing there is enough fuel (taking into account the uncertainty of hydro inflows and wind flows) to generate sufficient electricity at all times.(p 61)

Wind generation cannot always guarantee firm capacity at times of peak demand. It is also less able than other types of generation technologies to provide services such as rapid reserve response and frequency and voltage support (page 62)

The intermittent nature of wind generation makes this form of generation less reliable – the economic cost of monitoring and managing this issue may put an upper limit on wind generation.(p 73)

The most important consideration for the future electricity supply has to be security of that supply. The effect of the supply of electricity not meeting the demand at some time in the future would be potentially disastrous, possibly resulting in deaths, food shortages, transport problems and collapse of the country's infra-structure. Economic ruin could follow if international financial business relocated from the New Zealand due to uncertainty about the security of electricity supply. Fisher and Paykel have recently stated they are to relocate their production overseas due to high production costs.

Security of supply implies firm generation capacity with a margin above the peak (winter) demand. The firm generation is supplied by baseload power stations (such as Geo-thermal and Combine Cycle Gas Turbines) and despatchable (controlled by the grid) power (such as coal, open cycle gas turbines (peaking plants) and certain renewables such as hydro-electric). Wind power stations do not contribute to the security of supply because the electricity generated is intermittent, unpredictable. Invariably peak winter demand occurs during extreme cold weather when a high pressure system settles across the country and drags in cold air with little wind. Even with wind turbines distributed widely across New Zealand under these low wind conditions, little electricity would be generated by wind turbines.

Wind Energy as an intermittent, uncontrollable largely unpredictable and variable energy source, provides limited if not negligible benefits and no capacity benefit to a grid operators need for reliable controllable and predictable electricity generating capacity to met demand on a 24 hour basis seven days a week 365 days per year.

The following excerpt from the Electricity Reliability Council of Texas' (ERCOT) 2005 study suggests a more conservative assessment of wind's effective capacity (*emphasis added*)
(http://www.windaction.org/documents/5707):
In addition to meeting the state's energy needs (MWh), the electric system must also meet expected peak demand (MW). Generation resources other than wind will be needed to meet most of the projected growth in peak demand, as maximum output from wind resources does not correspond to system peak demand.

E.ON Netz (2004) admitted that every megawatt of installed wind power required 0.8 MW of backup from "shadow power stations", thus even when not generating wind turbines are still causing some CO" emission. The following year The German grid operator, Eon Netz,- one of the world's largest managers of wind energy, addresses wind's effective capacity in its 2005 Annual Report as follows: (*emphasis added*)
(http://www.windaction.org/documents/461):

Wind energy is only able to replace traditional power stations to a limited extent. Their dependence on the prevailing wind conditions means that wind power has a limited load factor even when technically available. It is not possible to guarantee its use for the continual cover of electricity consumption. Consequently, traditional power stations with capacities equal to 90% of the installed wind power capacity must be permanently online in order to guarantee power supply at all times.

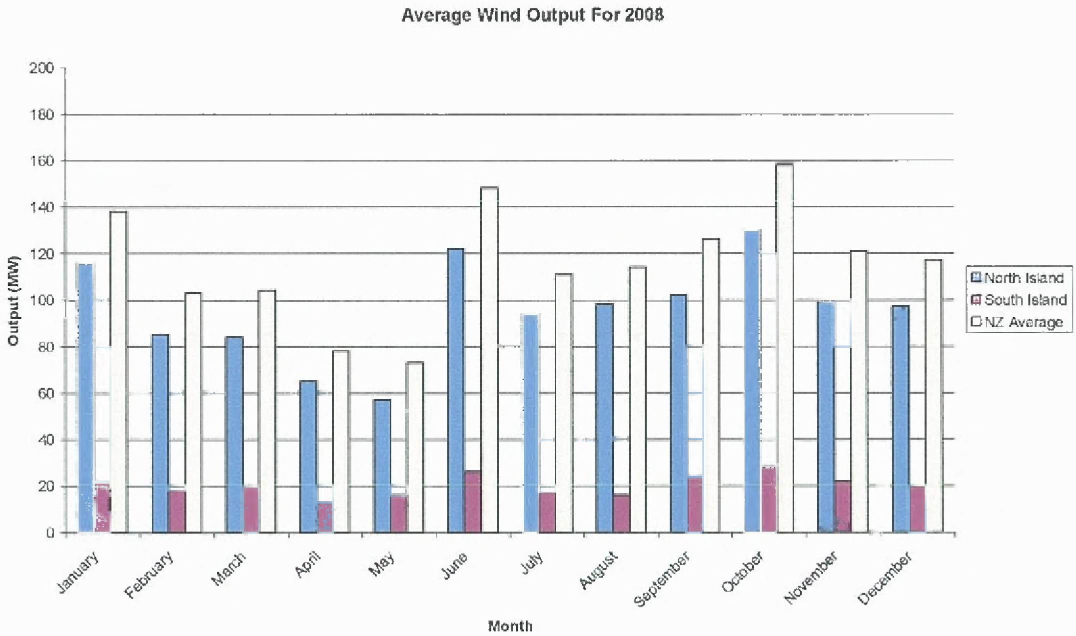
In the winter of 2008 New Zealand went through a period of energy saving because of a “Dry Year”, this is a problem for New Zealand because over 60% of the electricity generated in New Zealand is hydrogenation, but the water storage is very limited (at maximum around 6 weeks)

The Power saving scheme started in May and was lifted in June, but in the South Island generation shortages lasted until late August, the table below shows the average output of wind in New Zealand during year of 2008

	North Island		South Island		NZ Average	
	Output (MW)	Average (%)	Output (MW)	Average (%)	Output (MW)	Average (%)
January	116	46.2	22	37.9	138	44.7
February	85	33.9	18	31.0	103	33.3
March	84	33.5	20	34.5	104	33.7
April	65	25.9	13	22.4	78	25.2
May	57	22.7	16	27.6	73	23.6
June	122	48.6	26	44.8	148	47.9
July	94	37.5	17	29.3	111	35.9
August	98	39.0	16	27.6	114	36.9
September	102	40.6	24	41.4	126	40.8
October	130	51.8	28	48.3	158	51.1
November	99	39.4	22	37.9	121	39.2
December	97	38.6	20	34.5	117	37.9
Annual Average	96	38.1	20	34.8	116	37.5

The above table shows that the output for wind during the dry months (April and May) was less than half of the output in October, the period when there are large hydro lake in flows (period of snow melt). It can be seen from the above table that the output from the wind farms in New Zealand was around 40% of the installed capacity.

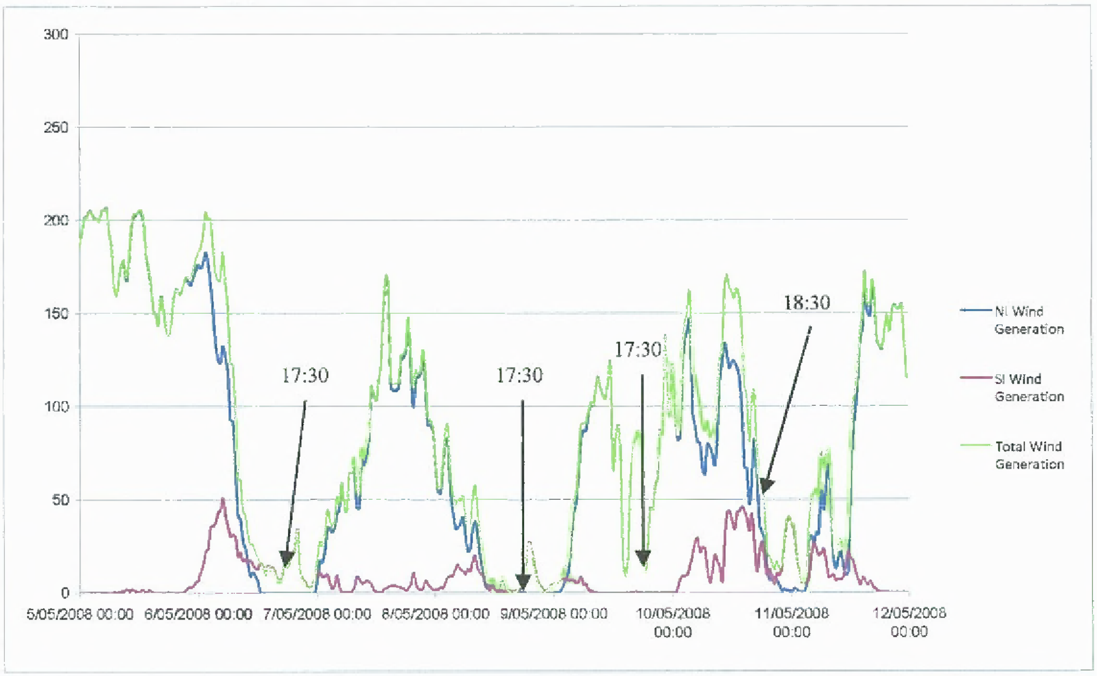
The graph below shows the month by month averages of wind output from the wind farms in New Zealand.



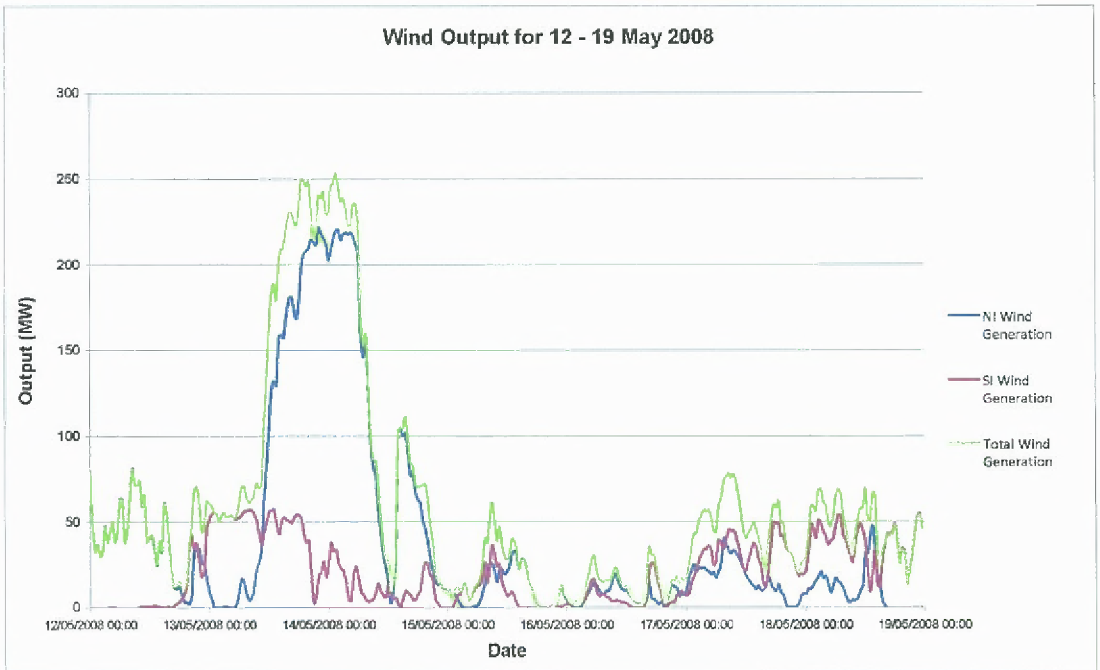
It can be seen the addition of wind farms will not increase the security of supply in New Zealand during a Dry Year as it appears that when there is no rain there is no wind.

Below are graphs that show the output for the wind farms, which identify why wind farms can never be relied on for security of the grid system, as it so variable and does appears to be reduce in output at times when the demand in New Zealand is high. This statement appears to be sweeping but all you have to think about is when you use electricity the most. This is: -

> During the winter from 5:30 to 6:30 at night on a cold frosty night, these nights usually are coldest when there is no wind. (This is not unique New Zealand but is the found all around the world, and as a consequence wind has little or no capacity value in these countries)



The Graph above shows the wind output between 5th and 12th May 2008 and details the wind output at the time of the peak demand, at shows the variability of wind output and also that for half of the peaks wind was not available. The peak times are highlighted on the graph



The above graph shows the output from the 12th – 19th May, it can be seen when the power is needed wind just cannot be relied on.

