BEFORE THE MINISTER FOR THE ENVIRONMENT SPECIAL TRIBUNAL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of an Application to amend the Water Conservation (Kawarau) Order 1997 under Section 216 of the Act
BY	**NEW ZEALAND FISH & GAME COUNCIL AND OTAGO FISH & GAME COUNCIL**
	Applicants

STATEMENT OF EVIDENCE OF DAVID WILLIAM PARKER ON BEHALF OF NEW ZEALAND AND OTAGO FISH & GAME COUNCILS
Dated this 28th day of May 2009

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Introduction

1. My name is David William Parker. I have been requested by the Otago Fish and Game Council to present evidence on the application to amend the Water Conservation (Kawarau) Order 1997 (the Application), and am doing so in my personal capacity.

2. I am currently a list Member of Parliament resident in Dunedin. From 2002 to 2005 I was the MP for the then Otago electorate. During the 2005 to 2008 Parliamentary term, I held various portfolios including being Minister of Energy and Minister for Land Information.

3. For the record, I declare the following earlier relevant interests:

   a. In the early 1990s I acted as legal counsel for the initial hearing that led to the original Order, before a committee of the National Water and Soil Conservation Authority.

   b. I had knowledge about the current Application both as Minister of Energy and Minister for Land Information.

   c. As Minister of Energy, I approved the submission made by the Ministry of Economic Development (MED) to the Special Tribunal (Tribunal) outlining the government's energy objectives for the Tribunal's consideration.

Summary of Evidence

4. My evidence will address New Zealand's energy policy settings, their environmental context, and the contribution that hydro electricity from a scheme on the Nevis River might make to New Zealand's energy future. The importance or otherwise of that potential contribution is relevant to

whether or not the Application should be granted, as it is one of the factors to be taken into account by the Tribunal in making its decision.

5. My evidence will include reference to:

   a. New Zealand Energy Strategy to 2050:

      i. implications of the target of 90% renewable electricity generation by 2025;

      ii. types of new renewable generation, and their costs and environmental effects;

      iii. emerging renewable generation technologies.

   b. Proposed National Policy Statement for Renewable Electricity Generation:

      i. renewable electricity benefits and adverse environmental effects;

      ii. reversibility of proposed generation technologies;

      iii. hierarchy of preference among renewable technologies.

   c. Potential Nevis hydro generation in context:

      i. relative importance of a contribution of 45 MW to national electricity supply should the Nevis River be dammed for electricity generation;

      ii. existing contribution from the Otago/Southland region to national electricity supply, and the relative associated environmental burden;

iii. planned increases in Otago/Southland contribution to national electricity supply.

MED submission

6. The MED submission, which neither supports nor opposes the Application, provides the following information:

   a. The Nevis River has hydro generation potential, which if developed would help ensure security of supply through diversification in electricity production methods, and by generating electricity in a manner that avoids greenhouse gas emissions.

   b. It is important that opportunities for new hydro generation are preserved and are not unduly constrained.

   c. Energy developments should not occur at any cost and when considering the development of new renewable electricity generation activities, decision-makers must have regard to the adverse environmental effects associated with proposed generation technologies.

   d. A hydro scheme on the Nevis would make a modest contribution to increased generation capacity required to satisfy demand.

   e. This contribution may need to be seen in the context of the significant amount of existing hydro generation development in the Otago-Southland region, noting that a number of other rivers in the region have been used for irrigation purposes.

f. While the 90% by 2025 renewable electricity target would be met by some new hydro generation, the majority of new renewable generation is expected to be wind or geothermal, which are likely to be more economic to develop than hydro to meet electricity demand for the foreseeable future.

Energy policy documents

7. Electricity is, of course, an important utility upon which New Zealanders and our economy rely. Electricity policy balances various interests including security of supply, economic cost, and environmental effects.

8. Written electricity policy is found in a number of Acts of Parliament, regulations, and policy documents. That policy is implemented though the efforts of a number of participants, including:
   a. MED;
   b. the Electricity Commission;
   c. the Commerce Commission;
   d. the Energy Efficiency and Conservation Authority;
   e. Transpower New Zealand Ltd (owner and operator of the national grid);
   f. local lines companies (owners and operators of local lines);
   g. electricity generators and electricity retailers;
   h. decision-makers under the RMA, including district and regional councils and special tribunals such as this.

9. The instruments which guide their actions include the:
   a. Electricity Act 1992;
   b. Resource Management Act 1991 (RMA);
   c. Commerce Act 1986;
   d. Climate Change Response Act 2002;
   e. Climate Change Response (Emissions Trading) Amendment Act 2008;
   f. New Zealand Energy Efficiency and Conservation Strategy (2007);

g. New Zealand Energy Strategy to 2050 (2007);

h. Proposed National Policy Statement for Renewable Electricity Generation, being made under the RMA (2008);

i. Electricity Commission's *Statement of Opportunities* (2008);

j. Transpower New Zealand Ltd's *Annual Planning Report* (2009);

k. Government Policy Statement on Electricity Governance (2009).

