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**STATEMENT OF CAROLINE JANE RYDER**

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## ***Statement of qualifications and experience***

1. My full name is Caroline Jane Ryder. I am a Senior Policy Analyst in the Energy and Environment Group at the Ministry of Economic Development, a position I have held since February 2007.
2. I lead the Ministry's involvement in the proposed National Policy Statement (NPS) and in broader RMA issues. I assisted with the development of the Cabinet papers in 2007 that sought agreement from Cabinet to prepare an NPS.
3. I hold a Masters of Science degree in Resource Management from Lincoln University, a Bachelor of Science degree (ecology and zoology) and a Bachelor of Commerce and Administration degree (public policy), both from Victoria University of Wellington. I have worked in the public sector for the past seven years.
4. I am representing the Ministry, the Energy Efficiency and Conservation Authority (EECA) and the Electricity Commission. These answers were prepared by the three agencies. With me today are Simon Lawrence, Manager of the Energy Information and Modelling Group at MED, and Steve Torrens, Senior Policy Analyst with EECA and Nathan Ross, Team Manager of the Solar and Efficient Water Heating Team with EECA. I may refer questions to them to answer.

## ***Scope of statement***

5. The Board of Inquiry for the proposed NPS has requested answers from the Ministry to the following questions:
  - 5.1 In the New Zealand Energy Strategy to 2050, October 2007 it is stated at 4.6.1: "In the future, wave and tidal electricity generation are also expected to become economically viable".(p22) Have there been any studies of or projections made on:
    - 5.1.1 The timing of wave and tidal electricity generation
    - 5.1.2 the economics of wave and tidal electricity generation at the moment.

- 5.2 It is stated at 4.6.1: “We need to balance the climate change benefits of increasing renewable energy against the potential impact on the local environment. We will support this balancing act by giving consent authorities guidance on the various trade-offs involved. It is important that the public continues to have confidence that the system and processes are fair and robust.” (p23) Apart from the content of the draft National Policy Statement, what indicators or criteria can be suggested to give consent authorities guidance on the various trade-offs involved?
- 5.3 Has the information in “benefit-cost analysis of New Zealand energy sector” been updated?
- 5.4 In 5.1 it is stated: “The government has also considered a series of principles that build on New Zealand’s tradition of providing much of our energy from local renewable sources, and our goal of using resources wisely.”(p29) Are those principles to be discerned by considering the Strategy or is there a further document or study that would assist in identifying them?
- 5.5 On Table 8.1 there is a summary of planned generation projects. (p63) Is there an up-to-date summary of that in light of recent Environment Court cases?
- 5.6 At 9.3.5 of the Strategy (p8), has any work been done on financial instruments local authorities could include in their resource management policies and plans to address an increase in the use of renewable energy and increased energy efficiency and conservation?
- 5.7 There is a reference to an NPS being developed for specific types of renewable generation, such as wind and geothermal, and reviewed later to include marine energy, hydro or biomass. Can that statement (second para of page 81) be expanded on as to timing and economics of a staged approach to the implementation of national policy statements for different renewables?

- 5.8 At 9.3.6 there is reference to an action: “The EC and Transpower are developing planning processes and guidelines to co-ordinate transmission and renewables investment.”(p81) In light of the comments in 9.3 about the need for clear policy to facilitate good co-ordination between generation and transmission, have planning processes and guidelines been developed, and if so, can they be made available?
- 5.9 At 10.2, what has been the benefit of the government’s solar water heating finance assistance programme? Has that benefit been assessed as yet?
- 5.10 Regarding the 90% renewable electricity target, could the most significant considerations in arriving at the 90% target be explained?
- 5.11 What are the most critical assumptions that reaching this target depends upon?
- 5.12 The NZES’s low-carbon scenario, which appears to be broadly consistent with the 90% target, assumed a rate of technological advancement, and the introduction of carbon pricing. Could these assumptions be described and is it possible to identify and preferably quantify the broad impact of recent events such as global economic difficulties?
- 5.13 What is the likely impact of the reconsideration of New Zealand’s ETS, given that the stationary energy sector was to have entered into the ETS in Jan 2010?
- 5.14 Are there other factors which are likely to have a significant effect on the demand side of the electricity market, or on the supply side, in terms of investment in renewable electricity
- 5.15 The EC’s ‘sustainability path’ scenario is similarly broadly consistent with the 90% target. Could comment be provided on the impact of recent global events, the reconsideration of the ETS, and other factors, in relation to this path?

- 5.16 Why in Table 1 of the Section 32 report (p.12) is it expected that wind capacity will expand by (only) around 900 MW (2007-25) and biomass by (only) around 90 MW?
- 5.17 Are there any Government policy announcements or policies in preparation that are likely to have implications for the electricity sector, and that may directly or indirectly impact the NPS, that the Board should be aware of?
6. The Ministry for the Environment is the lead agency for the following two questions, and will respond directly:
- 6.1 At Box 5.1: Global Abatement Cost Curve. (p28) Has any attempt been made to undertake a cost curve of the nature shown in Box 5.1 for New Zealand?
- 6.2 What are the likely implications (for the renewable electricity NPS) of the electricity transmission NPS?

