

# **Electricity Security of Supply Policy Review**

**Castalia's Consultation Paper**

**Report to MEUG**

**5 April 2007**

## **Preface**

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## Contents

<b>1. Introduction</b> .....	<b>1</b>
<b>2. Overview</b> .....	<b>1</b>
2.1 Scope of review .....	1
2.2 Optimal security of supply .....	2
2.3 Will the market achieve the desired standard? .....	3
2.4 Improving the current arrangements .....	4
<b>3. Key issues</b> .....	<b>5</b>
3.1 Optimal security of supply .....	5
3.2 Market failure .....	6
3.3 Improving current arrangements .....	6
3.3.1 Points of agreement.....	6
3.3.2 Points of disagreement .....	7
3.3.3 Other matters not considered by Castalia .....	9
<b>4. Summary and conclusions</b> .....	<b>9</b>

## Appendices

<b>Appendix A Castalia’s Questions and Responses</b> .....	<b>11</b>
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# 1. Introduction

In 2001 and 2003 low inflows into hydro storage lakes resulted in sustained high prices in the wholesale electricity market. The Government responded by arranging for the construction and commissioning of a reserve energy plant at Whirinaki and announced a reserve energy regime in September 2003. The regime was outlined in the draft Government Policy Statement on Electricity Governance (draft GPS) released in December 2003. In October 2004, the Electricity Commission (Commission) was given responsibility for implementing the reserve energy regime.

Under the regime the Commission is required to have an independent review of its operation undertaken by 30 June 2007.<sup>1</sup> Castalia were appointed by the Commission to undertake the independent review. It has issued a consultation paper and sought feedback on its preliminary views of the regime.<sup>2</sup> The Major Electricity Users' Group (MEUG) has commissioned NZIER to provide a report on Castalia's consultation paper. This paper is that report.

In the next section we provide an overview of the consultation paper. In section 3 we focus on a number of key issues that arise from the paper. The final section contains a summary and our conclusions. Responses to the various questions contained in Castalia's paper are included in Appendix A.

## 2. Overview

### 2.1 Scope of review

In its consultation paper Castalia sets out its preliminary analysis and draft recommendations relating to the following key questions:

- What is the optimal security of supply standard for New Zealand?
- Is it likely the market will deliver this level of security by itself?
- How have the current reserve energy arrangements operated and how well have they performed?
- What other approaches to achieving the desired security of supply should be considered, and how do they compare with the current arrangements?

We shall consider Castalia's treatment of each of these topics in turn.

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<sup>1</sup> Originally by 31 March 2007, but since extended by the Minister of Energy.

<sup>2</sup> Castalia, *Electricity Security of Supply Policy Review*, March 2007. (Hereinafter "Castalia".)

## 2.2 Optimal security of supply

Castalia notes that absolute security of supply is not a sensible or achievable objective. Instead it proposes a standard economic approach; that the optimal level of security of supply is that which minimises the total combined cost of un-served energy and security of supply mechanisms. The total combined costs are minimised when the marginal cost of demand restraint (i.e. un-served energy) will equal the marginal cost of additional reserve energy.

Castalia estimate the marginal cost of demand restraint. They note that at present any insecurity of supply in New Zealand results from dry year risks. In this circumstance, the demand restraints are voluntary or arranged with considerable advance warning and focused on loads that will suffer the least inconvenience from the cuts. Thus, the marginal costs of demand restraint is likely to be relatively low, and significantly below the Value of Lost Load (VoLL) which estimates the cost of unexpected and indiscriminate power cuts, including at peak times of power usage.

On the basis of savings achieved by voluntary responses to conservation campaigns in recent dry years, Castalia suggest that savings of 10 percent can be achieved in winter before the marginal cost of un-served energy reaches something close to \$2/kWh above the prevailing retail price (currently around 18c/kWh). Rationing of an additional 10 percent would take the marginal cost to \$4/kWh above the prevailing price. Castalia take this information (and the assumption of a linear demand curve for electricity in proximity to current market prices) to derive the following expression for the expected marginal cost of demand restraints:

$$18F + 2000 \text{ USE in c/kWh}$$

where F is the probability of at least some demand restraint and USE is the expected proportional amount of demand suppressed by conservation campaigns and rationing.