10. In this evidence I will endeavour to explain the effect of those instruments in the context of the Tribunal's inquiry. I will identify forecast electricity demand. I will also discuss forecast electricity supply. This will include information about the estimated quantity and relative cost of various alternative sources of new supply available over the coming decades, as well as information on a number of projects in the consent process.

New Zealand Energy Strategy to 2050

11. The *New Zealand Energy Strategy to 2050* (NZES) lays out a path to a sustainable low emissions energy system. The NZES sets a target of 90% of New Zealand's electricity being generated from renewable sources by 2025, compared with about 65% at present. Recent and current renewable investment is increasing this proportion.

12. In reaching the 90% renewable target, the NZES points to the need to pursue both:

a. cost-effective energy efficiency and conservation; and

b. increased renewable electricity generation while safeguarding the environment.

13. The New Zealand Energy Efficiency and Conservation Strategy is complementary to the NZES. It will assist in reaching the 90% renewable target by keeping the rate of growth in electricity demand in check. This will involve lifting the rate of improvement in energy efficiency, and increasing the uptake of energy conservation measures.

14. All types of electricity generation carry environmental costs, including renewable technologies. Fossil fuelled thermal produces substantial quantities of greenhouse gas emissions. Hydro affects river environments and inundates land. Wind has landscape effects. Geothermal produces generally low levels of greenhouse gas emissions and localised landscape effects.

15. The NZES recognises that all types of energy generation have some adverse environmental effects, but that proposals with unacceptable adverse effects should not proceed. That includes some economically viable projects that should not proceed because of local environmental effects. This approach is independent of, but consistent with, the underlying principles of the RMA.

16. Table 9.1 in the NZES (page 73) shows economic potential new renewable electricity believed (in 2007) to be technically capable of development at costs of less that 9 c/kWh. Some 26,100 GWh/yr of potential supplied energy is identified – of which 43% is geothermal, 35% wind, and 22 % hydro. [See Attachment 1] This does not of course imply that all of this is consentable or would proceed, but it does indicate the scale of New Zealand renewable resource.

17. By way of context, the 26,100 GWh/yr of potential renewable electricity is about equivalent to current renewable production, and compares with current total electricity production of around 40,000 GWh/yr.

18. Figure 5.7 in the NZES (page 38) graphs the typical costs for new electricity generation of different types. It shows that New Zealand is blessed with an abundance of new electricity generation options. It shows substantial quantities of wind and geothermal generation are expected to provide relatively low cost contributions to supply. [See Attachment 2] Renewables investment behaviour by generators is evidence of the soundness of this graph.

19. The Electricity Commission provides an annual assessment of generation projects at different planning and development stages in its annual *Statement of Opportunities* report, or SOO. This is relevant to both the Commission's oversight of transmission investment and its role in monitoring security of supply.

20. Appendix 3 of the Electricity Commission's 2008 Briefing to the Incoming Minister lists the large number of new generation projects under construction, consented or in the consent process. [See Attachment 3] This information is based on analysis done by the Electricity Commission for the 2008 SOO.

Forecast electricity demand and supply being developed

21. New Zealand currently has around 6300 MW of renewable generation capacity, and 2900 MW of fossil fuel generation. Approximately 3200 MW of additional generation capacity is expected to be required by 2025 to meet electricity demand growth of around 22% by then, and to maintain security of supply [See Reference 1] That forecast is based on the NZES projection that electricity demand will grow at around 1.3% per annum over the period. The NZES says (at page 72) that:

> *"It is worth noting that this projected growth is significantly lower than recent historic levels of growth (around two per cent per annum). Improved energy efficiency throughout the economy will lower the growth in demand, but a significant amount of new capacity is still expected to be needed."*

22. Expected increases in demand are based on economic and population forecasts prepared for the Treasury. While for the purposes of this evidence, I have assumed those forecasts remain valid, the recession in New Zealand and overseas may mean that economic growth assumptions are likely to err on the high side rather than on the low side.

23. On the supply side, there is currently about 5600 MW of additional electricity capacity either under construction, consented or in the consent process. A Nevis River scheme is not included in the prospective projects identified by the Electricity Commission. [See Attachment 3]

24. Of course, not all of the 5600 MW will be consented or built, while some will replace obsolete plant, mainly thermal. Most remaining thermal plant is in the case of gas quite new, and in the case of coal significantly refurbished. It is likely that remaining coal-fired plant will be used less (e.g. in times of winter peak or dry years) rather than be closed down in the short to medium term. In the case of geothermal, Wairakei (160 MW) will be replaced by Te Mihi (220 MW).

25. The 5600 MW figure gives a significant level of comfort about future generation options. The mix of generation types is informative. Most is wind and geothermal, with a decreasing reliance on new hydro compared with the past.

26. Wind power has come of age in the last decade and is now cost competitive. Geothermal in New Zealand is abundant and under-developed. Geothermal can provide stable base load at very high capacity factors. It was uneconomic for some decades because of cheaper alternatives that relied upon volumes and prices for Maui gas which no longer apply.