**In the New Zealand Energy Strategy to 2050, October 2007 it is stated at 4.6.1: “In the future, wave and tidal electricity generation are also expected to become economically viable” (p22). Have there been any studies of or projections made on:**

**(a) The timing of wave and tidal electricity generation?**

7. The 2008 report “Development of Marine Energy in New Zealand” contains a useful summary of the recent available knowledge and opinions on the timing of marine energy in New Zealand. This report was commissioned by EECA, the Electricity Commission and the Wellington Regional Council.
8. The report concludes with the prediction that there will be at least three demonstration projects in the water within the next three to five years, and the first commercial deployment within three to seven years. There is likely to be exponential growth once prototypes mature into commercial and cost-effective products.

9. Section 6 of the report comprehensively addresses the growth of marine energy generation including international growth, the expected growth of specific New Zealand projects, and similarities with the development of the wind energy industry. It also canvases other published opinions on forecast growth in New Zealand.
10. The report is available at: <http://www.eeca.govt.nz/eeca-library/renewable-energy/marine/report/marine-energy-in-nz-jun-08.pdf>.
11. The Electricity Commission's 2008 Statement of Opportunity (SOO), compiled for the purposes of overseeing transmission investment, outlines a number of possible generation development scenarios. It divides future projects into "highly likely" projects, which the Commission views as highly likely to be developed over the next few years and those "prospective projects" which may be developed from 2011 onwards. The prospective projects modelled include (among others) six wave projects of 50 MW (see page 90). The SOO sustainable path scenario (Appendix 6) assumes the first wave energy generation occurs in 2025.

**(b) the economics of wave and tidal electricity generation at the moment?**

12. There is little available confirmed information on the economics of marine energy generation at present, most likely because of commercial sensitivity. The EC's 2008 SOO presents a chart of estimated long run marginal cost of generation, showing the estimated cost of marine energy to be \$125 per MWh.<sup>1</sup>
13. Transpower has provided an assumed estimate of marine energy costs in its November 2008 Transmission Strategy, outlined in the table below.<sup>2</sup> It has based its estimates on information from the International Energy Agency (IEA).

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<sup>1</sup> "2008 Statement of Opportunities" Electricity Commission August 2008 p. 95

<sup>2</sup> "Transmission 2040 (Grid Development Strategy) – Workpackage 1 - Generation and Demand Scenarios consultation material" TransPower November 2008 p. 47

**Table 6-1 - Technology assumptions with costs in real \$2008**

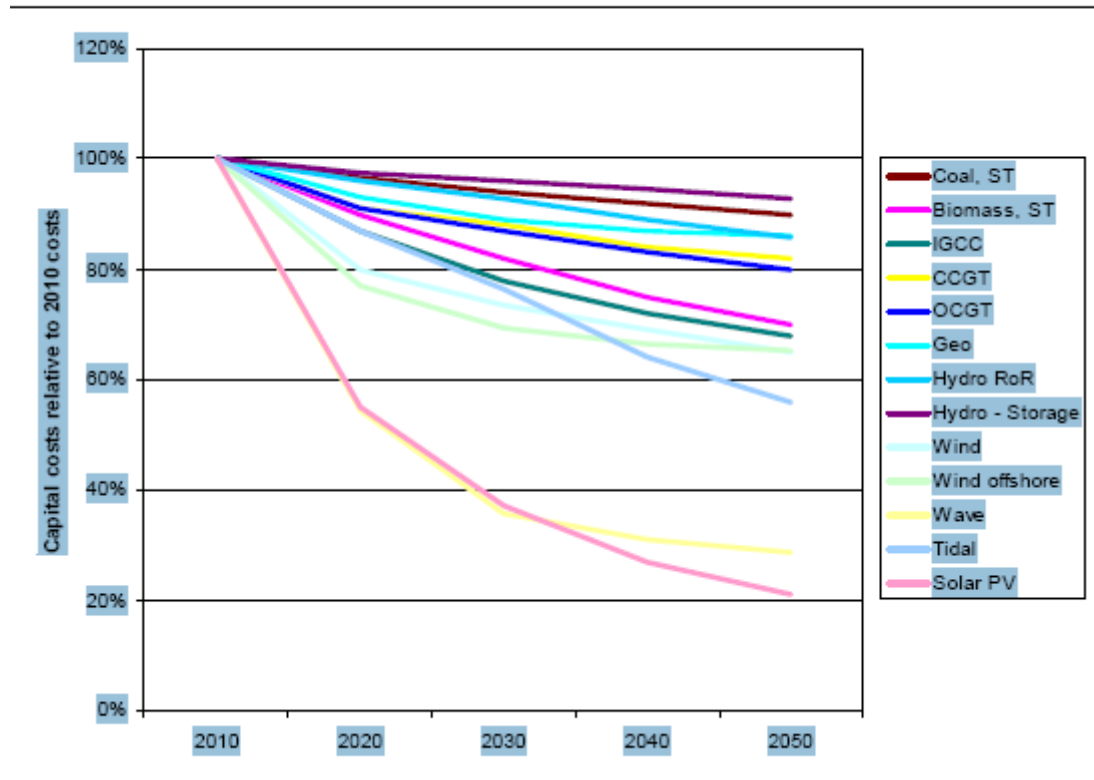
Technology	Assumed size, MW	Capacity factor, %	Heat rate, GJ/GWh	Capital cost, \$/kW	Fixed O&M, \$/kW	Variable O&M, \$/MWh
Coal	400		9500	2400	40	9
Lignite	400		10800	2460	44	10
IGCC w. CCS	400		8000	4000	50	12
CCGT	400		7050	1035	50	4
CCGT w. CCS	400		7800	1250	60	5
OCGT	150		10000	1000	40	4
Geothermal	200	95%		4000-6000	95	0
Hydro	50	50%		2000-6500	23	0
Hydro, pumping	300			3000	15	0
Wind	150	35-45%		2400-2700	0	16
Wave	50	40%		9000	0	20
Tidal	50	40%		8000	0	20