The Electricity Commission are responsible for calculating generation adequacy for the government of New Zealand and when doing this they state that wind farms have a 20% capacity value at the time of the peak, that is the value of output assigned for all the wind farms in New Zealand at the time of the peak is 20% of its installed capacity. If this figure is used and relied on, New Zealand will not have enough generation to meet the peak demand plus the reserves required to cover the loss of the largest generator, if the wind does not blow. The 20% output from wind for 2008 was 62MW. In graph above it can be seen that the output from wind was less than 62MW. In future the New Zealand system will be at risk when there is no rain or no wind.

For approximately 30% of the winter peaks in New Zealand the average the output from wind is less than 20% of its installed capacity, so if we rely on wind our power supply will at best be unreliable. Also, it can be seen that wind output from the wind farms in the NI are not available for well over 10% of the time during the winter peaks.

Wind cannot increase system security as it is an intermittent energy source and when planning the power system studies are carried out the output from wind is assumed to be 0MW and not taken into account (Transpower's National Winter Group)

Wind power generation – weather restricts availability

The weather situation determines the wind level. Both cold wintry periods ad periods of summer heat are attributable to stable high pressure weather systems. Low wind levels are meteorologically symptomatic of such high pressure weather systems. This means that in these periods the contribution made by wind energy to meeting electricity consumption demand is correspondingly low.
E.On Netz Wind report 2005

Do New Zealanders realise that New Zealand exports coal to other countries so that they can freely pollute, where they are not a signatory to the Kyoto protocol? Any benefit however small we may gain through harnessing wind power would be completely negated by the added pollution we are enabling elsewhere in the world

Although the wind is a renewable source of energy, wind turbines can only operate on the grid in conjunction with backup generation to ensure demand is met when the wind fails. For this reason, it has been claimed that wind-generated electricity cannot be classed as renewable.

Because of the intermittency and unpredictability of the wind and thus of the electricity generated by wind turbines, wind turbines cannot replace a significant number of conventional power stations. Thus wind turbines are being constructed as a secondary source of electricity. In essence, the consumer is paying for two sets of electricity generation; the conventional dispatchable power stations, necessary to meet demand at all times and wind turbines which operate only when the wind blows and which then displace dispatchable power stations

Because of the way the electric grid works, constantly matching supply with demand to avoid dips and surges of power, the variable production of wind turbines is treated as part of the demand side of the equation. A base level of power is provided from large plants, and other plants are kept burning to be able to provide the maximum likely power (peak load) needed as it varies through the day. As demand drops, those plants are diverted from power generation, and as demand rises they are brought back on to resume generating the needed power. These plants burn fuel whether or not they are producing electricity. Wind power may displace generation of power from such plants, it does not displace the burning of fuel in them – the heat is simply diverted.

In other words, these peak load plants must continue burning fuel when demand falls or wind production rises, because either trend may reverse at any time. Because they are out of the control of the grid's dispatchers, just like user demand, the wind turbines' only effect is to bring the spinning standby plants in and out of production. But, again, the plants continue to burn their fuel. And the additional fluctuations of wind power add to the cost and inefficiency of that burning.

The peak electricity demand (5pm on a cold winter's night) in New Zealand is growing at a rate of 2.5% per year, which equates to approximately 200MW (this demand has to be met by generation other than wind as wind is so unreliable). We will still need to build additional fossil-fuelled or geo thermal power stations to support this growth in peak demand, but this was stopped by the last government which is exacerbating the current New Zealand energy crisis.

Building wind farms means building two lots of generation, gas powered peaking plant would have to be built as back up power for wind

Wind power will increase the cost of electricity not just because of the cost of wind but because of what it does to other generation.

In conclusion, it would seem that the previous Government was willing to force businesses and consumers to subsidise the developers of wind farms through significantly higher power prices and the promise of carbon credits under the pretext that this is the most sustainable and environmentally-friendly way of providing the increased capacity necessary to meet future energy requirements. However it can be shown that in fact more fossil-fuelled generators will need to be built to meet peak demands and offset the inefficiencies of wind generation which makes the policy more political than rational, and not in accordance with the Government statement in the NZES that **maintaining security of energy supply at competitive prices is essential for a modern economy and also in accordance with the current Government's statement that security of supply is important.**

The wind farm will reduce system losses

I attended a meeting with RES and they stated that the Puketiro wind farm would be connected to the Transpower transmission system and this will have the normal system losses of any generator connected to the grid system of around 5% and as a consequence would not reduce system losses.

Some small wind farms (around 1 to 50MW) can be connected to distribution systems (33kV networks) and they will reduce system losses when they are generating electricity, but if the load on the network they connect to is less than the output of the wind farm the losses could be high.

The wind farm is 90% efficient

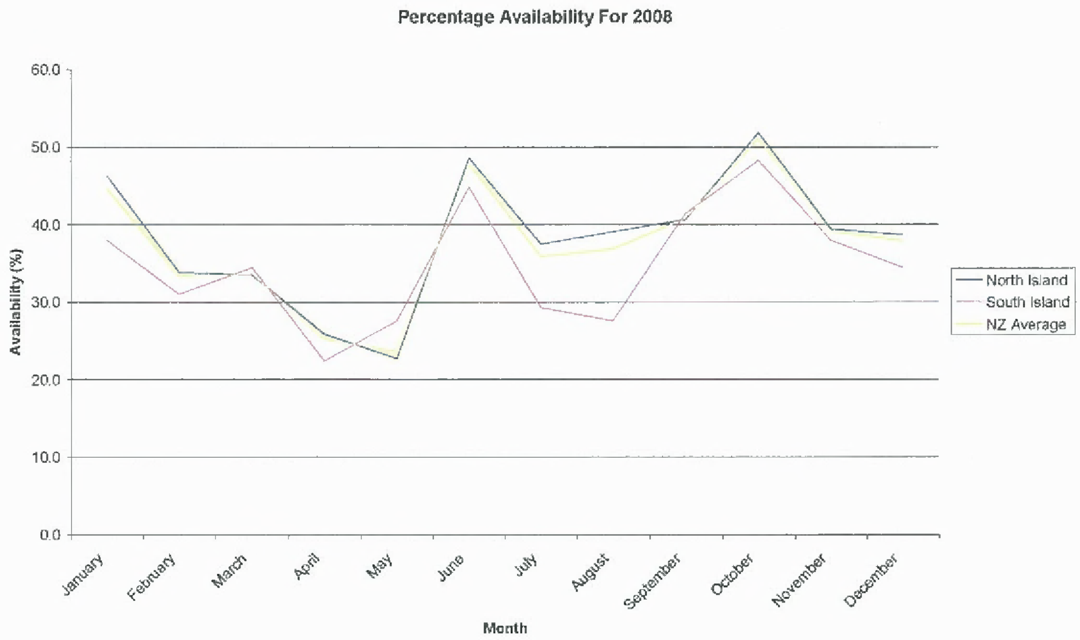
Wind farm developers use the term "efficient" wrongly, the mechanical efficiency of a wind turbine is less than 20%, this is: -

Efficiency= Power Output / Power Input *100

This the efficiency at turning wind power into electrical power. The developers mean that 90% of the time the turbines generate some electricity, this is on average, but does not take into account when the power is needed as quoted above: -

The average output from the wind farm will be 40% of installed capacity

The graph below shows the average output from all the wind farms in New Zealand and the graph shows the percentage availability of wind through 2008 on a monthly basis



It can be seen from the graph that the wind output is at the highest availability in October when the hydro lakes are at their highest or even overflowing and at its lowest during the highest demand periods. **The problem with averages is that they miss specific problems.**

CONCLUSION

For approximately 30% of the winter peaks in New Zealand the average output from wind is less than 20%

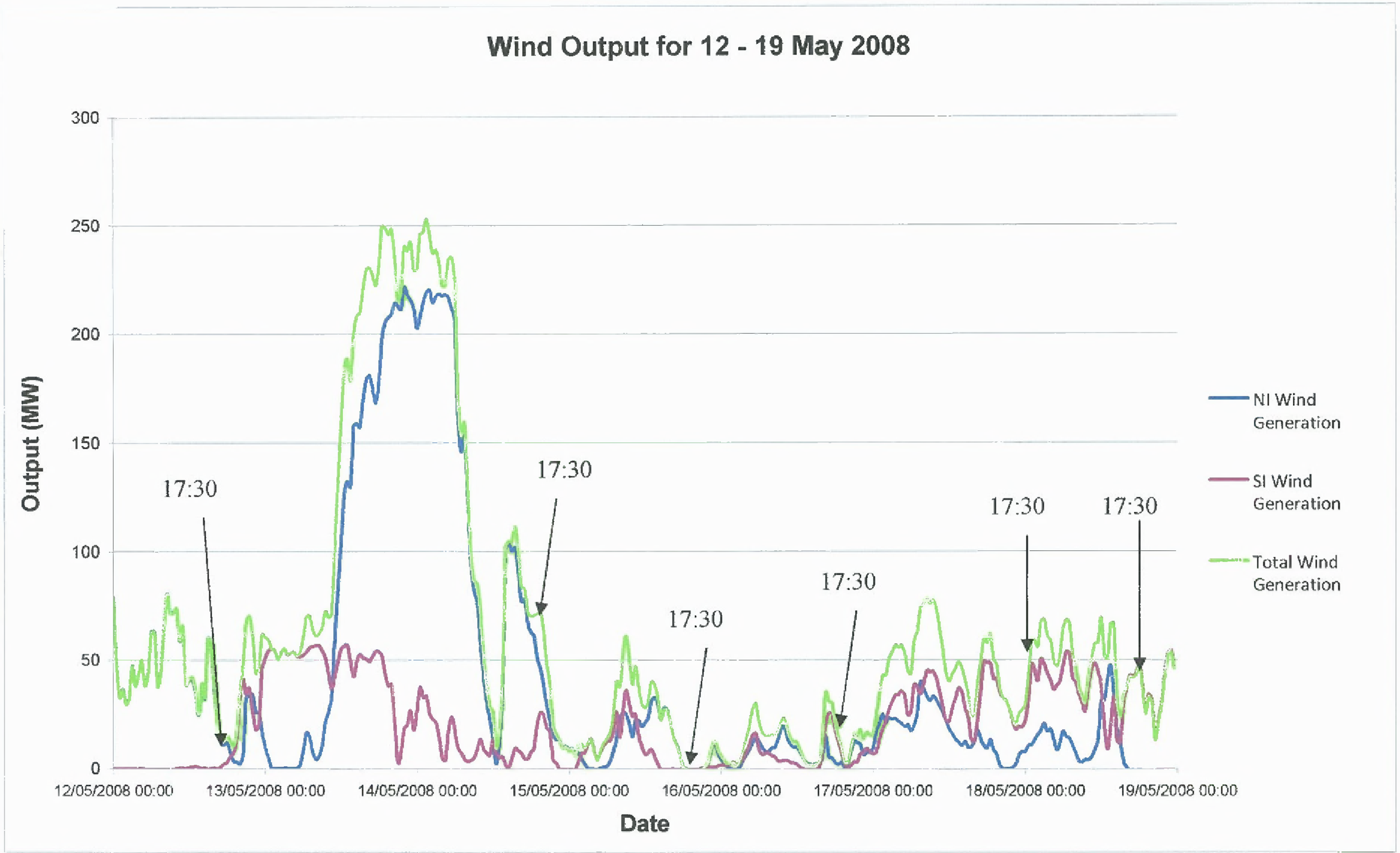
Output from the wind farms in the NI was not available for well over 10% of the time during the winter peaks.