27. Geothermal is experiencing a renaissance following those decades of low activity, as illustrated by the recent commissioning of the 100 MW Kawerau geothermal station, the current construction of Rotokawa 2 (130 MW), and the net gain of about 60 MW that will result from Te Mihi. The increasing contribution of geothermal is reflected in Transpower's decision to upgrade the capacity of the "Wairakei ring" so that substantial increases in geothermal electricity from this area can be exported elsewhere via the grid.

28. The world is transiting to low carbon electricity. Emerging technologies are being developed and are having billions of dollars invested in them annually. They include photovoltaics, carbon capture from fossil fuel used in electricity generation, solar concentration, marine generation, and deep ("hot-rock") geothermal.

29. Over the next two decades we can be confident that a number of these technologies will become economic, as wind has over the last decade. In the meantime, New Zealand has ample wind and geothermal to rely upon. We do not need to dam even more rivers to maintain security or on account of price.

Proposed NPS for Renewable Electricity Generation

30. The proposed National Policy Statement for Renewable Electricity Generation (proposed NPS) was identified in the NZES as being needed. The proposed NPS has been prepared and is currently under consideration by a Board of Inquiry established under the RMA, and is intended to provide guidance to consent authorities on the national benefits of renewable energy. Its objective is:

> *"To recognise the national significance of renewable electricity generation by promoting the development, upgrading, maintenance and operation of new and existing renewable electricity generation activities, such that 90 percent of New Zealand's electricity will be generated from renewable sources by 2025 (based on delivered electricity in an average hydrological year)."*

31. The preamble to the proposed NPS recognises the dilemma that can arise between providing renewable electricity supply on the one hand, but causing adverse environmental effects on the other – a dilemma made more acute when the supply benefit is national and the adverse

environmental effect local. The proposed NPS suggests a nationally consistent approach to balancing these values. The preamble says:

> *"Development that increases renewable electricity generation capacity can, however, have environmental effects that span local, regional and national scales, often with adverse effects manifesting locally and positive effects manifesting nationally. …*
>
> *In particular, the natural resources from which electricity is generated can coincide with areas of significant natural character, significant amenity values, historic heritage, outstanding natural features and landscapes, significant Indigenous vegetation and significant habitats of indigenous fauna. Adopting a nationally consistent approach to balancing the competing values associated with the development of New Zealand's renewable energy resources will provide greater certainty to decision-makers, applicants, and the wider community."*

32. Policy 3 (of five) in the proposed NPS particularly relates to the approach required in balancing values in the current Application. Policy 3 says:

> *"When considering proposals to develop new renewable electricity generation activities, decision-makers must have particular regard to the relative degree of reversibility of the adverse environmental effects associated with proposed generation technologies."*

33. While considering the proposed NPS in March 2008, Cabinet recorded a minute in which it:

> *"noted that judgements will be required when considering how much emphasis should be given to alternative sources of renewable energy, based on their respective environmental effects, e.g. geothermal compared with wind compared with hydro."*

34. This Cabinet minute indicates a general hierarchy of preference among renewable technologies – it is expected that geothermal would generally be better environmentally than wind, and wind generally better than hydro. This order is reflected in the reversibility principle articulated in Policy 3.

35. For practical purposes, the adverse environmental effects of hydro development involving damming are permanent. They are not reversible within any reasonable timespan, unlike most of the effects of wind and geothermal.

36. Policy 3 and the Cabinet minute are compatible with achieving the 90% renewable electricity target. As noted above, the majority of new renewable generation needed to reach the 90 percent renewable target will be wind or geothermal, for a combination of economic and environmental reasons.

Potential Nevis hydro generation in context

37. A hydro scheme on the Nevis could generate up to 45 MW. [See Reference 1] This would make only a modest contribution to the 3200 MW increased generation capacity required by 2025 (about 1.5% of the increase, or 0.35% of total capacity at that time).

38. There is already substantial hydro generation in the Otago/Southland region, with more expected from capacity increases for the Clyde and Roxburgh generation stations. [See Reference 5, page 311] Further hydro development, particularly on the Nevis, would further permanently compromise remaining natural river values in the region.

39. At 1688 MW, the Otago/Southland region currently has about 19% of New Zealand's total operational electricity generation capacity. This generation usually contributes a major part of total South Island generation and exceeds local demand. The South Canterbury region,

focused around the Waitaki catchment, makes a similar contribution to national generation capacity. [See Reference 5, pages 311, 295]

40. In addition to existing capacity, new generation projects for 1103 MW in the Otago/Southland region are under construction, consented or in the consent process. That represents nearly 20% of the national total of new projects. The increasing capacity in Otago/Southland is mainly wind, by way of TrustPower's Mahinerangi project (200 MW, consented) and Meridian Energy's Project Hayes (630 MW, consent under appeal). And on the Waitaki, Meridian Energy's North Bank Tunnel hydro scheme (up to 280 MW) now has its water consents approved though under appeal. [See Attachment 3]

41. The Water Conservation (Kawarau) Order 1997 protects outstanding intrinsic and amenity values in the Nevis River. However, as it stands, the Order could allow inundation of a specified stretch of the Nevis River if certain conditions were met. The application seeks a prohibition on damming the river, along with conditions on minimum flows. I understand that the application is being made in light of increased knowledge of values in the Nevis since the original Order was finalised in 1997.