14. The Transpower strategy outlines their expectation that costs will decrease over time, as the learning rate is assumed to fall. “As the doubling of the worldwide installed capacity is faster for new technologies like solar PV and marine energy, the cost drops more quickly for those.”<sup>3</sup>
15. The table below shows the predicted cost curve (or the learning curve) for both wave and tidal energy reducing sharply over time.<sup>4</sup>

<sup>3</sup> ibid p.49

<sup>4</sup> ibid p.50

**Figure 6-5 - The capital cost adjustment used in this study to represent technological improvements**



It is stated at 4.6.1: “We need to balance the climate change benefits of increasing renewable energy against the potential impact on the local environment. We will support this balancing act by giving consent authorities guidance on the various trade-offs involved. It is important that the public continues to have confidence that the system and processes are fair and robust.” (p23) Apart from the content of the draft National Policy Statement, what indicators or criteria can be suggested to give consent authorities guidance on the various trade-offs involved?

16. It was intended that the National Policy Statement on renewables would give consent authorities guidance on the trade-offs, but at the time of drafting the NZES, it was not yet decided what form the NPS would take.
17. MED does not have a view on what indicators or criteria could be used to give consent authorities guidance.

**Has the information in “benefit-cost analysis of New Zealand energy sector” been updated?**

18. Updated model runs have been completed as part of other energy modelling activities, which gives updated projections of energy supply balances and prices. The cost/benefit analysis in the report has not been updated.

**In 5.1 it is stated: “The government has also considered a series of principles that build on New Zealand’s tradition of providing much of our energy from local renewable sources, and our goal of using resources wisely.”(p29) Are those principles to be discerned by considering the Strategy or is there a further document or study that would assist in identifying them?**

19. The NZES was based on two principles:
- 19.1 Investment should occur in energy efficiency measures where this is cheaper than the long-term costs of building extra generation capacity, including environmental costs
- 19.2 For the foreseeable future, it is preferable that all new electricity generation be renewable, except to the extent necessary to maintain security of supply.
20. The government has since indicated that it will review the NZES to refocus it on security of supply, affordability, and environmental responsibility, with the overriding goal of maximising economic growth.

**On Table 8.1 there is a summary of planned generation projects. (p63) Is there an up-to-date summary of that in light of recent Environment Court cases?**

21. Please see Appendix 1.

**At 9.3.5 of the Strategy (p8), has any work been done on financial instruments local authorities could include in their resource management policies and plans to address an increase in the use of renewable energy and increased energy efficiency and conservation?**

22. As far as MED is aware, no work has been done on financial instruments to encourage renewables and energy efficiency and conservation at a council level. Other countries use incentives such as feed-in tariffs to encourage renewables, but

New Zealand's policy is to not distort the electricity market through the use of feed-in tariffs or other subsidies. In any case, such an initiative should come from government, not local government.

23. EECA works with councils to encourage renewables and energy efficiency, but their work has been more focused on advocacy, providing information and supporting councils. As an action in the New Zealand Energy Efficiency and Conservation Strategy, MED and EECA support the development of council energy strategies and RMA plan and policy making (typically through submissions and through providing information).