Castalia also develop an estimate of the expected marginal cost of increasing security of supply on the assumption that at the relevant balancing point the lowest cost reserves are from a diesel-fired plant. It comes up with the expression

$$20F + 1/\alpha$$

where F is as above and  $\alpha$  is the proportion of the year over which the dry year shortage materialises.

Castalia then use the condition that there will be marginal equivalence at the optimal point to estimate that the optimal level of security of supply is likely to:

- Involve an expected level of un-served energy each year of around 0.05 percent (range 0.025 percent to 0.1 percent);
- Equates to a probability of any demand restraint around 1-in-20 (range 1-in-11 to 1-in-35); and
- Implies an optimal annual energy margin of about 15 percent (range 12 percent to 17 percent).

It seeks feedback on its methodology and these preliminary estimates.

Castalia notes that if its estimates are accepted, the current 1-in-60 standard is more stringent than is optimal, but that the previous “7 percent ECNZ dry year security margin” is in line with Castalia’s preliminary estimates of the optimal level of security of supply.

## 2.3 Will the market achieve the desired standard?

Castalia conclude that:

*On reasonable investment projections over the next ten years, the expected gross energy margin for the New Zealand electricity system may fall below plausible estimates of the optimal level of reserve margin, save for the availability of energy from Whirinaki .. [and] with more conservative assumptions, the expected gross margin may be too low even with Whirinaki.<sup>3</sup>*

Castalia believes it cannot rule out the possibility of a market failure in the provision of reserve energy and it cannot determine which of following three broad categories any market failure may fall into:

- Contingency-specific failure – the market fails to provide the socially optimal security of supply in relation to some specific contingency, like a very dry year, but otherwise generally delivers the required level of resources;
- Periodic failure – on average the market provides the socially optimal security of supply but is prone to error from time to time; and
- Systematic failure – on average and in general, the market fails to provide the socially optimal security of supply.

Castalia assesses four options for providing security of supply:

- Current arrangements, perhaps with minor changes – the Commission adopts a “watchdog” role and stands ready to intervene at the last minute if it becomes necessary, and is ready to move on to more comprehensive options if the frequency and significance of its *ad hoc* interventions suggested this is necessary;

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<sup>3</sup> Castalia, p.7.

- Procure all hedges – centralised tendering for energy adequacy hedges covering all energy demand likely in a year;
- Procure all hedges with opt-out – centralised tendering for energy adequacy hedges for the proportion of load that load serving entities have not already hedged themselves; and
- Market augmentation – a decentralised approach built around tradable obligations to hold energy adequacy hedges. All load serving entities would be required to hold hedges to meet their expected load or face penalties.

In view of its uncertainty of whether there is market failure and, if there is, the kind of failure, Castalia are of the view that the appropriate approach is to continue with the current arrangements (with enhancements) and, as experience with the frequency and kind of failures increases, to assess whether some more interventionist type approach involving energy hedges is required.

## 2.4 Improving the current arrangements

Castalia having recommended that, for a time at least, the current reserve energy arrangements should continue, considers possible improvements to them. Castalia's recommendations are:

- Introduce a clear delineation between the roles of the primary legislation (the Electricity Act 1992), the GPS (the regime) and the practical implementation of both (the policy). Under the current framework the GPS goes much further than setting the quantitative objectives and boundaries of the Commission's powers and deals with operational aspects. These should be left to the Commission to determine;
- The existing universal levy mechanism should be retained for the present assets and if the Commission intervenes to buy more reserve energy assets these should also be funded by a universal levy. If the Commission moves to an energy adequacy hedge scheme then the costs should be recovered from those on whose behalf the Commission acts;
- The Commission should set a clear trigger for the procurement of additional reserve energy. This should be expressed in terms of a desired energy margin.<sup>4</sup> Castalia's preliminary calculations indicate that the minimum desired energy margin should be between 12 and 17 percent.<sup>5</sup> The Commission should procure additional reserve energy when it becomes clear that the actual energy margin will fall below the minimum desired level;

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<sup>4</sup> Energy margin is the difference between the expected amount of energy that can be provided and the expected demand, expressed as a percentage of the expected electricity demand.

<sup>5</sup> There is some inconsistency within the Castalia report as to whether the lower bound is 11 percent or 12 percent.