42. It is reasonable to ask whether the Otago/Southland region has already made a sufficient contribution of its natural river values to the national interest of secure electricity supply. I think it unfair – and unnecessary – for the burden on the region's natural river values to be increased. This is particularly the case with the Nevis where those values have been recognised by way of the existing Order, and where a hydro scheme would little difference to the country's overall electricity supply.

43. In short, achieving the 90% by 2025 renewable electricity target does not require every last river to be dammed. Nor for that matter does it require every last ridgeline to have wind turbines built on it, but that point is not near (and the effects of wind generation are generally more reversible than those of hydro dams).

44. The relative value of things changes over time. The value of hydro used to be relatively higher than it is now because there was little other economic renewable generation available. When the hearings on the original Order were being conducted, wind power was undeveloped and new geothermal was not economic. Yet in the last quarter of 2008, wind contributed 3% of total electricity supply (i.e. GWh) while geothermal contributed 11% (MED *New Zealand Energy Quarterly*).

45. And by 2025, other emerging technologies may have been mainstreamed and continue to relieve pressure for generation capacity that irreversibly modifies natural values, as well as enabling New Zealand to use predominantly renewable electricity generation for even longer.

46. The relative value of unmodified rivers has now gone up because there are fewer of them, and those that remain are becoming an increasingly scarce resource. They also face increasing pressure from irrigation. They do not need to be sacrificed in the interests of renewable energy production. The water in a river is renewable, but a river ecosystem once dammed is not.

47. The relative value of the Nevis as an unmodified Otago river also increased recently in light of the decision by the Minister of Conservation to exclude part of the upper Manuherikia River from the proposed Oteake Conservation Park, in order to facilitate potential future access to the lignite deposit that lies beneath the river basin floor. This decision was made despite such lowland environments being a national priority for protection and the upper Manuherikia being an outstanding landscape in the Central Otago District Plan.

48. I note that the Contact Energy Ltd submission on the Application asks the Tribunal (at paragraph 39) to:

> *"have particular regard to the Proposed Renewables NPS and the NZES and recognise the role that renewable generation, including any potential hydro electric scheme on the Nevis River, will play in New Zealand's future. To that end, it is not appropriate to prohibit damming on the Nevis River or [make] the additional amendments the application seeks."*

49. Statements of this nature reflect an overly simplistic analysis of the NZES and proposed NPS. They overlook the environmental objectives which are central to those documents, and the range of renewable energy alternatives identified in the NZES. To say that the prospect of damming the Nevis must be kept open because of the NZES or climate change or energy security – and despite the modest contribution this would make to national electricity supply – is to misunderstand the NZES, the proposed NPS, and indeed the RMA.

Conclusion

50. In conclusion, I suggest to the Tribunal that it ought not to decline the Application because of the Nevis River's hydro potential, which is relatively insignificant.

51. The Tribunal's decision on the Application should rest foremost upon whether it believes the applicant has demonstrated the outstanding values which are a prerequisite to the granting of the Application.

Attachments

1 *New Zealand Energy Strategy to 2050*, October 2007 (NZES), page 73, Table 9.1

2 NZES, page 38, Figure 5.7

3 *Briefing to the Incoming Minister*, Electricity Commission, November 2008, Appendix 3

References

1. Ministry of Economic Development, Submission on application to Special Tribunal to amend the Water Conservation (Kawarau) Order 1997

2. Ministry of Economic Development, *New Zealand Energy Strategy to 2050*, October 2007

3. Ministry for the Environment, *Proposed National Policy Statement for Renewable Electricity Generation*, August 2008

4. Electricity Commission, *Briefing to the Incoming Minister*, 20 November 2008 (Appendix 3 of which is Attachment 3 to this evidence)

5. Transpower New Zealand Ltd, *Annual Planning Report*, March 2009

If the Tribunal wishes to review references 2 to 5, Fish and Game will make them available.

9.1.2 Our renewable energy potential

New Zealand has significant renewable energy resources. Table 9.1 provides estimates of the potential electricity generation available from renewable sources by 2030, based on current technology and resource information. If electricity demand grows at projected rates, demand in 2030 will be approximately 12,400 GWh more than in 2006.[43] Geothermal resources, which provide baseload generation, are able to contribute some 900 MW (at least) of additional capacity. This is equivalent to more than seven years of demand growth by itself.

Table 9.1: New Zealand's renewable electricity potential

Primary energy source	2005 energy supplied (GWh/yr)[a]	Economic potentials (GWh/yr)[b]
Hydro	23,237	5,800
Geothermal	2,693	11,100
Wind	610	9,200
Total	26,540	26,100

Sources: [a] *New Zealand Energy Data File,* Ministry of Economic Development.
[b] Drawn from the latest Ministry of Economic Development generation industry analysis (unpublished).

Note: The 'economic potentials' included are identified prospective generation projects believed to be capable of development at costs less than 9c/kWh (electricity).

Substantial quantities of renewable capacity are likely to be less than or close to the cost of fossil fuel-based generation in the medium term, assuming an emissions price of $25/tonne of CO_2-equivalent (see Figure 5.7 in Part 1). New plant generation costs can shift, depending on changes in such factors as international demand for equipment, exchange rates, fuel prices, climate change policy and environmental constraints.