**There is a reference to an NPS being developed for specific types of renewable generation, such as wind and geothermal, and reviewed later to include marine energy, hydro or biomass. Can that statement (second para of page 81) be expanded on as to timing and economics of a staged approach to the implementation of national policy statements for different renewables?**

24. At the time the NZES was written, Cabinet had agreed to prepare an NPS but it had not been determined what form the NZES would take. Two possible options were outlined: one that set out the government's position on the national significance on renewable energy, and an alternative that would contain specific policies for specific types of generation.
25. Following feedback from stakeholders, Cabinet decided in March 2008 that the NPS would cover all generation types. One of the reasons for this was the desirability of having an NPS that would cover emerging renewable technologies, such as marine energy.

**At 9.3.6 there is reference to an action: “The EC and Transpower are developing planning processes and guidelines to co-ordinate transmission and renewables investment.”(p81) In light of the comments in 9.3 about the need for clear policy to facilitate good co-ordination between generation and transmission, have planning processes and guidelines been developed, and if so, can they be made available?**

26. The Transmission to Enable Renewables (TTER) is an Electricity Commission-led project to:

26.1 Enable participants to better understand how the current framework (in particular section III of Part F of the Electricity Governance Rules 2003) can be utilised to support the integration of renewables

26.2 Provide an up-to-date “map” of potential renewable locations and potential renewable fuel source sizes (wind, hydro and geothermal), which can be factored into:

26.2.1 The next Statement of Opportunities

26.2.2 Transpower’s 2009 Annual Planning Report

26.3 Investigate the possible economic transmission investments that Transpower could put forward for approval under Part F of the rules to support the development of renewable generation.

27. Phase 1 the TTER is complete. The final report is available at: <http://www.electricitycommission.govt.nz/pdfs/opdev/transmis/renewables/TTER-Final-report.pdf>.

28. In February 2009, the Commission initiated phase 2 of the TTER project. Phase 2 includes looking at new technologies which have the potential to reduce transmission barriers, enabling more efficient renewable generation uptake. The project will include the further development of the Commission’s generation expansion model to help rank renewable generation regions from an overall cost perspective. The outputs of this project will be used to investigate possible refinements to the regulatory framework which would result on overall benefits to

consumers. The Commission anticipates consulting with interested parties in late 2009.

29. In addition, in June 2008 the EC has published the Grid Upgrade Investment Review Policy (GUIRP). This document has been jointly prepared by Transpower and the Commission. The GUIRP has been approved by the EC and has been endorsed for use by Transpower by the Transpower Board. This document has:

29.1 Improved certainty around the timing of key steps in the grid upgrade approval process

29.2 Improved the timeliness of the grid upgrade approval process

29.3 Improved the predictability of the outcomes from the grid upgrade approval process

29.4 Promoted the efficient use of resources, including those of Transpower, the Commission and its consultants, and other stakeholders

29.5 Promoted role clarity between Transpower, the Commission and other stakeholders

29.6 Differentiated between, but remained applicable to, small, medium, large and amended investments;

29.7 Applied to both reliability and economic investments;

29.8 Clarified assumptions likely to be common to most proposals; and

29.9 Has improved the grid upgrade process going forward.

30. This document is available at:

<http://www.electricitycommission.govt.nz/opdev/transmis/gridupgradepolicy/?searchterm=GUIRP>

31. The SOO/APR/GUIRP are intended to help ensure that Transpower's investment processes align with where new generation is expected to be built.

**At 10.2, what has been the benefit of the government's solar water heating finance assistance programme? Has that benefit been assessed as yet?**

32. The solar water heating (SWH) programme will be reviewed and reported to the Minister of Energy and Resources in September 2009.
33. However, since 2006 when the programme was set up:
  - 33.1 Product standards for SWH have been amended and improved
  - 33.2 NZQA-recognised SWH installation training courses were developed and funded
  - 33.3 Some installations of SWH were audited
  - 33.4 EECA has provided independent information to the public on SWH performance
34. Uptake of grant funding has been mixed. Three funding rounds of an 'Innovation Fund' exceeded expectations with \$3m in funding allocated for over 80 projects. Projects covered both SWH and Heat Pump Water Heaters and included a range of commercial and residential installation projects as well as training and research based projects.
35. Uptake of three finance schemes targeting residential SWH installations was very low from the launch of the schemes in May 2007 through to September 2008. The main reason for this low uptake was identified as the inclusion of cost effectiveness as eligibility criteria for financial assistance. This criterion was removed in September 2008 and has resulted in increased uptake. Residential grants increased from 10 grants per month from May 2007 to September 2008, to over 140 per month in January and February 2009.

