

Annual Security Assessment 2008

Information and Conclusion

December 2008

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1. Background

1.1 Introduction

1.1.1 The obligations of the Commission, in respect of security of supply, are set out in the Electricity Act (1992) and associated Government Policy Statement (GPS)¹. In October 2008 the Electricity Commission (“Commission”) undertook its annual review of the security of supply outlook including the possible need for reserve energy or reserve capacity².

1.1.2 This year’s assessment was based on the winter energy margin and capacity margin concepts recently adopted by the Commission for monitoring generation investment adequacy and the potential need for reserve energy or capacity needs. In this regard, the relevant assessment horizon is one to three years but, for information purposes, margins out to 2018 have also been estimated.

1.2 Purpose of this paper

1.2.1 The purpose of this paper is to

- (a) summarise the conclusions from the 2008 Annual Security Assessment consultation paper
- (b) summarise the submissions to that paper
- (c) state the Commission’s decisions about the procurement of reserve energy or reserve capacity for 2009 and 2010.

¹ http://www.med.govt.nz/templates/MultipageDocumentTOC____35669.aspx.

² <http://www.electricitycommission.govt.nz/consultation/RENA-08>.

2. 2008 Annual Security Assessment

2.1 Approach

2.1.1 The 2008 security assessment has been undertaken in line with the Commission's revised Security of Supply Policy³. Key revisions to that policy relating to assessing security were:

- (a) assessing energy security with respect to an economically derived "winter energy margin" of 17 percent for New Zealand (and 30 percent for the South Island), rather than the "1-in-60 dry year" standard. If forward projections lead the Commission to conclude that the "winter energy margin" will fall below the standard it should trigger the purchase of additional reserve energy;
- (b) monitoring short-term energy security of supply with respect to a series of hydro storage guidelines, reflecting different levels of security of supply risk, rather than the concept of a minzone; and
- (c) the introduction of a standard for capacity adequacy standard, to complement the standards for energy adequacy standard. The standard is expressed as a minimum 780MW margin of derated North Island supply over the average of the highest 200 half-hours of winter North Island daytime demands. North Island supply includes the contribution of supply from the South Island accounting for the South Island supply/demand balance and HVDC capability. Again if forward projections lead the Commission to conclude that the capacity will fall below the standard it should trigger the purchase of additional reserve energy.

2.1.2 Until 2007, annual security of supply assessments focused on dry year energy (GWh) requirements only. In the 2007 security assessment, an analysis of peak supply adequacy (MW) was introduced, but only focussed on the next winter (2008), whereas the energy security assessment extended over the period to 2016. The 2008 report also addresses energy security and capacity adequacy but using different methodologies as summarised in Table 1. In each case, the assessment horizon extends to 2018.

³ <http://www.electricitycommission.govt.nz/pdfs/opdev/secsupply/policy/sos-policyOct08.pdf>

Table 1: Changes in Approach to Assessment

Issue	Basis for 2009 Assessment	Basis for 2008 Assessment
Capacity adequacy	'Capacity margin' concept. Expected winter capacity capability relative to a measure of high winter demand periods.	'Peak adequacy' concept. Ability to meet single peak half-hour demand.
Energy security	'Winter energy margin' concept. Expected winter energy supply capability relative to winter energy demand.	Hydro storage minzone concept. Storage level at which the market has the technical capacity to meet demand during a hydro drought.
Trigger for reserve energy procurement decision	Forecast winter energy margins below specified levels over three year horizon.	Minzone expected to reach around 70% over next two years (exact level determined by spill/ reserve energy cost trade-off).
Trigger for reserve capacity procurement decision	Forecast winter capacity margins below specified levels over two year horizon.	Not discussed.