In considering the potential contribution of renewable generation to a sustainable energy future, the following factors need to be taken into account:

- the price and quantity of realisable renewable energy resources will vary depending on the outcome of consenting processes under the RMA
- economies of scale and the current market and regulatory environment tend to favour larger grid-connected renewable generation rather than distributed generation, with correspondingly more concentrated local environmental impacts[44]
- many renewable energy resources are remote from major load centres and will require a robust transmission grid
- renewables in the South Island will face higher transmission costs reflecting the distance from major load centres
- 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
- other renewable energy resources, such as marine energy, are not listed in Table 9.1. These resources may contribute towards New Zealand's electricity supply in the future, but are at a relatively early stage of development and are not currently economic.

[43] *Benefit-Cost Analysis of New Zealand Energy Strategy*, Ministry of Economic Development, September 2007.

[44] Notwithstanding economies of scale, renewable generation plants can be built in smaller increments than fossil fuel generation.

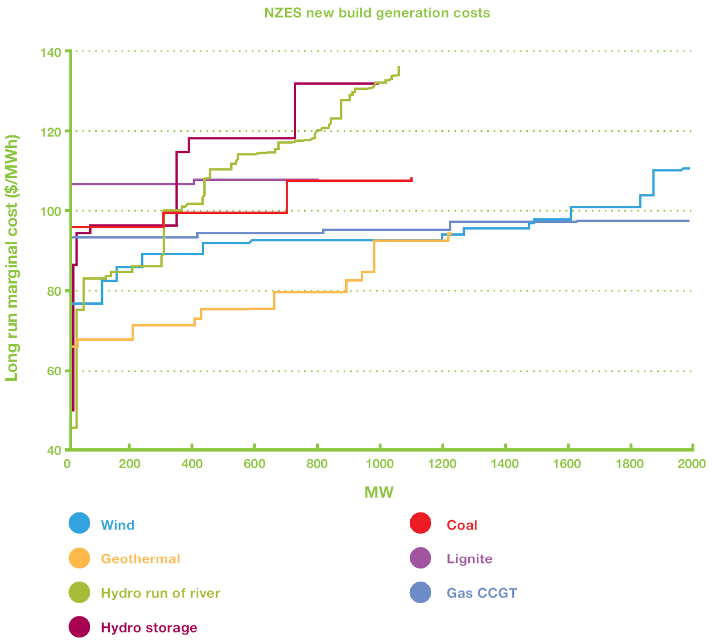
5.2 Effect of this strategy on prices

5.2.1 Electricity costs

Figure 5.7 shows the estimated costs of alternative sources of new electricity generation, including capital and fuel. The costs are based on information from the EC.[23]

The cost curve shows that, in the medium term, renewable sources of electricity generation are cost competitive with fossil fuel-based sources, particularly when the impact of an emissions price is incorporated.

Figure 5.7: Typical costs for new electricity generation (updated August 2007)[24]



Source: Ministry of Economic Development

The graph shows that new geothermal, wind and combined-cycle gas turbine (CCGT) generation are all available at around the same price, assuming medium-term gas prices of $9/gigajoule and an emissions price of $25/tonne of CO_2-equivalent emissions. If gas prices continue to move towards the higher cost of imported LNG, or if the cost of greenhouse gas emissions from fossil fuel-based generation rises in the longer term towards $50/tonne of CO_2-equivalent emissions, renewables are likely to be cheaper than gas-fired generation.

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[23] Based on 2006 assumptions in the EC's *Statement of Opportunities*. www.electricitycommission.govt.nz/opder/transmis/500/

[24] Includes fuel transportation costs and location factors.

Appendix 3: List of possible/probable/committed new generation plant

These tables have been prepared using information available in the public domain and in-house knowledge; they do not use any material supplied by generators under confidentiality. All information presented is subject to uncertainty and will change as more data comes to light. The Commission updates these tables regularly and publishes them on its website.

The following tables are provided:

- Table 1 presents a high level summary of the current generation projects, sorted by status (under construction, consented, consented under appeal, applied for consent), owner, generation type, and region;
- Table 2 lists the details of projects which are currently under construction, or have received consent, or applied for consent, sorted by generation type;
- Table 3 shows the same list of projects, sorted by earliest possible commissioning date;
- Figure 1 plots the data presented in Tables 2 and 3.

Generation projects with capacity less than 5 MW are not shown.

It should be borne in mind that some types of new projects (particularly thermal peakers) can be consented and constructed relatively rapidly. The projects listed in this document, therefore, should not be seen as an exhaustive list of all generation that could be constructed in the next few years.

The data presented in italics in Tables 2 and 3 are speculative as no data was available at the time of this update.