36. It is estimated that by the end of 2007, there were 36,600 systems installed in NZ, with 120,200m<sup>2</sup> of collector area resulting in an avoidance of 84GWh of electricity<sup>5</sup>.
37. SWH Industry Installations fell from 4200 (10.5 GWh/pa<sup>6</sup>) in 2006/2007 to 3400 (8.5 GWh/pa) in 2007/2008. This decline is attributed to:
- 37.1 A lack of uptake of financial assistance through the residential schemes
  - 37.2 A decline in the new build housing market during the later part of 07/08 and 08/09
  - 37.3 Negative publicity regarding quality (discolouration) issues.
38. Recent industry figures have indicated that the SWH market may be beginning to grow following the removal of the cost effectiveness criteria on the residential schemes in September 2008, although the impact of the recession and reduction in new build housing (a key market for SWH) is yet to be fully assessed.
39. It is estimated that approximately 70% of installations that receive funding assistance through the Government's SWH programme are in addition to business as usual installations. As a result, the programme is likely to be lessening the negative impact of the recession on the solar industry.

**Regarding the 90% renewable electricity target, could the most significant considerations in arriving at the 90% target be explained?**

40. The intent was to establish a challenging but achievable target for renewable electricity generation in New Zealand. The level chosen reflected New Zealand's large endowment of relatively low-cost renewable generation opportunities and assumes normal hydrological conditions. The model run that suggested such an outcome would be achieved with a \$50 emissions price and gas price of \$9/GJ<sup>7</sup>.

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<sup>5</sup> Source: Solar Industries Association -

<http://www.solarindustries.org.nz/documents/About%20SIA/SWH%20market%20statistics.pdf>

<sup>6</sup> Estimate 2500 kWh/pa savings per SWH system

<sup>7</sup> Current gas prices are around \$6-7/GJ. LNG could be anything from \$10/GJ to \$35+ depending on oil prices and exchange rate.

These assumptions are external inputs and not in themselves the result of specific government policies.

41. Modelling considered a range of different proportions of renewable electricity. Higher proportions of renewables above 90 percent were found to attract significant additional costs. As some renewables are intermittent, a higher level of generation capacity would be required to meet dry-year and peak-security constraints.

**What are the most critical assumptions that reaching this target depends upon?**

42. Achieving the target relies on the vast majority of new baseload electricity generation investment being renewable, and significant reduction in output from the coal-fired units at Huntly. The assumptions required for this to happen are as noted in the previous answer.

**The NZES's low-carbon scenario, which appears to be broadly consistent with the 90% target, assumed a rate of technological advancement, and the introduction of carbon pricing. Could these assumptions be described and is it possible to identify and preferably quantify the broad impact of recent events such as global economic difficulties?**

43. These assumptions are set out in detail in “New Zealand Energy Strategy Low Carbon Energy Scenario”, available at:  
<http://www.med.govt.nz/upload/52210/Low-Carbon-Energy-Scenario.pdf>.
44. Some examples of assumptions include:
  - 44.1 500MW of a future generation technology available from 2045
  - 44.2 Carbon capture and storage (CCS) becomes available from 2020
  - 44.3 750MW of demand-side reduction initiatives are introduced
  - 44.4 Diesel vehicles represent 50% of all vehicle purchases by 2050
  - 44.5 50% of base case dairy coal use switched to gas after 2010.

45. No comprehensive analysis of recent global difficulties has been undertaken. However, in broad terms, the recent movements in the exchange rate have adversely affected the relative economics of the more capital intensive electricity generation options – which are generally renewable. Generators have informally reported that it has been more difficult raising capital. On the flip side, generators have reported that demand for turbines and other materials is not as competitive as previously.
46. Electricity demand growth rates have also been revised upwards since completion of the Low Carbon Scenario, which results in a higher level of new generation investment required to meet demand (this revision of growth rates is not due to economy conditions, but revision of the forecasting model).
47. Future technologies that were not fully taken into account in the Low Carbon Scenario included:
  - 47.1 The emergence of solar photovoltaic and other renewable distributed generation technologies
  - 47.2 The development of new electricity storage technology, such as vanadium redox flow batteries
  - 47.3 Electric vehicles, which may have the capability to send electricity back into the grid in times of peak demand.

**What is the likely impact of the reconsideration of New Zealand’s ETS, given that the stationary energy sector was to have entered into the ETS in Jan 2010?**

48. The impact of emissions pricing in stationary energy is generally to alter longer term investment decision-making by altering the economics of various fuel choices. Delaying introduction by a year or so therefore has a fairly minor impact.

**Are there other factors which are likely to have a significant effect on the demand side of the electricity market, or on the supply side, in terms of investment in renewable electricity?**

49. We have no information to suggest that demand growth will greatly deviate from its current forecast rate. Establishment, or closure, of electricity-intensive industry could have a material impact on electricity demand, but we can only speculate about such changes. Electric vehicles are unlikely to be significant before 2025.
50. Significant effects on the supply side are more likely. For example, fuel input prices, exchange rate movements and the international price of steel all impact on the relative costs of new generation options. As renewable options are, in general, more capital intensive and reliant on internationally sourced materials, the recent movements in the exchange rate and cost of materials have tilted the economics towards thermal options.
51. The domestic gas price is also a significant factor. Most recent information suggests that the domestic gas price could reach import parity by around 2019. This change greatly favours renewable options. Higher emissions prices would reinforce this shift.