2.1.3 The assessment process followed is described in the report. Particular features of note are that:

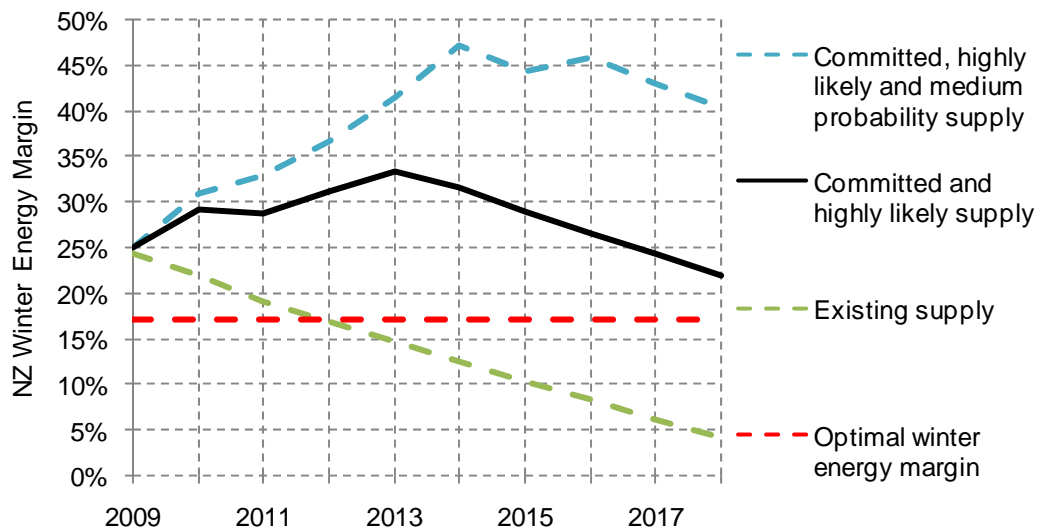
- (a) The assessment has a dual role of providing information about demand forecasts and expected supply, as well as providing a means for assessing the need for the Commission to procure reserve energy or capacity if not provided by the market in order to meet the energy or capacity adequacy standards.
- (b) The period of the security assessment extends to 2018, although consideration of the need for reserve energy and capacity only considers the next 1-3 years
- (c) Commission staff engaged with industry participants regarding key supply and transmission assumptions;
- (d) demand assumptions were prepared by the Commission in accord with the medium term demand forecasting methodology developed and consulted on in 2007 and updated in 2008⁴.
- (e) where necessary, participants' expectations regarding confidentiality were met.

⁴ <http://www.electricitycommission.govt.nz/opdev/modelling/demand/security/index.html>.

2.2 Energy Adequacy Assessment

2.2.1 Figure 1 illustrates the projected New Zealand winter energy margin assessments to 2018 relative to the optimal margin of 17%.

Figure 1: Projected NZ Winter Energy Margins to 2018



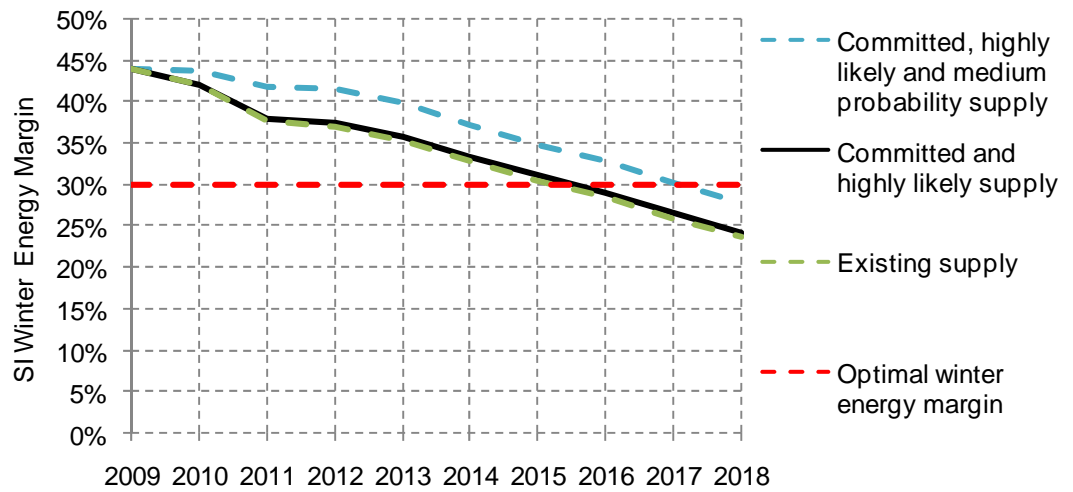
2.2.2 Key conclusions from analysis of the New Zealand winter energy margin are that

- new generation is needed to ensure that the 17% standard can be maintained after 2011;
- taking committed and highly likely generation projects into account, the estimated winter energy margin is significantly above the 17% standard through to 2018; and
- beyond 2011 the level of confidence in new supply assumptions is an important consideration.