Status

Under construction	367
Consented	1570
Consent under appeal	1267
Applied for consent	2430

Owners

Contact Energy	1583
Meridian Energy	1305
TrustPower	565
Genesis	498
Mighty River Power	492
Others	1191

Generation types

Geothermal	502
Hydro	494
Wind	3524
Diesel	23
Marine	2
Gas	1089

Regions

Northland	16	Marlborough	73
Auckland	898	West Coast	131
Waikato	1217	Canterbury	64
Bay of Plenty	45	Waitaki	240
Hawkes Bay	552	Otago	863
Taranaki	354	Southland	240
Manawatu	726	Fiordland	0
Wellington	215	Tiwai	0

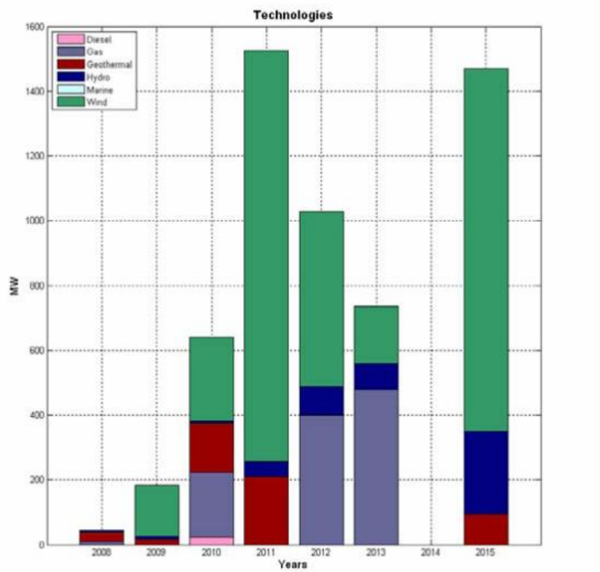
Table 1 Summary of potential projects which have begun the consenting process: capacities in MW

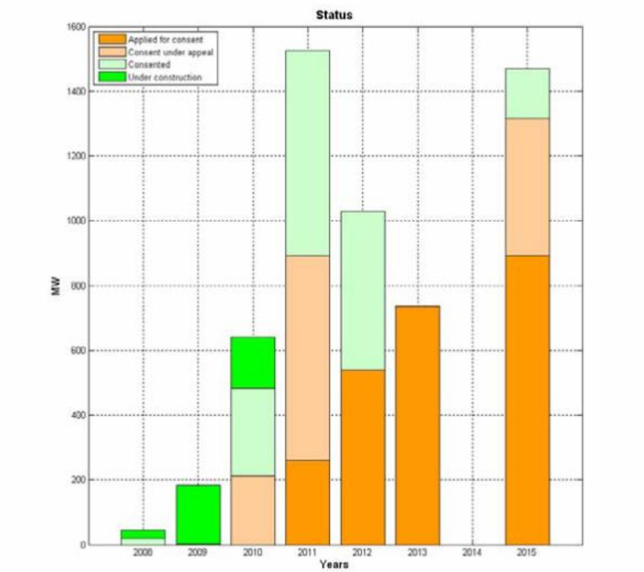
	Region	Location / Name of Project	Owned by	Capacity (MW)	Earliest commission date	Status
Diesel	Canterbury	Bromley, Belfast	Orion	23	2010	Consented
Gas	Taranaki	McKee - cogeneration	Todd Energy	9	2008	Under construction
	Taranaki	Stratford	Contact Energy	200	2010	Consented
	Auckland	Otahuhu C	Contact Energy	400	2012	Consented
	Auckland	Rodney	Genesis	480	2013	Applied for consent
Geothermal	Bay of Plenty	KA24 Kawerau	Geothermal developments	10	2008	Under construction
	Waikato	Poihipi	Contact Energy	20	2008	Consented
	Northland	Ngawha	Top Energy	15	2009	Under construction
	Waikato	Centennial Drive - Tauhara	Contact Energy	20	2010	Under construction
	Waikato	Nga Awa Purua	Mighty River Power	132	2010	Under construction
	Waikato	Te Mihi	Contact Energy	220	2011	Consented
	Bay of Plenty	Rotoma	Rotoma No. 1 Corporation	35	2015	Applied for consent
	Waikato	Poihipi - Tukairangi Rds	Geotherm	60	2015	Consented
Hydro	Otago	Deep Stream	TrustPower	6	2008	Under construction
	Otago	Benmore refurbishment	Meridian Energy	11	2009	Under construction
	Waikato	Waipa	Hydro Energy Ltd	7	2010	Under construction
	West Coast	Arnold (Dobson)	TrustPower	46	2011	Applied for consent
	Marlborough	Wairau	TrustPower	73	2012	Consented
	Otago	Hawea Control Gate Retrofit	Contact Energy	16	2012	Consented
	West Coast	Mokihinui	Meridian Energy	80-100	2013	Applied for consent
	Taranaki	Mokau	King Country Energy	10	2015	Applied for consent
	Waitaki	North Bank Tunnel	Meridian Energy	200-280	2015	Applied for consent
	West Coast	Matiri	New Zealand Energy Ltd	5	2015	Applied for consent
Marine	Wellington	Cook Strait Marine Energy pilot	Neptune Power	1 (pilot)	2009	Consented
	Northland	Kaipara Harbour pilot	Crest Energy	1 (pilot)	2011	Consent under appeal
Wind	Manawatu	Te Rere Hau Stage 2	NZ Windfarms	14	2009	Under construction
	Wellington	West Wind	Meridian Energy	143	2009	Under construction
	Hawkes Bay	Te Waka	Unison/Roaring 40s	102	2010	Consent under appeal
	Hawkes Bay	Titiokura	Unison/Roaring 40s	43	2010	Consented
	Hawkes Bay	Te Pohue wind farm	Hawkes Bay Wind Farm Ltd	225	2011	Consented
	Otago	Project Hayes	Meridian Energy	630	2011	Consent under appeal
	Otago	Mahinerangi	TrustPower	200	2011	Consented
	Waikato	Hauāuru mā raki	Contact Energy	540	2012	Applied for consent
	Hawkes Bay	Waitahora (Puketoi)	Contact Energy	177	2013	Applied for consent
	Auckland	Awhitu	Genesis	18	2015	Consented
	Canterbury	Mt Cass	MainPower	41	2015	Applied for consent
	Manawatu	Te Rere Hau Stage 3	NZ Windfarms	17	2015	Consented
	Manawatu	Te Rere Hau Stage 4	NZ Windfarms	15	2015	Consented
	Manawatu	Motorimu	Allco Wind Energy	110	2010	Consent under appeal
	Manawatu	Central Wind (Moawhango)	Meridian Energy	130	2015	Applied for consent
	Manawatu	Turitea	Mighty River Power	360	2015	Applied for consent
	Manawatu	Pori	Allco Wind Energy	80	2011	Applied for consent
	Southland	Kaiwera Downs	TrustPower	240	2015	Consent under appeal
	Taranaki	Waverley	Allco Wind Energy	135	2011	Applied for consent
	Waikato	Taharoa	Taharoa C / PowerCoast	100	2015	Consent under appeal
	Waikato	Taumatatorara	Ventus	44	2015	Consented
	Waikato	Te Uku	WEL Network	84	2015	Consent under appeal
	Wellington	Mill Creek	Meridian Energy	71	2015	Applied for consent
			Total	5634		