When energy was needed in April and May last year due to a lack of hydro, wind output was only 22% of installed capacity or less than half the value in October when there were large amounts of hydro generation available (resulting in hydro spill)

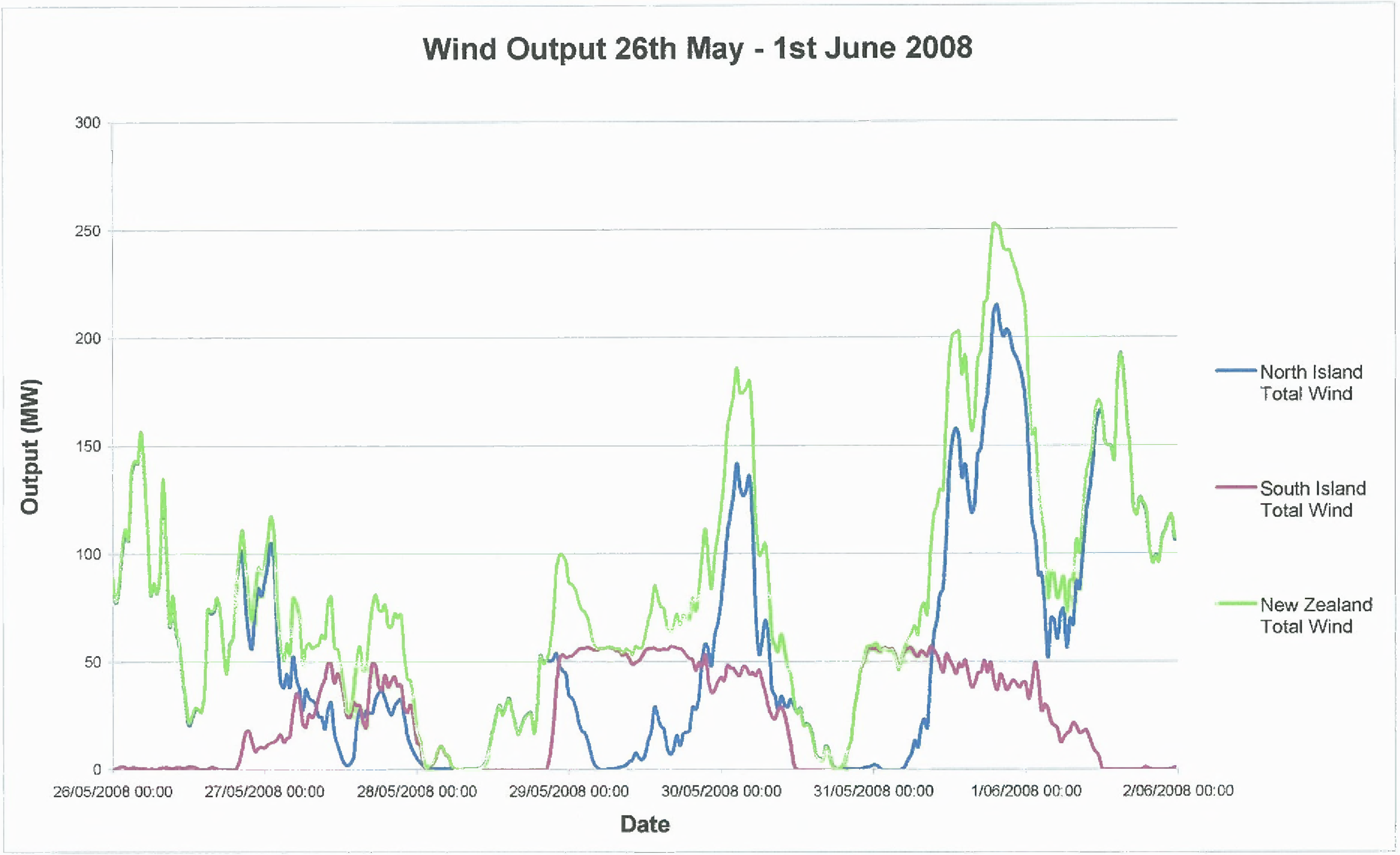
Additional wind farms will not solve the North Island capacity problems, reliable generation is required to secure NZ growing electricity demand (currently growing at around 3% per annum)

The graphs also show that the locational diversity does not appear to be of great benefit as the output on the North and South Island appear to follow a pattern.

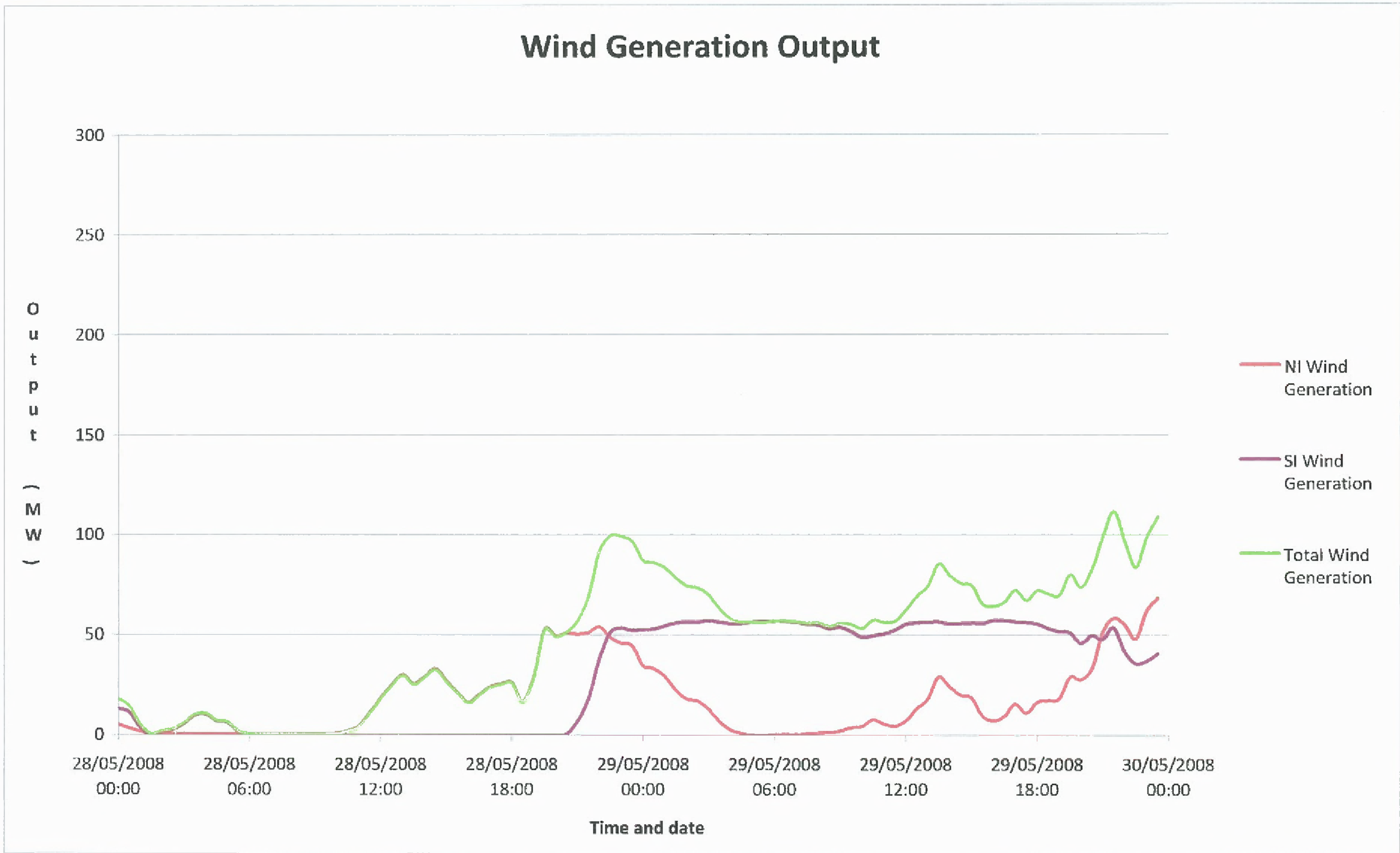
Attached are a series of graphs showing periods when wind is not available, and also the wind output on a month by month basis showing the variability of wind output.



Wind Output for 12 - 19 May 2008
Output (MW)
300
250
200
150
100
50
0
12/05/2008 00:00
13/05/2008 00:00
14/05/2008 00:00
15/05/2008 00:00
16/05/2008 00:00
17/05/2008 00:00
18/05/2008 00:00
19/05/2008 00:00
Date
NI Wind Generation
SI Wind Generation
Total Wind Generation
17:30
17:30
17:30
17:30
17:30
17:30

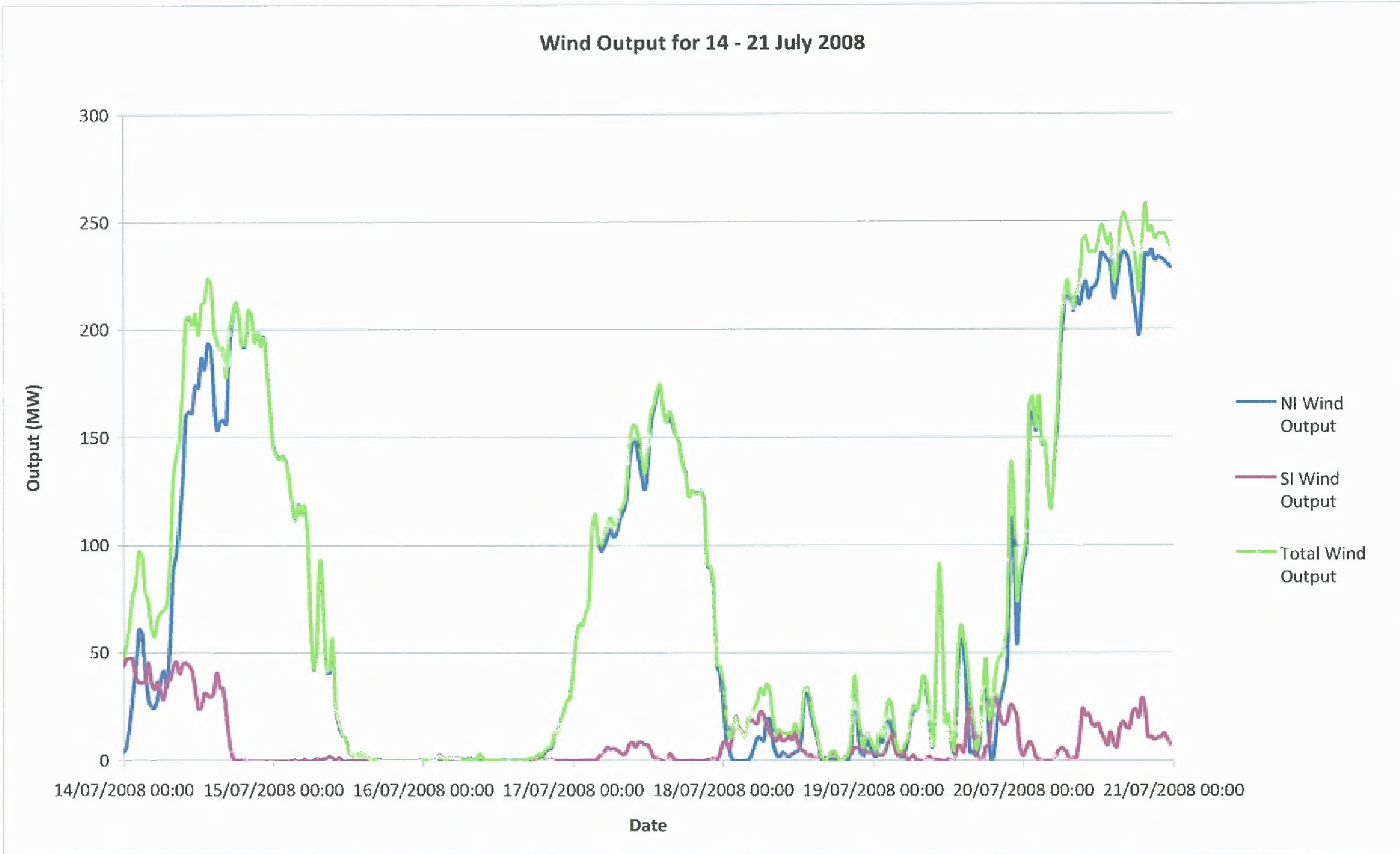


Wind Output 26th May - 1st June 2008
Output (MW)
300
250
200
150
100
50
0
26/05/2008 00:00
27/05/2008 00:00
28/05/2008 00:00
29/05/2008 00:00
30/05/2008 00:00
31/05/2008 00:00
1/06/2008 00:00
2/06/2008 00:00
Date
North Island Total Wind
South Island Total Wind
New Zealand Total Wind