2.2.3 From a reserve energy perspective the analysis indicates that, with no new generation investment, New Zealand winter energy margins are not projected to fall below the 17% winter energy margin over the next three years. Committed and highly likely generation projects significantly increase headroom.

2.2.4 Figure 2 illustrates South Island winter energy margin assessments to 2018 relative to the optimal margin of 30%.

Figure 2: Projected SI Winter Energy Margins To 2018



2.2.5 A key input to these margin calculations is the maximum energy able to be received in the South Island from HVDC transfers. The assumptions of lower North Island ac transmission and HVDC capacities are more conservative than the capacities actually achieved this winter.

2.2.6 Key conclusions from analysis of the New Zealand winter energy margin are that:

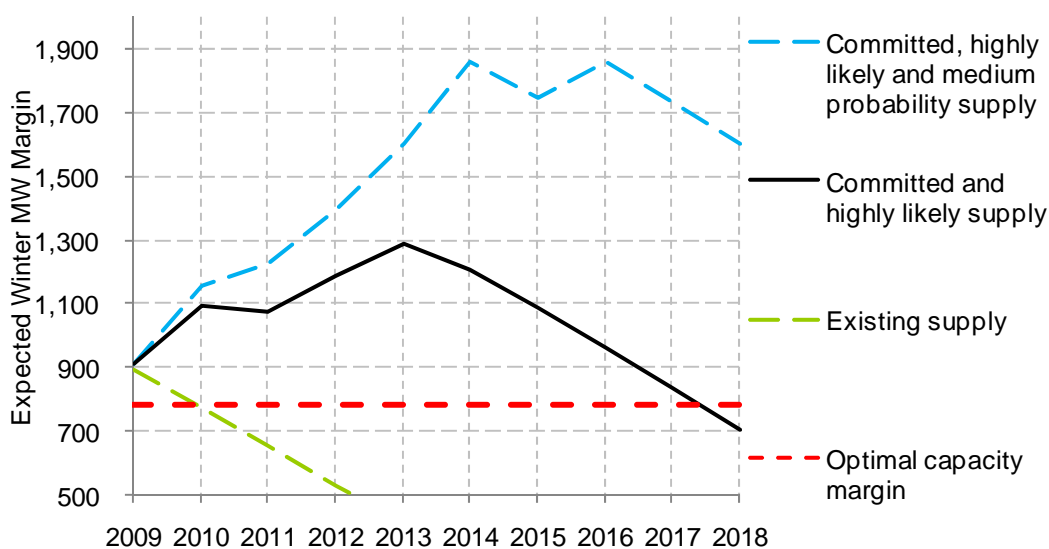
- (a) existing supply is sufficient to meet the 30% standard beyond 2015;
- (b) committed and highly likely generation projects make little impact on the winter energy margin; and
- (c) the level of confidence in existing transmission and generation assumptions are an important consideration.

2.2.7 From a reserve energy perspective the analysis indicates that, with no new generation investment, South Island winter energy margins are not projected to fall below the 30% winter energy margin over the next four years.

2.3 Capacity Adequacy Assessment

2.3.1 Given the levels of generation and expected demand in the South Island a capacity assessment for the North Island, taking account of the HVDC capacity, is also a proxy for a capacity adequacy assessment for New Zealand. Figure 3 shows North Island capacity assessments to 2018 relative to the optimal margin of 780 MW.