**The EC's 'sustainability path' scenario is similarly broadly consistent with the 90% target. Could comment be provided on the impact of recent global events, the reconsideration of the ETS, and other factors, in relation to this path?**

52. As discussed above, movements in the exchange rate and the international steel price, and updated gas price assumptions, will have altered the relative economics of different options within the 'sustainability path'.

**Why in Table 1 of the Section 32 report (p.12) is it expected that wind capacity will expand by (only) around 900 MW (2007-25) and biomass by (only) around 90 MW?**

53. The Electricity Commission's Statement of Opportunities (SOO) outlines when it expects generation to be commissioned or decommissioned. We are unable to reconcile Table 1 with Appendix 6 of the 2008 SOO as Table 1 appears to contain errors and the errors are inconsistent. As an example, Table 1 appears to have superimposed the installed capacity for wind and geothermal for 2007.

54. Below is a table comparing Table 1 and the Energy Data File (2007 Calendar year edition) and projects outlined in Appendix 6 of the SOO for generation up to and including 2025. The SOO only considers grid-connected generation; hence the difference in figures between the Energy Data File and the SOO for 2007.

55. The Energy Data File does not distinguish diesel from oil. The original Table 1 did not specify coal.

	Gas/coal	Oil/Diesel	Hydro	Wind	Geothermal	Biomass	Marine	Total
Table 1 installed capacity 2007	2,959	156	5,346	434	322	130	0	9,347
EDF Installed capacity 2007	2,700	155	5,366	322	450	140	0	9,133
EC SOO 2008 in 2007	2436	155	5133	309	406	40	0	8479

Table 1 Installed capacity 2025	1,414	1,206	6,378	1,374	1,750.5	220	50	12,393
EC SOO 2008 (using EDF as base)	1,636	1,055	6,419	2,227	1,368	280	50	13,185

**Are there any Government policy announcements or policies in preparation that are likely to have implications for the electricity sector, and that may directly or indirectly impact the NPS, that the Board should be aware of?**

56. Relevant government initiatives include:

56.1 Review of the NZES. This will refocus the NZES on security of supply and economic development. No change is expected to the 90 percent renewable electricity target.

56.2 Review of the electricity sector. The review would look at security of supply, electricity affordability and the duplication of sector governance.

56.3 RMA reforms, including:

56.3.1 RM Amendment Bill 2009

56.3.2 Establishment of an Environmental Protection Authority

56.3.3 Freshwater management

56.4 Review of the emissions trading scheme.

57. The Ministry for the Environment is the lead agency for the RMA reforms and the review of the emissions trading scheme.

15 April 2009

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Caroline Ryder

## Appendix 1: New Zealand Electricity Developments Report – as at 8 April 2009

### Renewable Electricity Generation Developments

#### Wind

##### Under construction

Name	Developer	Region	Earliest Commissioning Date	Capacity (MW)
Te Rere Hau (Part 2)	NZ Windfarms	Manawatu	2009	14
West Wind	Meridian	Wellington	2009	143
Horseshoe Bend	Pioneer Generation	Central Otago	2009	2.25
<b>TOTAL</b>				<b>159</b>

##### Consented

Name	Developer	Region	Status	Earliest Commissioning Date	Capacity (MW)
Kaiwera Downs	Trustpower	Southland	Consented, after appeal		240
Titiokura	Unison	Hastings	Consented, after appeal	2010	48
Motorimu	Allco Wind Energy	Manawatu	Consented, after appeal, but less turbines	2010	68
Te Pohue wind farm	Hawkes Bay Wind Farm	Hastings	Consented, after appeal	2011	225
Mahinerangi	Trustpower	Otago	Consented, after appeal	2011	200
Te Uku	WEL Energy	Waikato	Consented, after appeal - construction Oct 09	2011	84
Taumatotara	Ventus	Waikato	Consented, but on hold	2015	20
Te Rere Hau (Part 3)	NZ Windfarms	Manawatu	Consented	2015	17
Te Rere Hau (Part 4)	NZ Windfarms	Manawatu	Consented	2015	15
Awhitu	Genesis	Franklin	Consented, after appeal, but on hold	2015	18
<b>TOTAL</b>					<b>935</b>

##### Applied for consent

Name	Developer	Region	Status	Capacity (MW)
Central Wind	Meridian	Rangitikei and Ruapehu	Consented, but appealed	130
Hauāuru mā raki	Contact	Waikato	In process – called-in	540
Mill Creek	WindCorp / Meridian	Wellington	Consented, but appealed	71
Mount Stuart	NZ Windfarms	Otago	In process	20
Project Hayes	Meridian	Central Otago	Consented, but appealed	630
Taharoa	Taharoa C Inc.	Kawhia	Consented, but appealed	100
Turitea	Mighty River Power	Manawatu	In process – called-in	360
Waverley Wind Farm	Allco Wind Energy	South Taranaki	In process – but on hold	135
<b>TOTAL</b>				<b>1986</b>