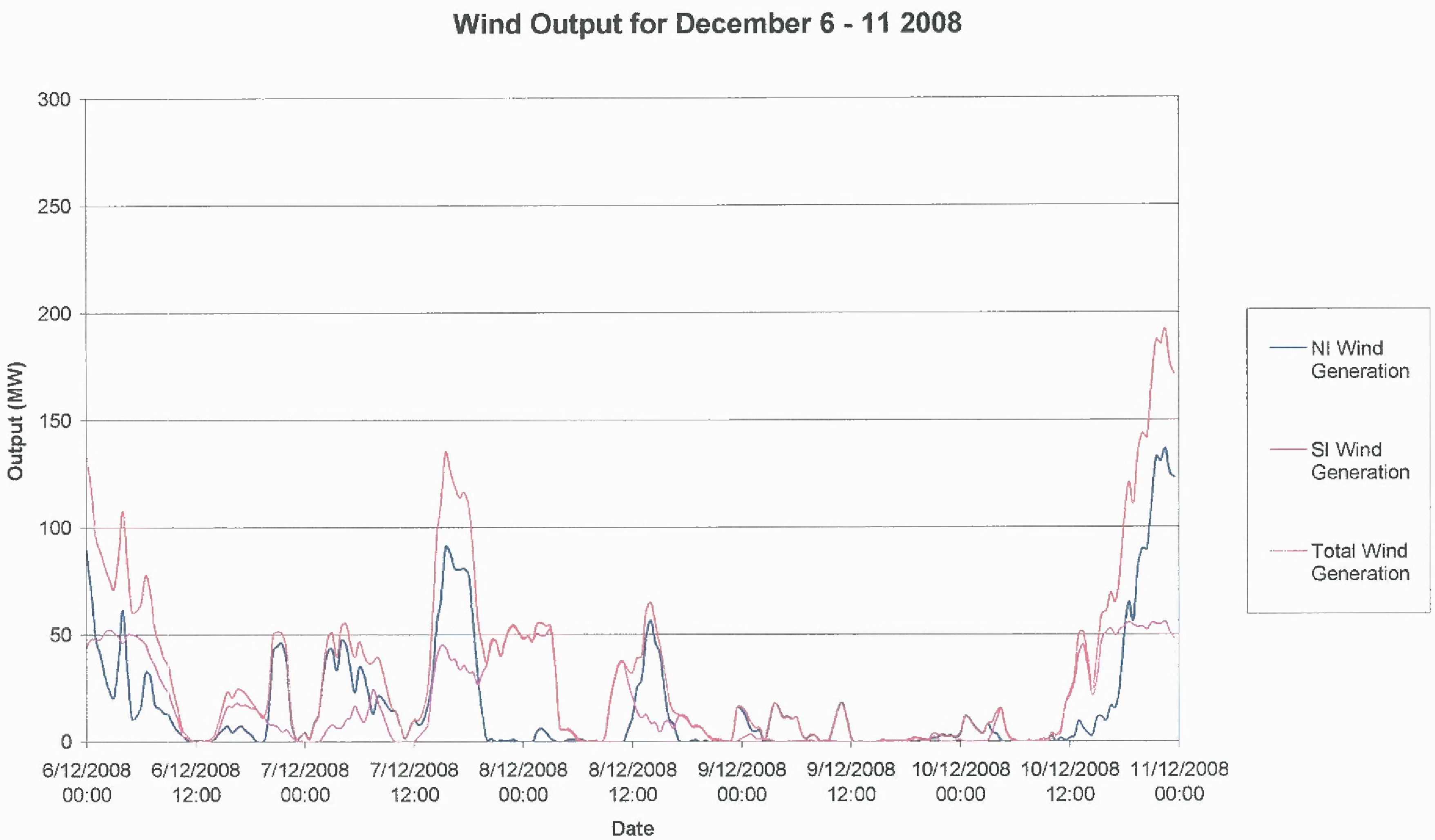


Wind Generation Output
Output (MW)
300
250
200
150
100
50
0
28/05/2008 00:00
28/05/2008 06:00
28/05/2008 12:00
28/05/2008 18:00
29/05/2008 00:00
29/05/2008 06:00
29/05/2008 12:00
29/05/2008 18:00
30/05/2008 00:00
Time and date
NI Wind Generation
SI Wind Generation
Total Wind Generation

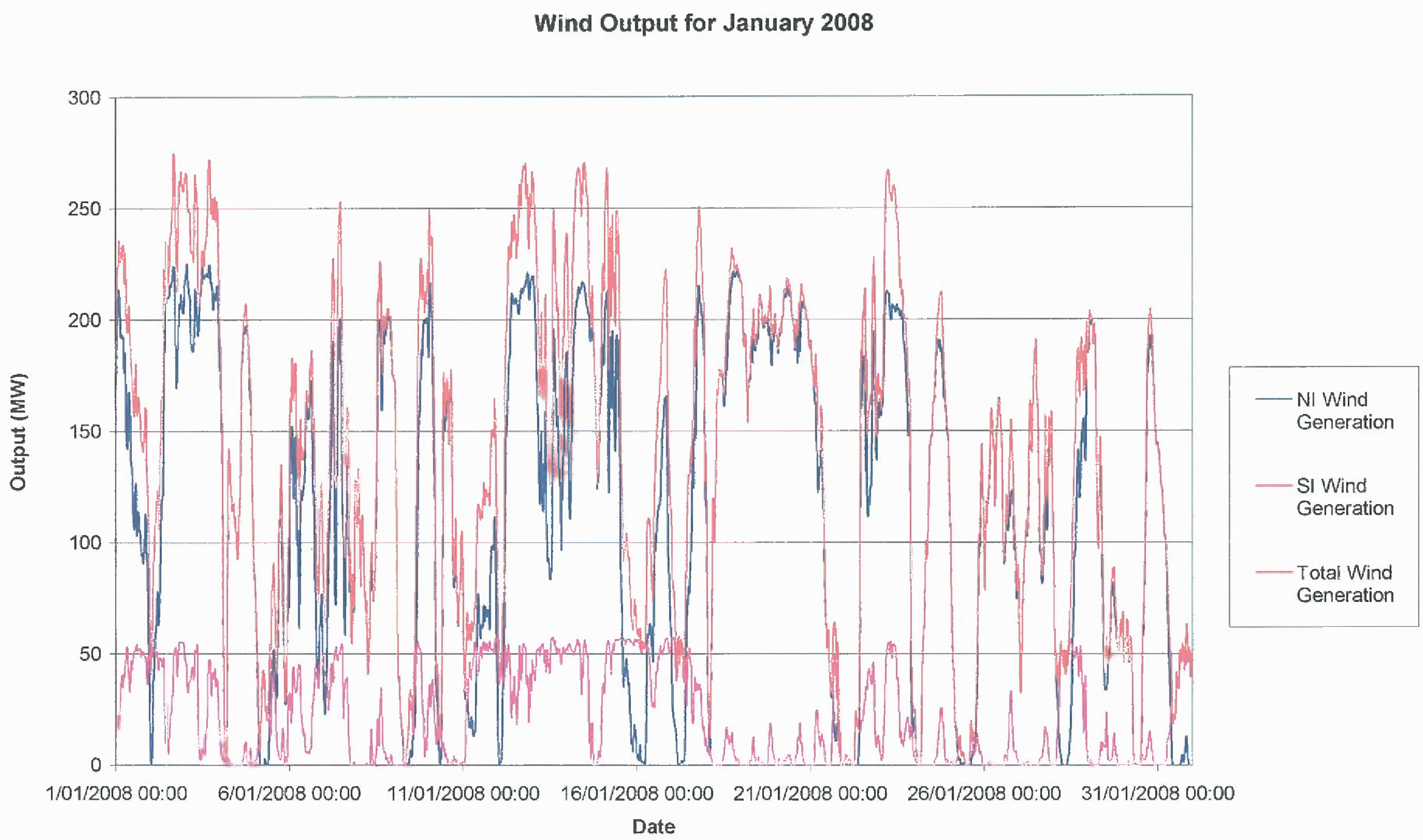
Wind Output for June 21st 2008
300
250
200
150
100
50
0
Output (MW)
21/06/2008 00:00
21/06/2008 06:00
21/06/2008 12:00
21/06/2008 18:00
22/06/2008 00:00
Date
NI Wind Output
SI Wind Output
Total Wind Output



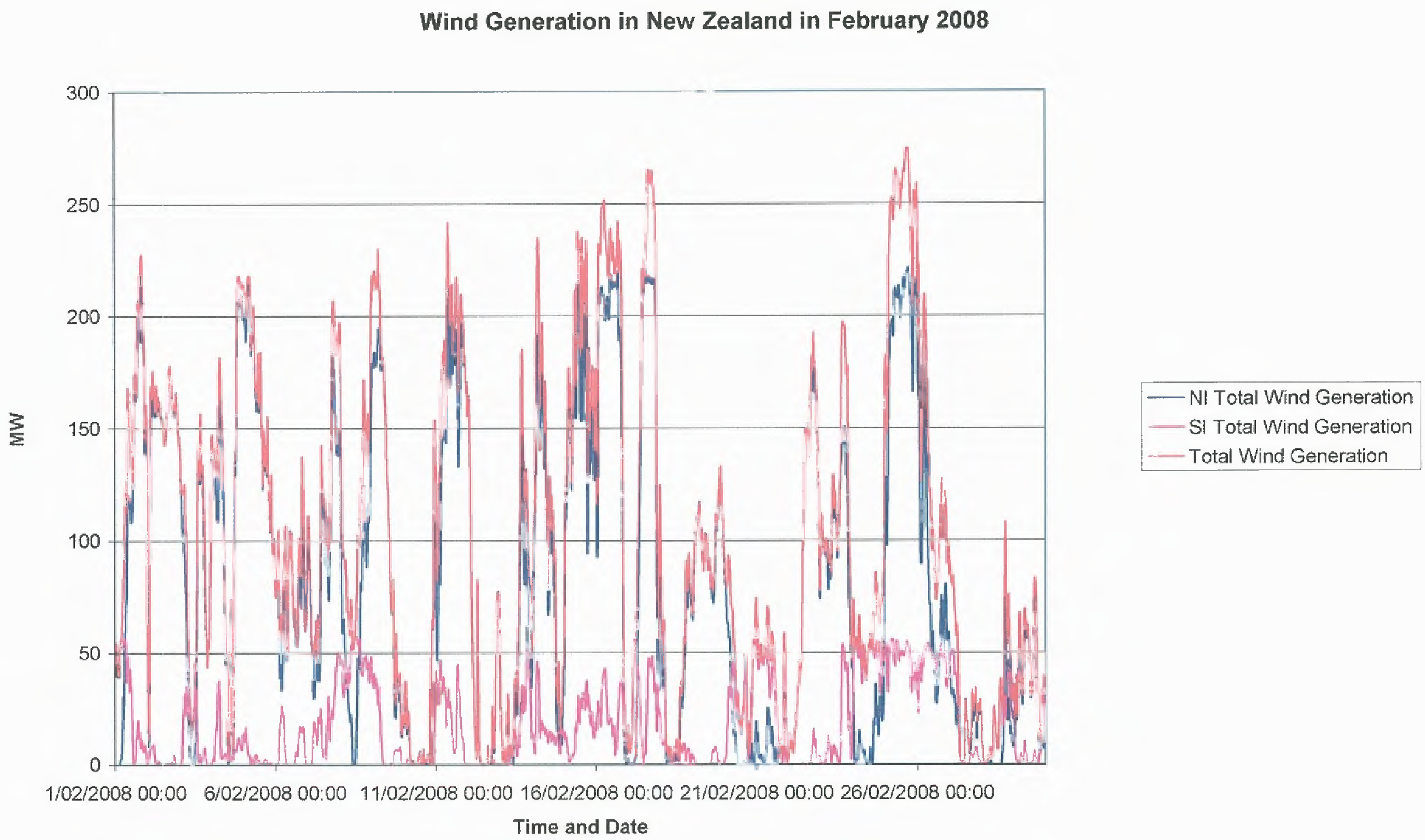
Wind Output for 14 - 21 July 2008
300
250
200
150
100
50
0
Output (MW)
14/07/2008 00:00
15/07/2008 00:00
16/07/2008 00:00
17/07/2008 00:00
18/07/2008 00:00
19/07/2008 00:00
20/07/2008 00:00
21/07/2008 00:00
Date
NI Wind Output
SI Wind Output
Total Wind Output