Figure 3: North Island Capacity Margin Assessments to 2018



2.3.2 The margin calculations assume that pole 1 is available for assisting with south-north transfers under the same arrangements as made for the winter of 2008. No adjustment has been made for the upgrade of the HVDC, expected in 2012, which will likely increase south-north capability⁵. If pole 1 was unavailable and HVDC transfers were only available on pole 2, then approximately 200 MW would need to be subtracted from the margins shown above. For example, without pole 1, the projected 2009 capacity margin is 690 MW (90 MW deficit), though from 2010 onwards the standard would be exceeded.

2.3.3 Key conclusions from this analysis of North Island capacity margins are that:

- (a) new generation is needed to ensure that the 780 MW capacity adequacy standard can be maintained beyond 2010;
- (b) availability of the half pole 1 in 2009 is needed to meet capacity adequacy standards;
- (c) the capacity margin including committed and highly likely generation projects is significantly above this figure through to 2018; and
- (d) the level of confidence around the assumptions about new capacity will be an important consideration.

2.3.4 Without new investment, the North Island capacity margin is projected to roughly equal the adequacy standard in 2010. However, the level of committed plus highly likely generation investment pushes the capacity margin 200 MW to 300

⁵ While the maximum transfer capability will be increased, the effective contributions from the South Island used for calculating the capacity margins are likely to be similar (though no lower) to those presented here given the assumptions about new supply and demand growth.

MW above the adequacy standard over the period to 2012⁶. On this basis, additional reserve capacity is not needed.

2.4 Submissions

2.4.1 Nine short submissions have been received from:

Consumer	Major Electricity Users' Group (MEUG) Venture Southland
Generator/Retailers	Contact Genesis Meridian Mighty River Power
Transport	PowerNet Transpower Vector

2.4.2 **Contact** agreed with conclusions regarding procurement of reserve energy/capacity for 2009.

2.4.3 **Genesis** agreed with conclusions regarding procurement of reserve energy and capacity for 2009, noting that capacity and energy adequacy requires good management of unit comment, which in turn requires good information and price signals.

2.4.4 **Meridian** agrees with conclusions regarding procurement, noting that they are conditional on the availability of existing and new plant and the HVDC half pole.

2.4.5 **MEUG** agrees with the conclusion regarding the need for reserve and energy capacity for 2009, noting that events since November 2007 have exposed possible shortcomings in the behaviour of suppliers to manage energy resources optimally.

2.4.6 **Mighty River** agrees that additional reserve energy should not be procured.

2.4.7 **PowerNet**⁷ made no explicit comment on the energy or capacity adequacy, but they implicitly disagreed with the conclusion on reserve energy, suggesting that

⁶ 'Expected supply capacity' in 2010 rises by approximately 240 MW given assumed committed plant i.e. Stratford peaker (194 MW contribution to supply capacity), Nga Awa Purua (76 MW in 2010 due to commissioning over winter, and 115MW from 2011), West Wind (29 MW), and Tauhara binary (17 MW).

reserve energy should be considered in the South Island over the next few years to cover demand growth and reliance on the HVDC.

- 2.4.8 **Transpower's** submission does not offer a comment on the conclusions reached, but did broadly agree with the assessment methodology.
- 2.4.9 **Vector** did not comment on the energy or capacity margins as they believe that the margins do not sufficiently reflect the input assumptions and that a probabilistic approach is needed capture practical assessments of engineering risks.
- 2.4.10 **Venture Southland**⁸, like PowerNet, made no explicit comment on energy or capacity adequacy, but they implicitly disagree with the conclusion on reserve energy, suggesting that reserve energy should be considered in the South Island.
- 2.4.11 A more substantive summary of submissions, including the Commission's comments, may be found in Appendix 1.
- 2.4.12 In summary
- (a) Five of the nine submitters agree with the overall Annual Security Assessment conclusions. The other four submissions do not offer specific comment on the overall conclusions.
 - (b) Some revisions to assumptions were provided by Contact, but these did not have a significant impact on the assessment of reserve energy/capacity needs over the next few years.