## Proposed

Name	Developer	Region	Status	Capacity (MW)
Puketiro	RES NZ Ltd / Greater Wellington Regional Council	Wellington	Consents expected to be lodged this year	90
Slopedown Wind Farm	Wind Prospects CWP	Southland (Wyndham)	Consents to be lodged April 09	150
Windy Peak	NZ windfarms/Powerco	Wairarapa	May be operating by 2011	N/A
Long Gully	Mighty River Power	Wellington	Consents to be lodged mid 2009	20
Pori	Allco Wind Energy	Manawatu	New Project	80
<b>TOTAL</b>				<b>340</b>

## Declined Consent

Name	Developer	Region	Status	Capacity (MW)
Te Waka	Unison	Hastings	Second application. "Called in" to the Environment Court and declined.	102
Waitahora	Contact Energy	Southern Hawkes Bay	Declined, expected to be appealed	177
Mt Cass	Mainpower	North Canterbury	Declined, expected to be appealed	41-69
<b>TOTAL</b>				<b>320</b>

## Hydro

### Completed 2008

Name	Developer	Region	Completion	Capacity (MW)
Monowai 3	Pioneer Generation	Central Otago	Jan-08	0.6
Manapouri efficiency Upgrade	Meridian Energy	Otago	Mar-08	18
Mangaio	Genesis Energy	Manawatu/Wanganui	Aug-08	2
Deep Stream	Trustpower	Otago	2008	6
<b>TOTAL</b>				<b>27</b>

### Under construction

Name	Developer	Region	Earliest Commissioning Date	Capacity (MW)
Waipa	Hydro Energy Ltd	Waikato	2008	7
Fox Upgrade	New Zealand Energy	West Coast	Feb-09	0.6
Raetihi Upgrade	New Zealand Energy	West Coast	Oct-09	0.3
Benmore efficiency upgrade	Meridian Energy	Otago	Dec-10	11
<b>TOTAL</b>				<b>19</b>

### Consented

Name	Developer	Region	Lodged	Status	Capacity (MW)
Hawea Gates (retrofit)	Contact Energy	Otago	2007	Design work in 2008 and built by 2012	17
Lake Rochfort Hydro Project	Kawatiri Energy	West Coast	2005	Consented	4
<b>TOTAL</b>					<b>21</b>

### Applied for consent

Name	Developer	Region	Lodged	Status	Capacity (MW)
Arnold Scheme	Trustpower	West Coast	2007	Consent Appealed	46
North Bank Tunnel	Meridian Energy	Otago	2007	In Process	210
Teviot - Marslin	Pioneer Generation	Otago - near Roxburgh	2008	Non-notified consents applied for - com Feb-10	1.9
Wairau	Trustpower	Marlborough	2004	Consented, but under appeal (due Nov 09)	72
Mokihinui	Meridian Energy	West Coast	2008	In Process	100
Matiri River	NZ Energy	Buller	2008	In Process	6
Mokau river	King Country Energy	King Country	2008	Consent Appealed	10
Stockton Plateau	Hydro Developments Ltd	Westland	Nov-08	In Process	25
Rakaia River	Ashburton Community Water Trust	Mid Canterbury	Nov-08	In Process	16
<b>TOTAL</b>					<b>487</b>

## Proposed

Name	Developer	Region	Status	Capacity (MW)
Nihotupu Hydro	Watercare services	Auckland	To be commissioned Dec-09	0.03
Upper Kaituna Hydroelectric	Bay of Plenty Energy	Rotorua	DoC concessions granted, applying for consents	13.5
Clutha: Luggate	Contact Energy	Roxburgh-Twizel circuit	Unknown	99
Clutha: Queensberry Hills	Contact Energy	Roxburgh-Twizel circuit	Unknown	180
Clutha: Tuapeka	Contact Energy	Roxburgh	Unknown	340
Clutha: Beaumont	Contact Energy	Roxburgh	Unknown	190
Manapouri Tailrace Amended Discharge	Meridian	Fiordland	Seeking Resource Consent – not yet applied	72
Lower Waitaki – Clarksfield Hydro	Clarksfield Holdings Ltd	Waitaki Valley	Concept (supported by Meridian)	0.3
Matakitaki River	Network Tasman	Murchison	Proposed	30
<b>TOTAL</b>				<b>925</b>

## Geothermal Energy

### Completed 2008

Name	Developer	Region	Completion	Capacity (MW)
KA 24	Geothermal Developments	Unknown	2008	10
Kawerau	Mighty River Power	Bay of Plenty	Sep-08	100
Poihipi Rd Enhancement	Contact Energy	Taupo	Nov-08	20
Ngawha Expansion	Top Energy	Northland	Oct-08	15
<b>TOTAL</b>				<b>145</b>