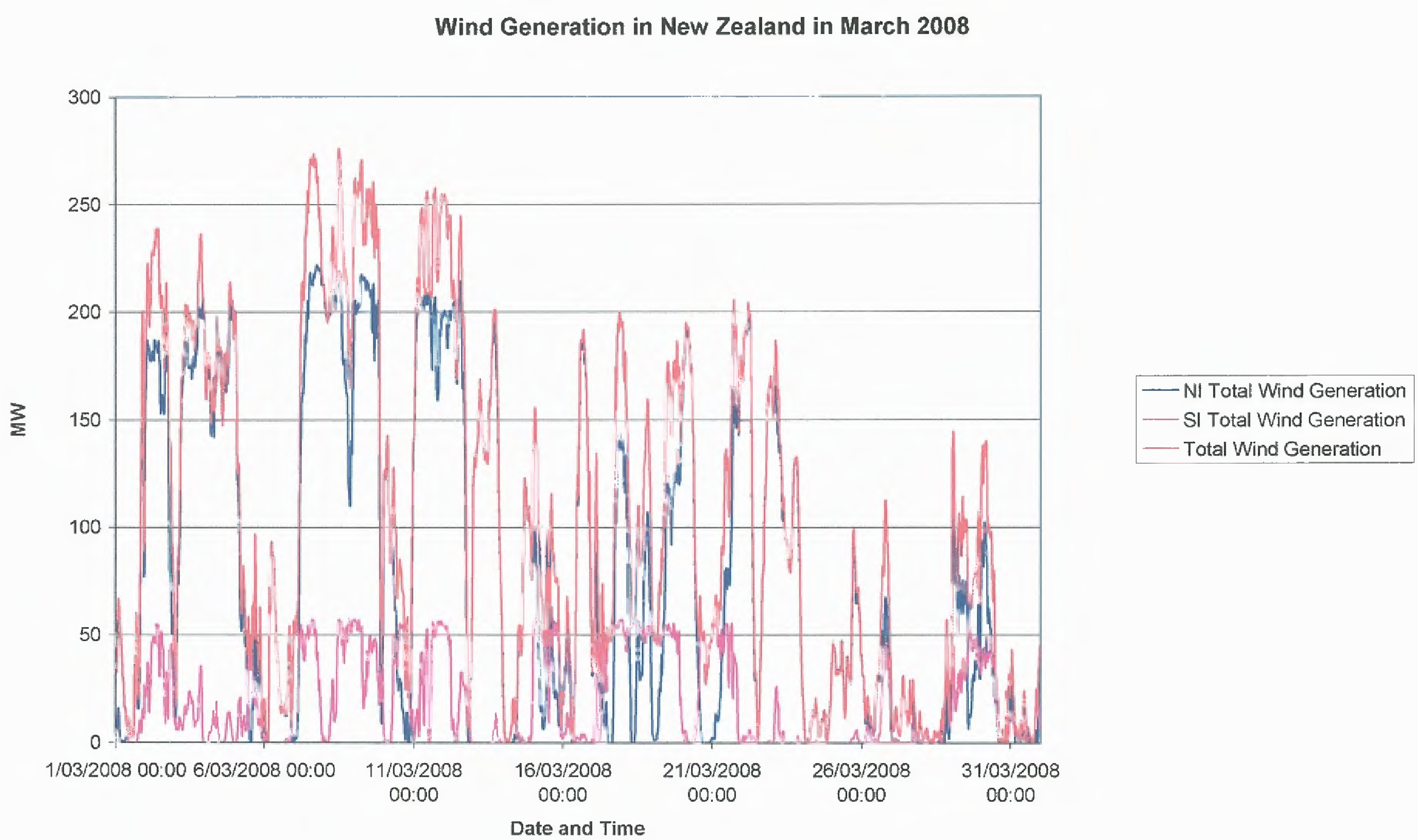


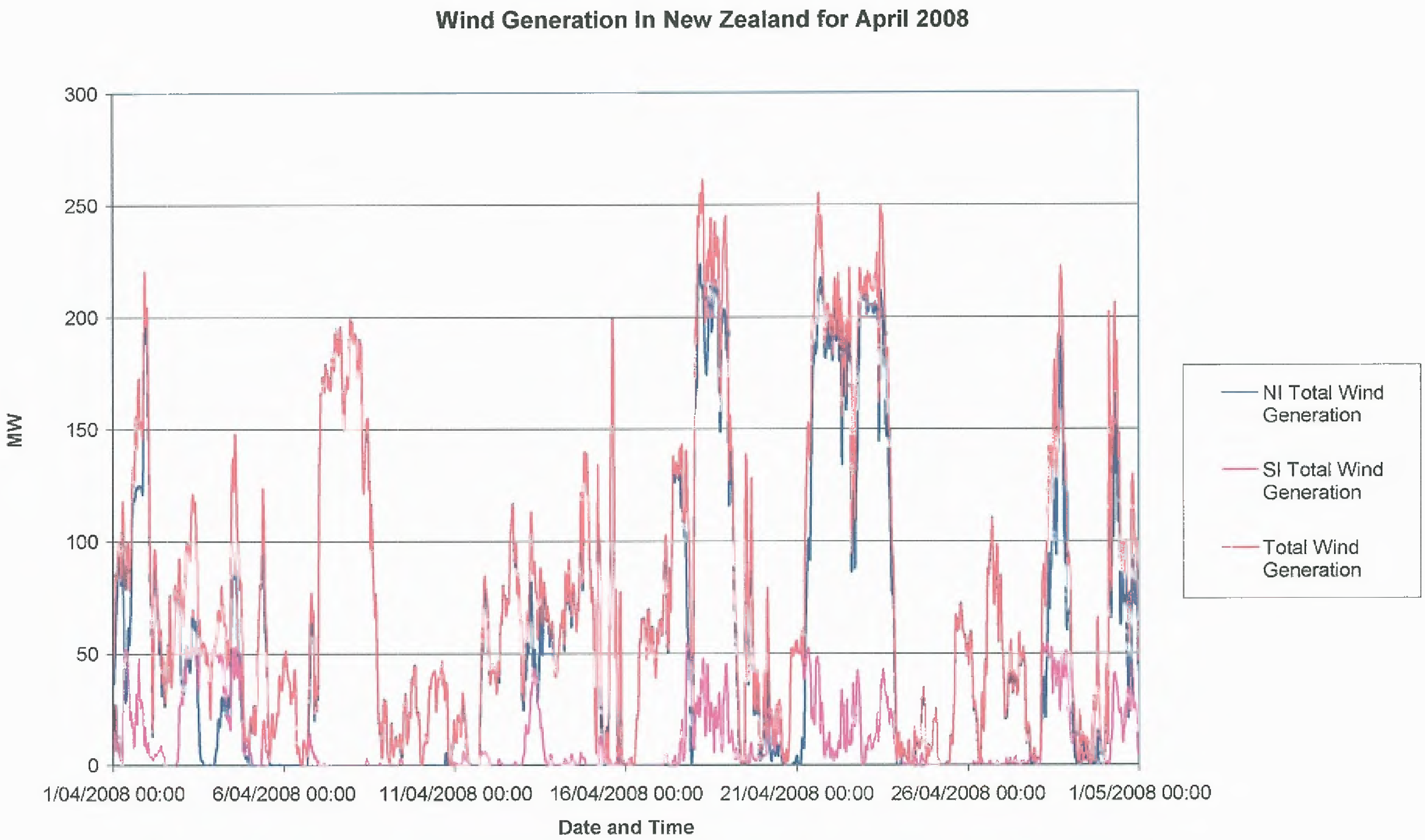
Wind Output for December 6 - 11 2008
Output (MW)
300
250
200
150
100
50
0
6/12/2008 00:00
6/12/2008 12:00
7/12/2008 00:00
7/12/2008 12:00
8/12/2008 00:00
8/12/2008 12:00
9/12/2008 00:00
9/12/2008 12:00
10/12/2008 00:00
10/12/2008 12:00
11/12/2008 00:00
Date
NI Wind Generation
SI Wind Generation
Total Wind Generation



Wind Output for January 2008
Output (MW)
300
250
200
150
100
50
0
1/01/2008 00:00
6/01/2008 00:00
11/01/2008 00:00
16/01/2008 00:00
21/01/2008 00:00
26/01/2008 00:00
31/01/2008 00:00
Date
NI Wind Generation
SI Wind Generation
Total Wind Generation

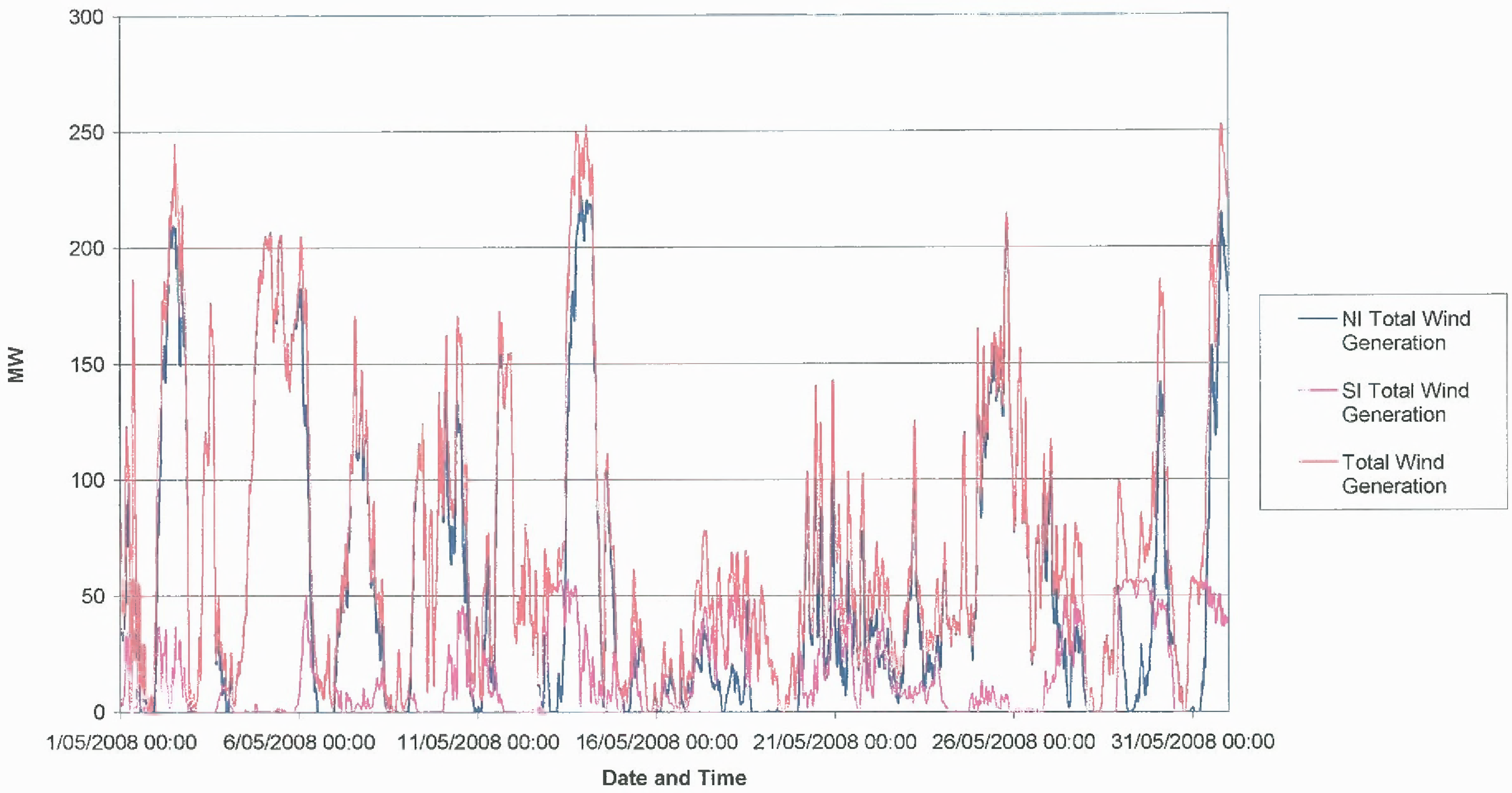

Wind Generation in New Zealand in February 2008
300
250
200
150
100
50
0
MW
1/02/2008 00:00
6/02/2008 00:00
11/02/2008 00:00
16/02/2008 00:00
21/02/2008 00:00
26/02/2008 00:00
Time and Date
NI Total Wind Generation
SI Total Wind Generation
Total Wind Generation