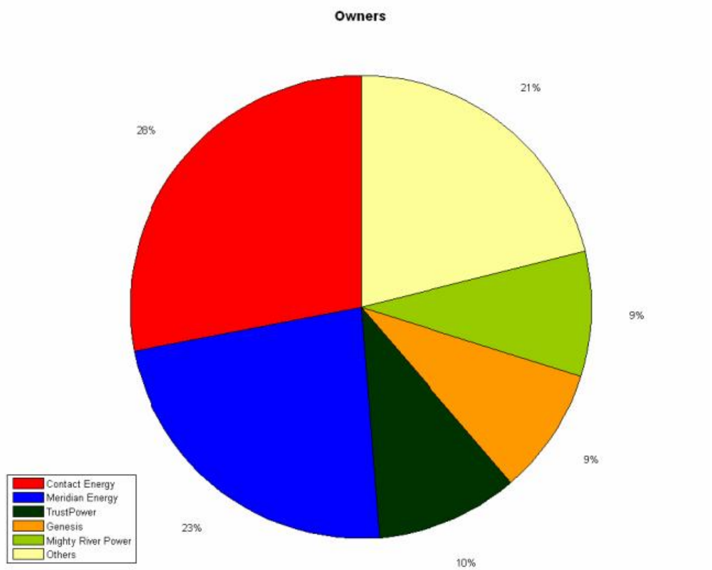
Table 2. Projects which are currently under construction, have received consent or have applied for consent – sorted by generation type