### Under construction

Name	Developer	Region	Status	Earliest Commissioning Date	Capacity (MW)
Nga Awa Purua	Rotokawa Joint Venture	Taupo	Early phase	May-10	132
Centennial Drive	Contact Energy	Taupo	Early phase	2010	20
<b>TOTAL</b>					<b>152</b>

### Consented

Name	Developer	Region	Status	Capacity (MW)
Tukairangi Road	Geotherm Group	Taupo	Consented	60
Te Mihi (Wairakei Replacement)	Contact Energy	Taupo	"Called in" to an independent board of inquiry.	220
<b>TOTAL</b>				<b>280</b>

### Applied for consent

Name	Developer	Region	Status	Capacity (MW)
Rotoma	Rotoma No. 1 Incorporation	Bay of Plenty	Submissions close 5 Sept 2008. With BOP Regional Council	35
<b>TOTAL</b>				<b>35</b>

### Proposed

Name	Developer	Region	Status	Earliest Commissioning Date	Capacity (MW)
Tauhara	Contact Energy	Taupo	Consents to be lodged Second half 2008	Unknown	240
Nga Tamariki	Mighty River Power	Taupo	Mostly Consented, exploration underway,	Jan-12	80
Mokai 3	Tuaropaki Power Company&MRP	Taupo	Planning Phase	Q3 - 2011	60
KA 22	Otewhetu Power	Unknown	Unknown	Unknown	N/A
<b>TOTAL</b>					<b>380</b>

## Bioenergy Developments

Biogas

### Completed 2008

Name	Developer	Region	Completion	Capacity (MW)
Southern Landfill	Todd Energy	Wellington	Mar-08	1
Happy Valley Landfill	Bay of Plenty Energy	Bay of Plenty	May-08	1
Pukete Wastewater Plant	Hamilton City Council	Waikato	Jun-08	0.11
Tirohia Landfill	Mighty River Power/HG Leach Ltd	Waikato	Oct-08	2
<b>TOTAL</b>				<b>4</b>

Biomass

We are currently not aware of any proposed biomass projects

## Marine Developments

### Consented

Name	Developer	Region	Earliest Commissioning Date	Status	Type	Capacity (MW)
Cook Strait Experimental Turbine	Neptune Power	Cook Strait	2010	Consented	Tidal	1
<b>TOTAL</b>						<b>1</b>

### Applied for consent

Name	Developer	Region	Earliest Commissioning Date	Status	Type	Capacity (MW)
Kaipara Harbour Marine Power Turbine Project	Crest Energy	Northland	Unknown	Applied for Consent	Tidal	2.25
Kaipara Harbour (Remainder)	Crest Energy	Northland	Unknown	Applied for Consent	Tidal	198
<b>TOTAL</b>						<b>200</b>

## Solar Developments

### Proposed

Name	Developer	Region	Status	Capacity (MW)
Solar Panels	Network Tasman	Tasman	Concept	Small Distributed

## Non Renewable Electricity Developments

### Natural Gas

#### Completed 2008

Name	Developer	Region	Completion	Max Capacity (MW)
New Plymouth Flare Gas Cogeneration (McKee)	Todd Energy	Taranaki	Jul-08	2.1
Partial re-commissioning of New Plymouth	Contact Energy	Taranaki	Jun-08	100
<b>TOTAL</b>				<b>102</b>

#### Under construction

Name	Developer	Region	Status	Earliest Commissioning Date	Capacity
Mangahewa - New Plymouth Flare	Todd Energy	Taranaki	Under construction	Dec-08	9.1
Stratford Peaking Plant	Contact Energy	Taranaki	Site historically consented, Contact has ordered turbines	2010	200
<b>TOTAL</b>					<b>209.1</b>

#### Consented

Name	Developer	Region	Status	Earliest Commissioning Date	Capacity
Otahuhu C	Contact Energy	Auckland	Unknown	Unknown	400
<b>TOTAL</b>					<b>400</b>

#### Applied for consent

Name	Developer	Region	Status	Earliest Commissioning Date	Max Capacity
Rodney	Genesis Energy	Auckland	In Process	Unknown	480
<b>TOTAL</b>					<b>480</b>

### Other Combustible Fuel Plants

Name	Fuel	Developer	Region	Status	Earliest Commissioning Date	Max Capacity
Waikato coal-seam gas project	Coal Seam Gas	Coal Bed Methane (Solid Energy)	Waikato	Commissioned	24-Nov-08	0.2
Psychology Department	LPG	University of Otago	Otago	In Construction	2009	30.0
Bromley	Diesel	Orion	Christchurch	Reduced Capacity from 30 MW	2010	11.5
Belfast	Diesel	Orion	Christchurch	Consented	2010	11.5
<b>TOTAL</b>						<b>53.2</b>