2.5 Commission Decision on Reserve Energy/Capacity

- 2.5.1 The Commission's decision is
- (a) confirm its earlier decision not to procure additional reserve generation for 2009, but reserve the option to contract for demand-side options if the input assumptions change to the point that the security standard cannot be met; and
 - (b) adopt the same approach for 2010.

⁷ PowerNet manages the local distribution networks owned by Electricity Invercargill and the Power Company Limited.

⁸ Venture Southland is a Joint Committee of the Invercargill, Southland, and Gore Councils.

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Appendix 1 Summary of Submissions to 2008 Annual Security Assessment

1.1 Introduction

- 1.1.1 In October 2008 the Electricity Commission released the consultation paper *Annual Security Assessment 2008*, and invited submissions on the assessment.
- 1.1.2 The closing date for submissions was October 31, 2008. Nine submissions were received, as detailed below.

Retailer / Generator	Other
Contact Energy Genesis Energy Meridian Energy Mighty River Power	Major Electricity Users' Group (MEUG) PowerNet Transpower Vector Venture Southland

1.2 Summary

- 1.2.1 Key points from the submissions on the need for reserve energy/capacity:
 - (a) There was general agreement with the conclusion that reserve energy need not be procured. PowerNet and Venture Southland suggested reserve energy should be considered in the South Island.
 - (b) There was general agreement with the conclusion that reserve capacity need not be procured.
 - (c) Several submitters agreed with the conclusions while also having queries about the input assumptions (e.g transmission constraints, instantaneous reserves, effect of Thermal Moratorium on thermal supply assumptions, variations to dates/capacity of ne supply).
 - (d) Submitters noted that while the margins indicate adequacy, ultimately this assessment is reliant on the behaviours of market participants.
- 1.2.2 A number of other issues were raised in submissions. These are summarised in the table below. For the issues closely related to the consultation paper, comments of response/explanation have been added in italics.

Issue	Discussion
<p>Margins too simplistic - probabilistic analysis needed</p>	<p>The use of “simple” margins and assumptions has been interpreted as not capturing the probabilistic nature of the inputs, or that the use of “averages” did not reflect the likelihood of extreme events.</p> <p>Similarly, submissions reflect some confusion over the link between the adequacy margins being used as a procurement trigger versus being used as an operational tool, and the assumptions relevant in each instance. For example:</p> <ul style="list-style-type: none"> • Several submitters commented on the assumption used in the capacity margin assessment that wind is counted at 20% of installed capacity, noting that it is not possible to guarantee that the wind will be operating at the peak half-hour. • Meridian note that the winter start storage assumption will likely be incorrect given inflow variability. <p><u>Comment</u></p> <p><i>The methodology underpinning the definition of the energy and capacity margins incorporates uncertainty around demand, supply, transmission, and economic cost assumptions. For example, the capacity adequacy analysis considered the coincident outages of multiple thermal units at the same time and/or extended unit outages at the same time as variability in output from intermittent generation (wind, geothermal, uncontrolled hydro) and uncertain availability of schedulable hydro plant.</i></p> <p><i>The margins are the culmination of this analysis and reflect the economic trade-off between supply and demand based on a wide range of uncertainties. In any year, though, the outcomes will be unique. The margins reflect an assessment of what is considered acceptable given this natural variability.</i></p>