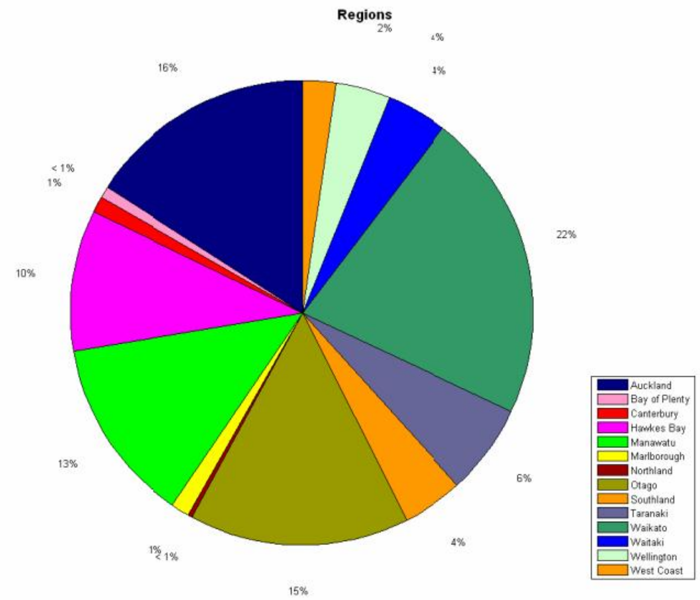
	Region	Location / Name of Project	Owned by	Capacity (MW)	Earliest commission date	Status
Gas	Taranaki	McKee - cogeneration	Todd Energy	9	2008	Under construction
Geothermal	Bay of Plenty	KA24 Kawerau	Geothermal developments	10	2008	Under construction
	Waikato	Poihipi	Contact Energy	20	2008	Consented
Hydro	Otago	Deep Stream	TrustPower	6	2008	Under construction
Geothermal	Northland	Ngawha	Top Energy	15	2009	Under construction
Hydro	Otago	Benmore refurbishment	Meridian Energy	11	2009	Under construction
Marine	Wellington	Cook Strait Marine Energy pilot	Neptune Power	1 (pilot)	2009	Consented
Wind	Manawatu	Te Rere Hau Stage 2	NZ Windfarms	14	2009	Under construction
	Wellington	West Wind	Meridian Energy	143	2009	Under construction
Diesel	Canterbury	Bromley, Belfast	Orion	23	2010	Consented
Gas	Taranaki	Stratford	Contact Energy	200	2010	Consented
Geothermal	Waikato	Centennial Drive - Tauhara	Contact Energy	20	2010	Under construction
	Waikato	Nga Awa Purua	Mighty River Power	132	2010	Under construction
Hydro	Waikato	Waipa	Hydro Energy Ltd	7	2010	Under construction
Wind	Hawkes Bay	Te Waka	Unison/Roaring 40s	102	2010	Consent under appeal
	Hawkes Bay	Titiokura	Unison/Roaring 40s	48	2010	Consented
	Manawatu	Motorimu	Allco Wind Energy	110	2010	Consent under appeal
Geothermal	Waikato	Te Mihi	Contact Energy	220	2011	Consented
Hydro	West Coast	Arnold (Dobson)	TrustPower	46	2011	Applied for consent
Marine	Northland	Kaipara Harbour pilot	Crest Energy	1 (pilot)	2011	Consent under appeal
Wind	Hawkes Bay	Te Pohue wind farm	Hawkes Bay Wind Farm Ltd	225	2011	Consented
	Otago	Project Hayes	Meridian Energy	630	2011	Consent under appeal
	Otago	Mahinerangi	TrustPower	200	2011	Consented
	Manawatu	Pori	Allco Wind Energy	80	2011	Applied for consent
	Taranaki	Waverley	Allco Wind Energy	135	2011	Applied for consent
Gas	Auckland	Otahuhu C	Contact Energy	400	2012	Consented
Hydro	Marlborough	Wairau	TrustPower	73	2012	Consented
	Otago	Hawea Control Gate Retrofit	Contact Energy	16	2012	Consented
Wind	Waikato	Hauāuru mā raki	Contact Energy	540	2012	Applied for consent
Gas	Auckland	Rodney	Genesis	480	2013	Applied for consent
Hydro	West Coast	Mokihinui	Meridian Energy	80-100	2013	Applied for consent
Wind	Hawkes Bay	Waitahora (Puketoi)	Contact Energy	177	2013	Applied for consent
Geothermal	Bay of Plenty	Rotoma	Rotoma No. 1 Corporation	35	2015	Applied for consent
	Waikato	Poihipi - Tukairangi Rds	Geotherm	60	2015	Consented
Hydro	Taranaki	Mokau	King Country Energy	10	2015	Applied for consent
	Waitaki	North Bank Tunnel	Meridian Energy	200-280	2015	Applied for consent
	West Coast	Matiri	New Zealand Energy Ltd	5	2015	Applied for consent
Wind	Auckland	Awhitu	Genesis	18	2015	Consented
	Canterbury	Mt Cass	MainPower	41	2015	Applied for consent
	Manawatu	Te Rere Hau Stage 3	NZ Windfarms	17	2015	Consented
	Manawatu	Te Rere Hau Stage 4	NZ Windfarms	15	2015	Consented
	Manawatu	Central Wind (Moawhango)	Meridian Energy	130	2015	Applied for consent
	Manawatu	Turitea	Mighty River Power	360	2015	Applied for consent
	Southland	Kaiwera Downs	TrustPower	240	2015	Consent under appeal
	Waikato	Taharoa	Taharoa C / PowerCoast	100	2015	Consent under appeal
	Waikato	Taumatatorara	Ventus	44	2015	Consented
	Waikato	Te Uku	WEL Network	84	2015	Consent under appeal
	Wellington	Mill Creek	Meridian Energy	71	2015	Applied for consent
			Total	5634		

Table 3. Projects which are currently under construction, have received consent or have applied for consent – sorted by earliest date


Technologies
Diesel
Gas
Geothermal
Hydro
Marine
Wind
MW
0
200
400
600
800
1000
1200
1400
1600
2008
2009
2010
2011
2012
2013
2014
2015
Years


Status
Applied for consent
Consent under appeal
Consented
Under construction
MW
0
200
400
600
800
1000
1200
1400
1600
2008
2009
2010
2011
2012
2013
2014
2015
Years


Owners
21%
28%
9%
9%
23%
10%
Contact Energy
Meridian Energy
TrustPower
Genesis
Mighty River Power
Others


Regions
2%
16%
< 1%
1%
22%
10%
13%
6%
4%
1%
< 1%
15%
Auckland
Bay of Plenty
Canterbury
Hawkes Bay
Manawatu
Marlborough
Northland
Otago
Southland
Taranaki
Waikato
Waitaki
Wellington
West Coast