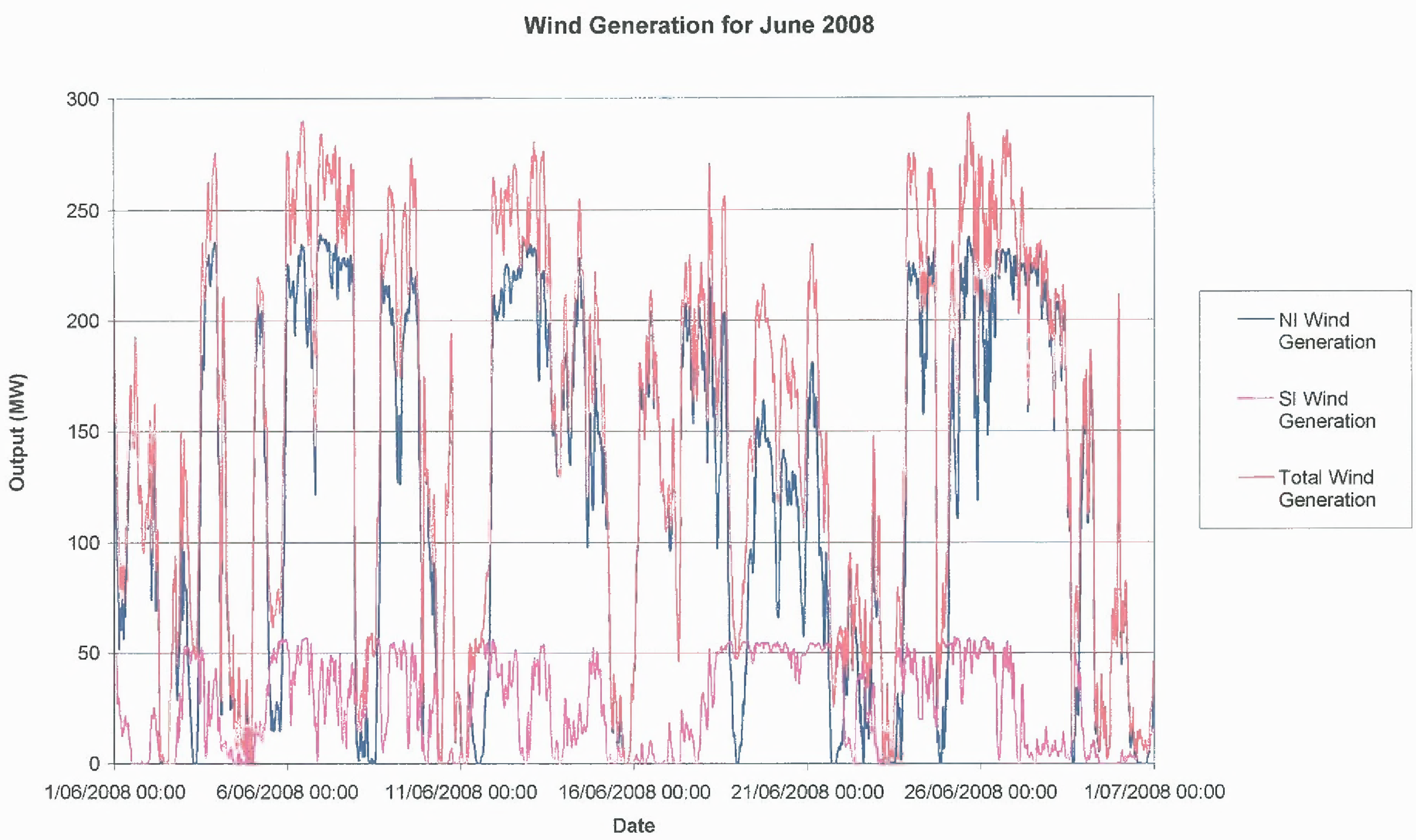

Wind Generation in New Zealand in March 2008
300
250
200
150
100
50
0
MW
1/03/2008 00:00
6/03/2008 00:00
11/03/2008 00:00
16/03/2008 00:00
21/03/2008 00:00
26/03/2008 00:00
31/03/2008 00:00
Date and Time
NI Total Wind Generation
SI Total Wind Generation
Total Wind Generation



Wind Generation In New Zealand for April 2008
MW
300
250
200
150
100
50
0
1/04/2008 00:00
6/04/2008 00:00
11/04/2008 00:00
16/04/2008 00:00
21/04/2008 00:00
26/04/2008 00:00
1/05/2008 00:00
Date and Time
NI Total Wind Generation
SI Total Wind Generation
Total Wind Generation

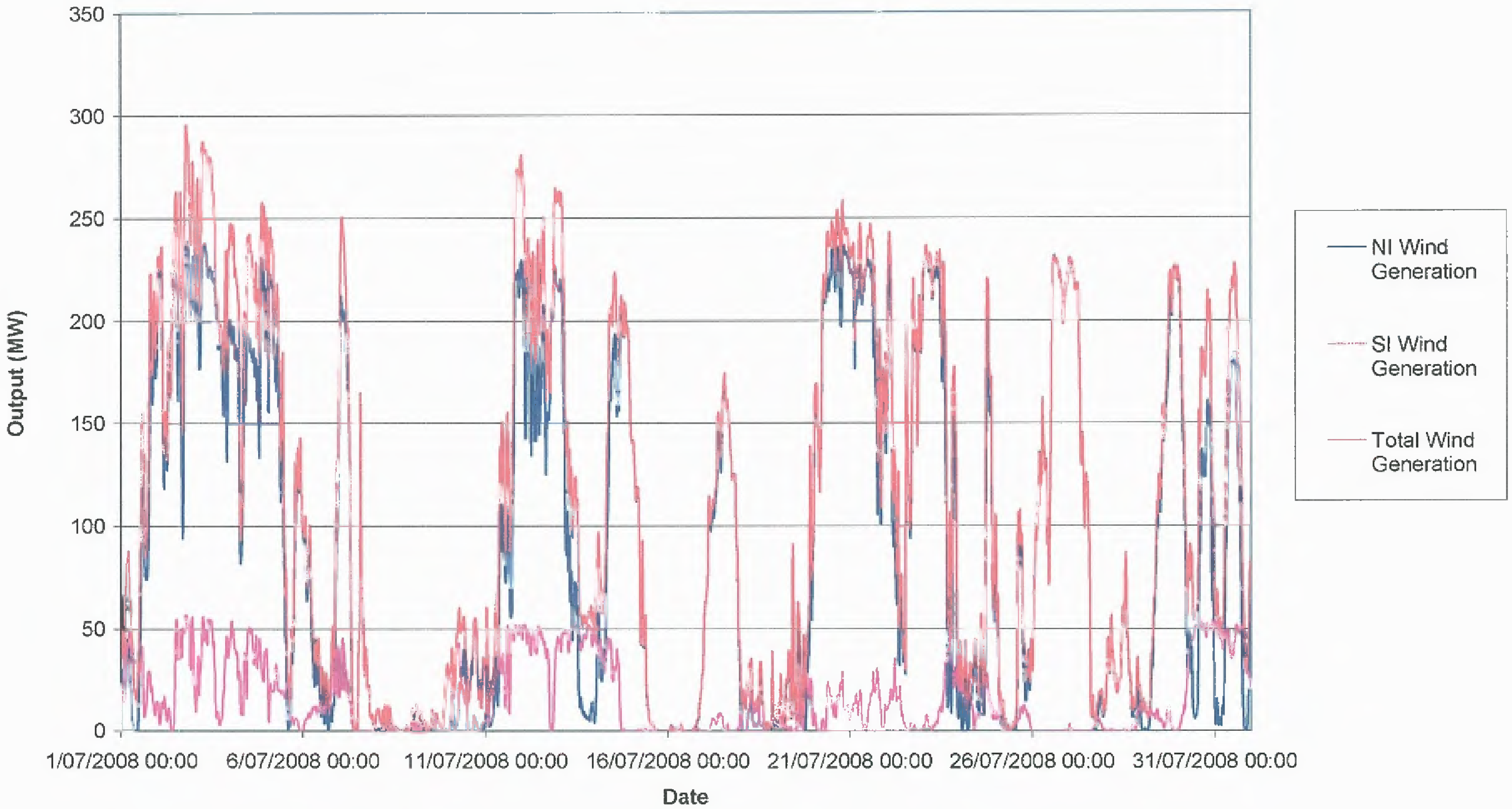
Total Wind Generation in New Zealand for May 2008