Issue	Discussion
	<p><i>With respect to the assumptions about wind and hydro storage:</i></p> <ul style="list-style-type: none"> • <i>The probabilistic analysis underlying the capacity standard considered variability to the output of all forms of generation coincidentally across a range of demands (not just the peak). With respect to wind, the analysis identified that the effective contribution of wind - given the existing plant mix and assuming a Tararua profile - is around 20% of its nominal capacity. The same economically optimal level of system capacity would be provided by an additional 100MW of wind or an additional 20MW of firm capacity (such as a peaker).</i> • <i>The start storage assumption used for determining energy margins reflects a reasonable expectation of start storage insofar as it will contribute to winter energy: it is not a prediction of what storage will be.</i>
<p>Are margins an operational or planning tool?</p>	<p>Transpower sought clarification about whether the margins are an operational planning tool for managing week to week or a trigger for future planning.</p> <p>Similarly, submissions reflect some confusion over the link between the adequacy margins being used as a procurement trigger versus being used as an operational tool, and the assumptions relevant in each instance.</p> <p><u><i>Comment</i></u></p> <p><i>The use of margins as a “long-term” planning tool for decisions >1 year is reflected in the structure and wording of the Security of Supply Policy. The margins are intended to be used for assessing the merit of new capacity over an entire winter and several thereafter; the margins reflect a standard at which incurring the cost of procuring reserve plant would be equivalent to the reduced cost of expected demand restraint. The margins are not intended to be used in an operational sense for assessing system security on daily or weekly basis.</i></p> <p><i>The “Development of a Capacity Adequacy Standard” report included a comparison with the NWG analysis and indicated that the capacity margin was of a similar level to the N-1 operational standard used by the NWG for operational assessments.</i></p>

Issue	Discussion
South Island demand forecasts	<p>PowerNet and Venture Southland both queried whether the demand forecasts reflected “bottom up” growth drivers in the region.</p> <p>MEUG commented that the growth rates might be slightly high, if anything, given current GDP forecasts.</p> <p><i><u>Comment</u></i></p> <p><i>While the demand forecasts are presented in summary form on the Annual Security Assessment, they are the end product of a separate (and detailed) consultation and analysis process. In early 2008 distributors were contacted as part of the process of developing forecasts, and specifically asked about demand growth drivers. The demand forecasts in the South Island have been adjusted upwards to include step-change drivers to industrial demand, such the impact of dairy industry growth (both at the farm and processing functions).</i></p>
Need for new South Island supply	<p>The conclusions section of the report included a sentence “...investment in generation in the South Island would be helpful”. This was focussed on by Meridian and PowerNet in their submissions.</p> <p>Meridian pointed out that that there appears to be some general confusion in resource consent hearings about the role of the Commission in planning generation and transmission and the documents associated with these roles (Annual Security Assessment and the SOO).</p> <p>Several parties commented on the contribution of HVDC charging to the lack of expected new South Island supply.</p>
Transmission adequacy and pricing regime	<p>There was concern about the ability of transmission and generation to meet demand in Southland (Meridian, PowerNet, Venture Southland).</p> <p>A similar comment was made about meeting demand in Auckland (Vector).</p>

1.2.3 Individual submissions are summarised in the next section.

1.3 Summary of responses by submitter

1.3.1 The following table outlines the issues raised by submitters.

	Submission
Contact	<p>Contact agreed with conclusions regarding procurement of reserve energy/capacity for 2009.</p> <p>Other comments:</p> <ul style="list-style-type: none"> • The HVDC charging regime has contributed to the lack of new South Island investment and should be reviewed. • Updated information was provided on its new supply. E.g., Stratford peakers now expected in Q2 2010 (not Dec 2009 as Contact indicated in July 2008 when assumptions were sought).
Genesis	<p>Genesis agreed with conclusions regarding procurement of reserve energy/capacity for 2009.</p> <p>Other comments:</p> <ul style="list-style-type: none"> • Capacity/energy adequacy requires good management of unit comment, which in turn requires good information and price signals. For example, the Special Winter Schedule (SWS) should be maintained, and Whirinaki offer can dampen ability of spot market signalling scarcity. • Effect of carbon policies on energy/capacity adequacy should be investigated by the Commission.
Meridian	<p>Meridian agrees with conclusions regarding procurement, noting that they are conditional on the availability of existing and new plant and ½ pole 1.</p> <p>Other comments:</p> <ul style="list-style-type: none"> • There are significant HVAC constraints undermining effectiveness of Whirinaki and ability to meet demand at peak times. • Clarity in EC's role in generation/transmission investment would be helpful. ASA implies that more SI generation would be helpful is at odds with SOO and contributing to delays in securing resource consents. • Concerned about security of supply in the Southland region and expected it will be an issue in Lower South Island GUP. • Desirable to have all components of Security of Supply Policy in "final form" and well communicated throughout the industry as well as the linkages between them (e.g., relationship between hydro risk curves and winter margins, link between risk curves and spill). • Would like to see assumptions about hydro spill relating to hydro risk curves.