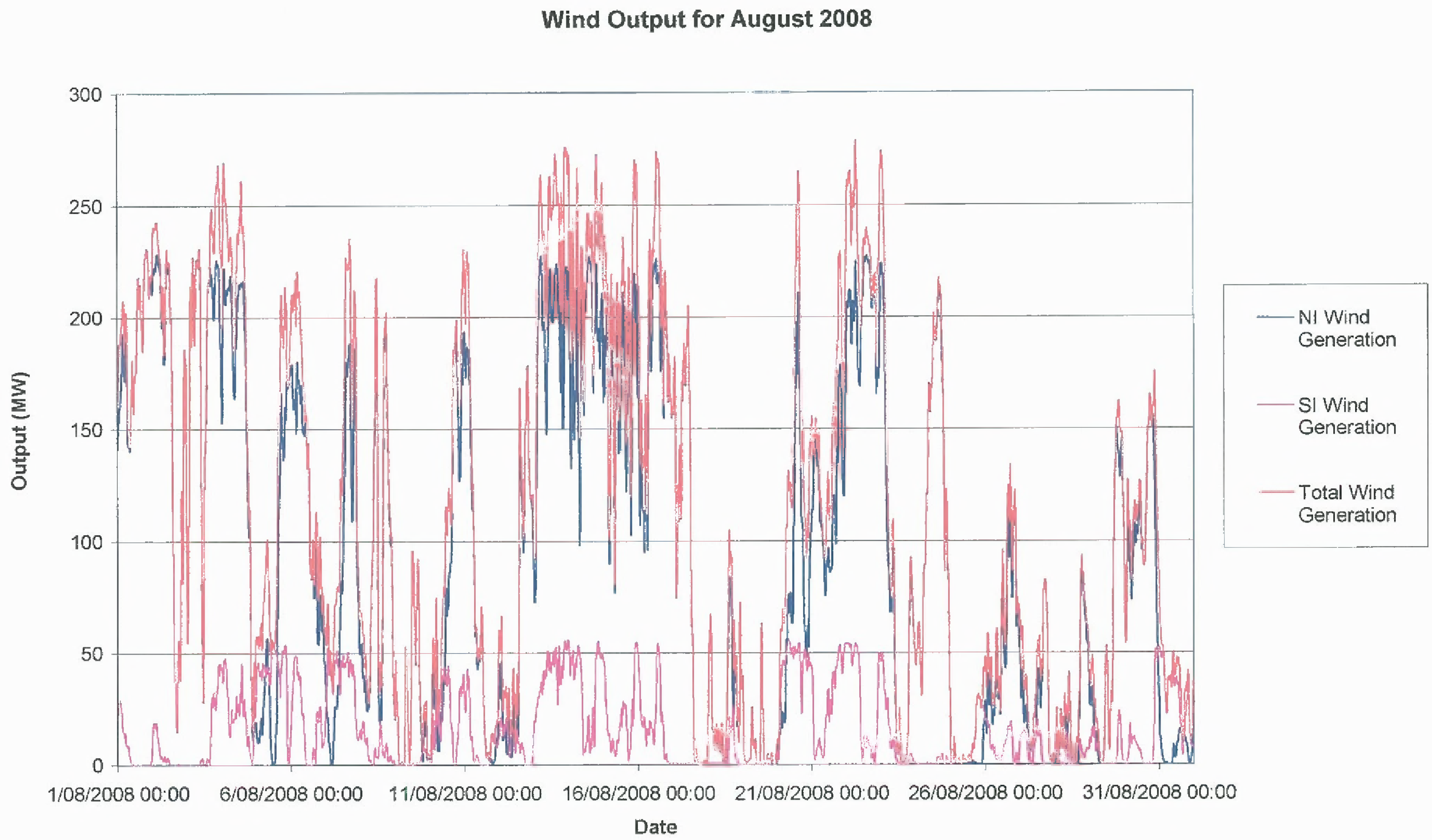




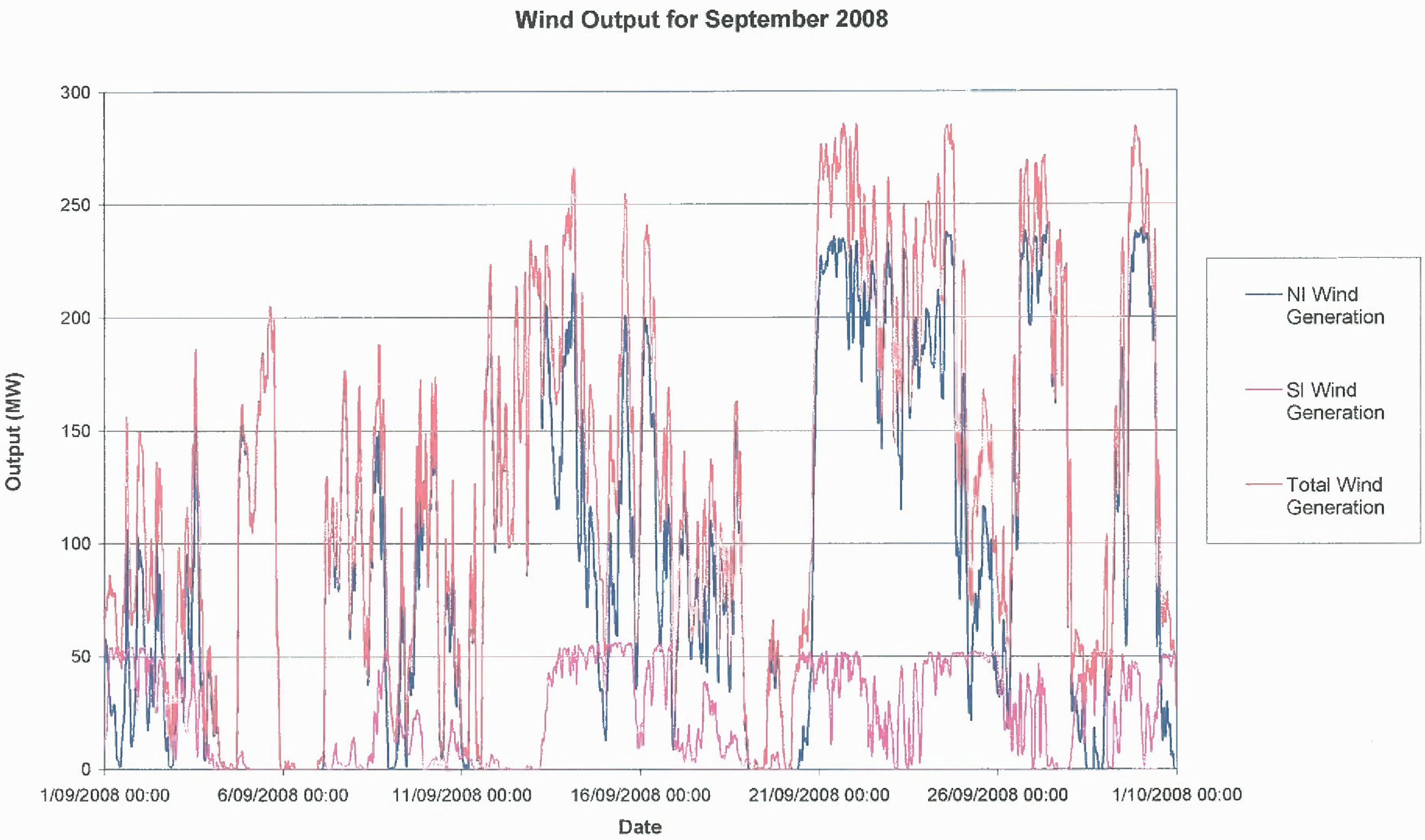
Wind Generation for June 2008
300
250
200
150
100
50
0
Output (MW)
1/06/2008 00:00
6/06/2008 00:00
11/06/2008 00:00
16/06/2008 00:00
21/06/2008 00:00
26/06/2008 00:00
1/07/2008 00:00
Date
NI Wind Generation
SI Wind Generation
Total Wind Generation

Wind Output for July 2008

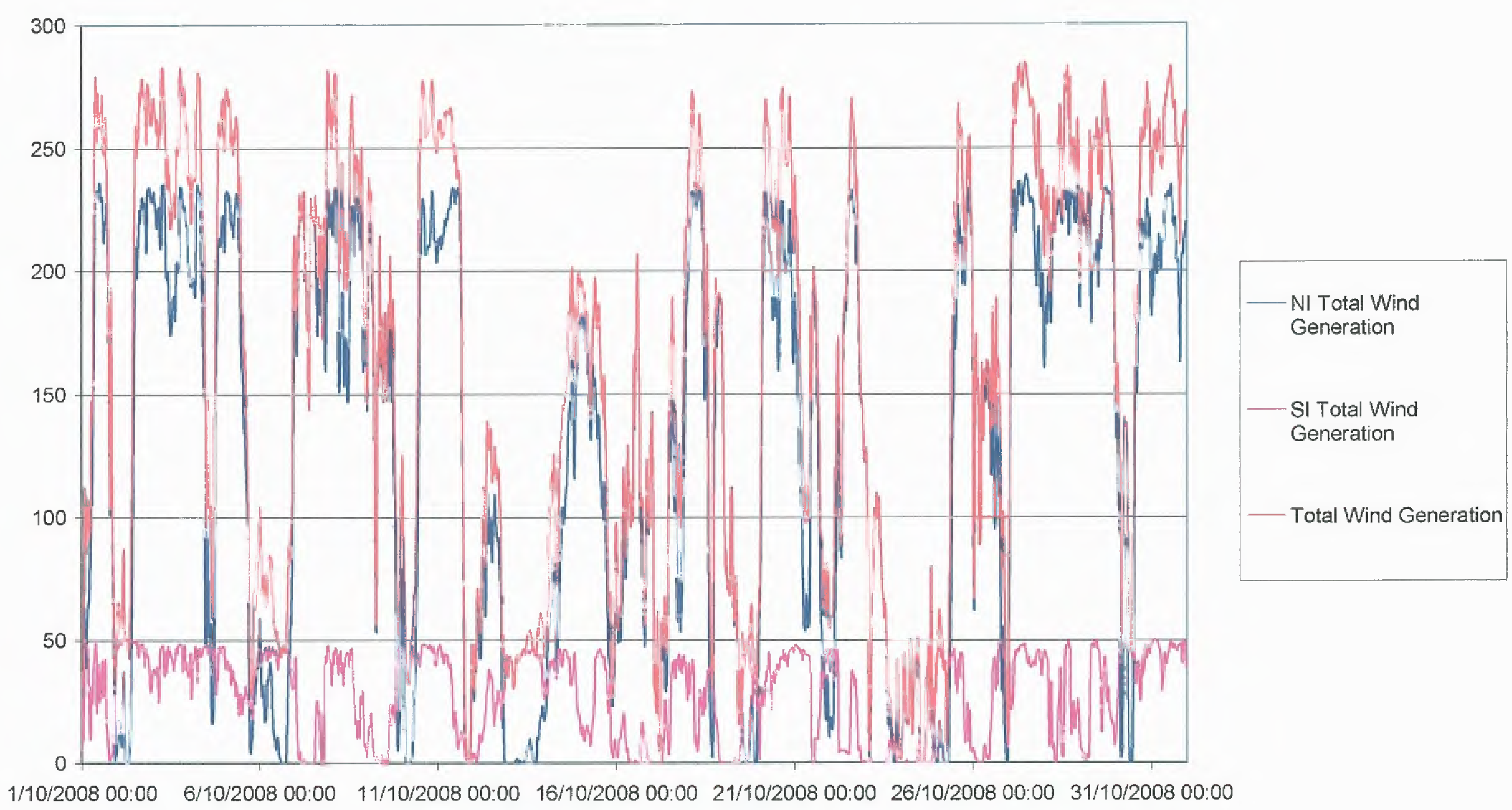




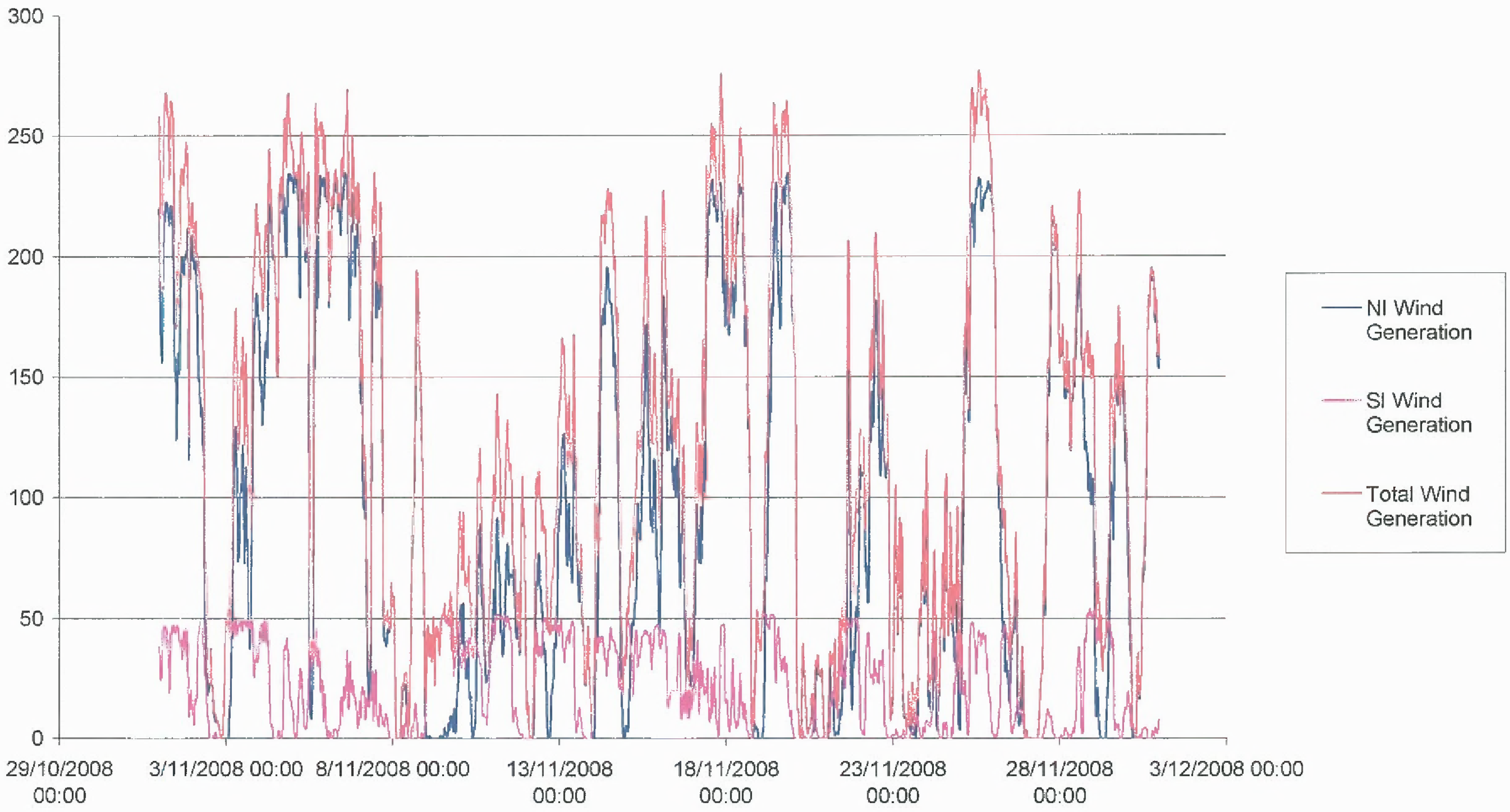
Wind Output for August 2008
Output (MW)
300
250
200
150
100
50
0
1/08/2008 00:00
6/08/2008 00:00
11/08/2008 00:00
16/08/2008 00:00
21/08/2008 00:00
26/08/2008 00:00
31/08/2008 00:00
Date
NI Wind Generation
SI Wind Generation
Total Wind Generation