	Submission
MEUG	<p>MEUG agree with conclusion regarding reserve/energy capacity for 2009.</p> <p>Other comments:</p> <ul style="list-style-type: none"> • Events since November 2007 exposed shortcomings in the behaviour of suppliers to manage energy resources optimally. • Continue publishing/improving information to enable parties to assess risk. • Noted corrections to two tables, and requested clarification of the status of Manapouri Tailrace proposal.
Mighty River Power	<p>Mighty River Power agrees that additional reserve energy should not be procured.</p> <p>Other comments:</p> <ul style="list-style-type: none"> • Commission's decision to offer Whirinaki below SRMC is likely to have a negative impact on future generation investment.
PowerNet	<p>(PowerNet manages the local distribution networks owned by Electricity Invercargill and the Power Company Limited).</p> <p>PowerNet made no explicit comment on energy/capacity adequacy, but they implicitly disagree with the conclusion on reserve energy, suggesting that reserve energy should be considered in the South Island over the next few years to cover growth and reliance on HVDC during upgrades.</p> <p>Other comments:</p> <ul style="list-style-type: none"> • Concern that South Island demand does not account for bottom-up drivers. • Noting that the market may not produce prudent management of generation resources • Commission should consider requesting authority to control power flows between the islands when supply to South Island consumers is at risk. • The HVDC charges should be charged on a dynamic basis to neutralise the financial deterrent to investment in South Island generation.

	Submission
Transpower	<p>Transpower did not comment on the need for reserve energy/capacity, but did broadly agree with the methodology.</p> <p>General comments:</p> <ul style="list-style-type: none"> • Consistency with SOO assumptions would be beneficial e.g., definitions of committed and highly likely. <p>Comments on capacity margins:</p> <ul style="list-style-type: none"> • Clarification of link between level of risk adopted in derivation of the planning standard and that applied operationally. • Work of the National winter Group should be considered, including mechanisms/funding for demand-side participation. • The impact of the generation portfolio should be accounted for (and a lower capacity value for wind should be used). • Belief that using H200 demand assumes a significant amount of load shedding is acceptable. • Summer capacity requires monitoring. • Interruptible load is provided for security situations to cover for generation at times of a contingency, so is double counted if included in the capacity margin calculations. <p>Comments on energy margins:</p> <ul style="list-style-type: none"> • Assumptions about thermal plant should be revised in light of Thermal Moratorium. • There is some inconsistency in plant status assumptions with the Grid Planning Assumptions.

	Submission
Vector	<p>Vector did not comment on the energy/capacity margins as they believe that the margins do not sufficiently reflect the input assumptions and that a probabilistic approach is needed that considers practical assessments of engineering risks.</p> <p>Comments on capacity margins:</p> <ul style="list-style-type: none"> • Capacity adequacy assessment for 2009 should have a greater focus on the operational status of generation/transmission assets. • Supply capacity should only include commissioned and committed plant. • Risk averse approach to contribution of wind should be used i.e., lower contribution. • Average of highest 200 hours of demand suitable for long-term planning, but not operational needs for next year. • Transmission constraints should be considered in much more detail. • Should reserve capacity be required, enforceable capacity obligations should be developed rather procurement of reserve capacity by the Commission. • Load control and other voluntary demand response should be enabled via the market design. <p>Other comments:</p> <ul style="list-style-type: none"> • Optimal energy margins should be derived past 2012.
Venture Southland	<p>(Venture Southland is a Joint Committee of the Invercargill, Southland, and Gore Councils).</p> <p>Venture Southland made no explicit comment on energy/capacity adequacy, but they implicitly disagree with the conclusion on reserve energy, suggesting that reserve energy should be considered in the South Island.</p> <p>Other comments:</p> <ul style="list-style-type: none"> • Concern about lack of reserve generation in the South Island given transmission constraints. • Control of North-South flows suggested for managing prudent South Island Hydro generation.