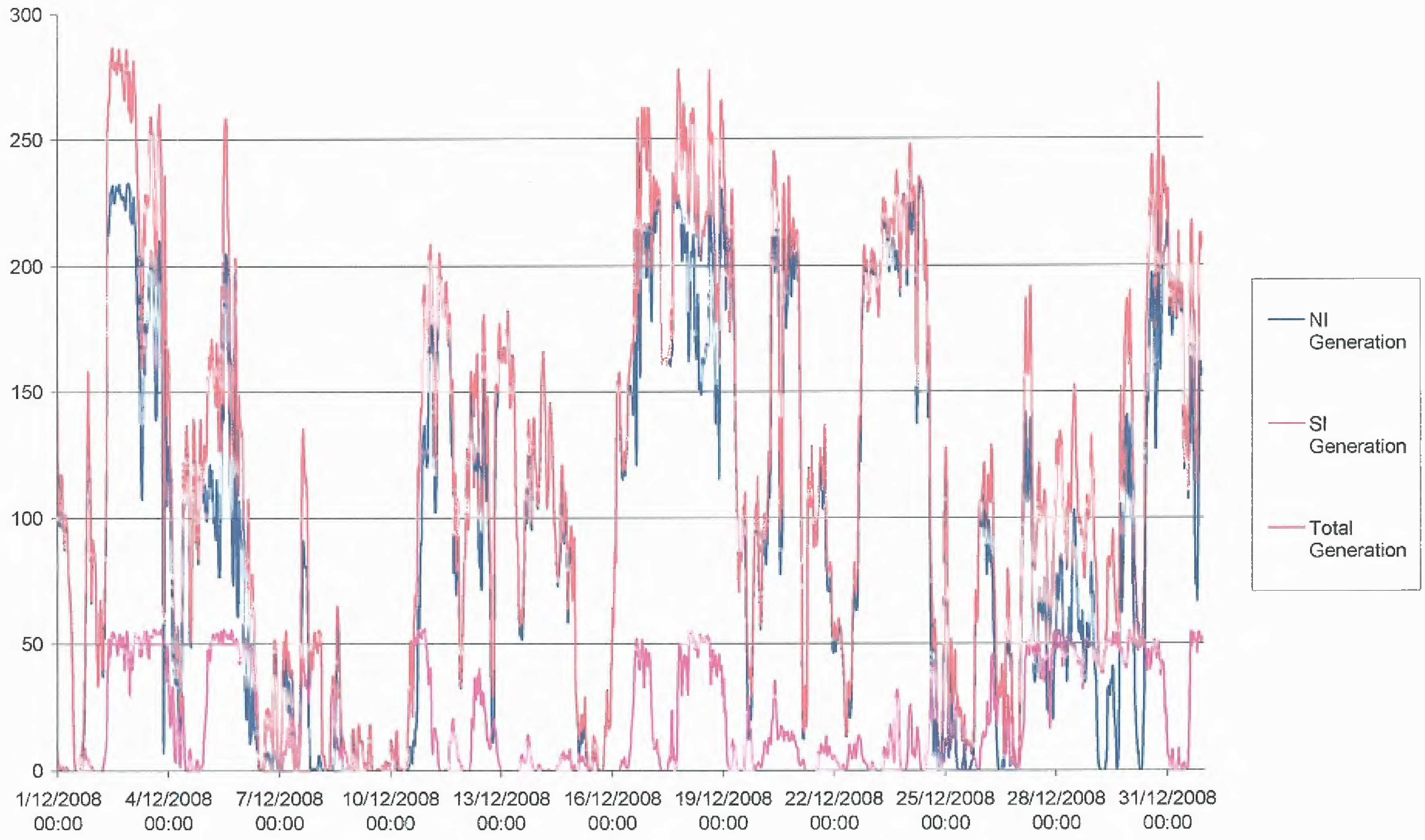

Wind Output for September 2008
Output (MW)
300
250
200
150
100
50
0
1/09/2008 00:00
6/09/2008 00:00
11/09/2008 00:00
16/09/2008 00:00
21/09/2008 00:00
26/09/2008 00:00
1/10/2008 00:00
Date
NI Wind Generation
SI Wind Generation
Total Wind Generation

Wind Generation in New Zealand in October 2008



Wind Generation in New Zealand in November 2008




300
250
200
150
100
50
0
1/12/2008 00:00
4/12/2008 00:00
7/12/2008 00:00
10/12/2008 00:00
13/12/2008 00:00
16/12/2008 00:00
19/12/2008 00:00
22/12/2008 00:00
25/12/2008 00:00
28/12/2008 00:00
31/12/2008 00:00
NI Generation
SI Generation
Total Generation

National Wind Watch

May 11, 2009
New Zealand, Opinions

Windpower: Foolish energy

The drive for renewable energy in the form of windpower, marine power and the like, is driven by a belief that man-made greenhouse gases will cause dangerous global warming and that large-scale adoption of these technologies will "fight climate change". To this end, thousands of MW of heavily subsidized wind power capacity are being added worldwide each year.

In New Zealand we are told that windpower is economic compared to alternatives, that the unpredictable short term fluctuations can easily be covered by our "abundant hydropower" and it helps conserve hydropower storage. Therefore, we are told, we should happily accept destroying iconic landscapes and seriously upsetting people who live nearby.

Compared to conventional power generation, wind has a low capacity factor (the ratio between the average output and the maximum output). Capacity factors of overseas wind farms vary from 18 — 30% while 37 — 40% is typical in New Zealand.

The truth is, as I will show, that windpower is expensive compared to alternatives, hydropower schemes have no spare capacity to back up windpower in a critical dry year and wind power output is lowest in the late summer and autumn when we need it most.

Furthermore, windpower adds a new source of major fluctuations to power systems that are, anyway, inherently unstable. Constant adjustment is needed to ensure that the total generation in a power system matches the normal fluctuations in load - seldom above 50 MW — on a minute by minute basis. If the fluctuations are excessive, the lights go out. With about 1000 MW of windpower on the system we are likely to see swings of 500 MW in a few minutes. The system operator will find it very difficult - and expensive - to find generating plant that can match these swings. The cost will be passed on to the consumers.

Windpower is seasonal. I recently analysed the output of wind farms in New Zealand since 2000. I found that the output was down 9% during the critical late summer - autumn period — when the hydro lakes are at their lowest levels — and at a maximum in the springtime when it is raining and the snow is melting. So a large amount of backup from new gas turbine stations will be needed. The cost will be passed on to the consumers.

I have calculated the cost of power generated by new wind farms such as Makara in Wellington which cost $440 million for 143 MW ($3100/kW), to be about 12 c/kWh at the station gate. Geothermal power costs about 8 cents. Generation from hydropower, gas or coal costs 8 - 10 cents. When the nuclear industry begins to mass produce new, small, sealed, inherently safe, high-temperature gas reactors, or advanced versions of existing reactors, the costs are likely to be similar.

It is often claimed that power systems like ours could run entirely from windpower and other new renewable energy technologies. The fact is that these technologies cannot provide a reliable supply unless they are associated with a low cost and efficient energy storage for periods of days, weeks and months. The best available technology is hydro pumped storage which, in general, can store energy for only about 10 hours operation. Pumped storage is neither efficient nor cheap.

To illustrate the problems and costs I carried out a "clean sheet" study of a notional power system with a peak demand of 5,000 MW at a capacity factor of 60% giving an annual energy demand of about 26,000 GWh pa. (The New Zealand system is 7000 MW and 43,000 GWh.)

I calculated the total cost of supplying the whole system from base load geothermal power combined with hydro pumped storage to meet daily load swings and compared it with windpower backed up by large scale pumped storage that would cope with the rapid swings in output of the wind farms and also store large quantities of energy in the springtime for use in the autumn.

My calculations showed that the geothermal option needed 4000 MW of geothermal plant and 2000 MW of pumped storage.

With a capacity factor of 37%, the windpower option needed 9,500 MW of windpower plus 6,000 MW of pumped storage (a total of 15,500 MW) to supply the 10,000 MW of load. At first sight, this figure looks ridiculous but the fact is that the wind farms must generate sufficient power to supply the load and to meet the 25% losses involved in pumped storage. Also the pumped storage schemes have be able to absorb all the windpower generated when the system load was low and the wind output was high.

Geothermal was costed at 4500/kW which is the generally accepted figure for stations in New Zealand. Based on investigations I have carried out into the cost of recent wind farms worldwide and confirmed by the published cost of Makara windfarm and the estimated cost of the Hayes windfarm, wind power was costed at $3100 per kW. I used a cost of $2000 per kW for the pumped storage schemes which, from my background in hydropower, is on the low side for schemes that store energy in the springtime to use in winter. For the purpose of the study I ignored that fact that, worldwide, suitable sites are as scarce as hen's teeth.

I made reasonable allowances for the cost of transmission. I made my own estimates for the costs of operation, maintenance and steam supply for the geothermal power plant and took the costs for windpower from a recent Finnish report.

My calculations showed that the geothermal powered system would cost about $24 billion and would supply power for about 9c/kWh. The equivalent wind powered system would cost about $50 billion and would supply power for about 21 cents/kWh. More than twice the cost.

The conclusion is that wind power is very expensive and large scale power supply from windpower (and other new renewable technologies), cannot be contemplated until an efficient, low-cost method of storing large amounts of electricity for long periods is discovered. I am not aware of any technology that comes anywhere near to meeting this requirement.

My comparison was for an extreme situation where all the electricity comes from windpower. In a real system, the cost of wind would vary from 12c/kWh for a very small percentage of wind power and would increase quite rapidly to a plateau cost of about 20 cents as the percentage of wind power increased.

Windpower exists worldwide because of grants, tax breaks and massive subsidies and because, consumers, taxpayers and ratepayers, not the generators, pay for the cost of transmission and backup power stations. The fact that New Zealand has an unusually good wind resource, simply means that the burden on the consumer is not as large as it is in other countries.

I believe that, given the high cost and operational problems of wind power, no responsible Board of Directors of a state-owned or private company could – or should — agree to "investing" in windpower. There are better and cheaper alternatives.

The world has been cooling since 2002. If this trend continues or deepens, there will be a worldwide $500bn crash in the value of subsidized renewable energy projects and carbon trading. Let New Zealand lead the world by studying the evidence and evaluating the risks!

Bryan Leyland

The New Zealand Centre for Political Debate Guest Forum [1]

10 May 2009

URLs in this post:
[1] The New Zealand Centre for Political Debate Guest Forum:
http://www.nzcpr.com/guest145.htm