- The Commission should define a clear process of how procurement of additional reserve energy would actually take place. The options entitled to tender should be diesel or gas-fired peaking plant, like Whirinaki, or contracted demand responses;
- The Commission's current framework for managing conflicts of interest related to its role as a regulator and market participant (in relation to reserve energy assets) is good and does not need to be changed;
- At present, if the minzone has been breached, Whirinaki is dispatched at 20c/kWh or at the variable cost of the fuel, if that is higher. The plant should be dispatched at its short run marginal cost (SRMC). With future reserve energy plants, the same approach should be adopted;
- The Commission should provide more information on how it calculates the minzone and should tailor its information to the needs and expertise of its various audiences. The need to protect commercially sensitive information that forms an important input into the Commission's calculations will limit the extent of disclosure, however;
- The Commission should make it clear that the minzone boundary records where the risk of some demand restraint reaches 1-in-60, not where conservation campaigns are required; and
- It is appropriate for the Commission to retain the current voluntary approach to information gathering for its reserve energy policy, but this decision should be revisited from time to time, especially if the quality of the information provided appears to deteriorate.

### **3. Key issues**

#### **3.1 Optimal security of supply**

- We agree with Castalia's decision to adopt an economic approach to defining the optimal level of security of supply;
- We agree with Castalia that this approach will need to be carefully explained;
- We agree with the actual definition of the optimal level of security of supply Castalia has adopted;
- We consider Castalia's estimates of the marginal costs of demand restraint and security reserves to be appropriate;
- We agree the marginal costs of demand constraint by voluntary measures and arrangements made considerably in advance of implementation is likely to be relatively low, and significantly below the VoLL which relates to the cost of unexpected and indiscriminate power cuts, including at peak times of power usage;
- We accept as appropriate Castalia's estimates and ranges for the optimal points of un-served energy (0.05%, 0.025% to 0.1%), probability of



demand restraint (1-in-20, 1-in-11 to 1-in-35) and annual energy margin (15%, 12% to 17%); and

- We support Castalia’s view that the current security of supply criteria of 1-in-60 is a higher level than is optimal when the marginal costs of security of supply are compared with the marginal benefits.

## **3.2 Market failure**

We are not convinced by Castalia’s discussion of market failure. We note that in the graphs on p.48 of the consultation paper, only when plant delays beyond what has been assumed are modelled does the gross security margin fall below the lower boundary of the energy margin Castalia suggests is appropriate. Moreover, the lower boundary is only breached for projections made assuming Whirinaki is not available. Those currently planning generation investment will almost certainly have assumed Whirinaki will continue to exist, in some form. Thus, the “without Whirinaki” forecasts are not relevant to judging whether current investment intentions around generation capacity are consistent with market failure in the provision of the optimal security of supply.

In our view, the evidence presented by Castalia does not support it agreeing as readily as it appears to do that there is some risk the market will fail in the provision of security of supply. We think the situation would be better characterised as one in which the evidence does not support any claim there is or has been market failure or anything to suggest it will fail in future in regard to security of supply, but the evidence is not robust enough to completely rule out the possibility of failure in the future. The difference is subtle, but we believe important when it comes to considering how Whirinaki should be paid for.

Although we see the evidence relating to potential market failure slightly differently than Castalia this does not lead us to a different conclusion as to the strategy the Commission should adopt. We think the “watchdog” role is still the appropriate one as this will allow the Commission to act if market failure does emerge, even though we do not see anything to suggest it will.

## **3.3 Improving current arrangements**

### **3.3.1 Points of agreement**

We agree with Castalia’s recommendations relating to:

- The need for a clearer delineation between the roles of the Act, the GPS and the Commission’s reserve energy policy and for the operational matters to be left to the Commission and not be spelt out in the GPS;

- The need for the Commission to set a clear trigger for the procurement of additional reserve energy policy and that the trigger should be defined in terms of the actual energy margin;
- The need for the Commission to define a clear process for the procurement of additional reserve energy and that demand side response should be one potential source considered;
- The appropriateness of the Commission’s current framework for handling conflicts of interest between its role as a regulator and its role as a market participant in relation to reserve energy assets;
- That Whirinaki should be offered and dispatched on the basis of its SRMC;
- The need for the Commission to provide, within the constraints of having to retain commercially confidential information, more information and explanation about its minzone and what it means; and
- The appropriateness of the Commission retaining the current voluntary approach to information gathering, subject to periodic review of the arrangement.

### **3.3.2 Points of disagreement**

We do not agree with Castalia’s view that the existing universal levy mechanism should be retained for the present reserve energy assets and if the Commission intervenes to buy more reserve energy assets these should also be funded by a universal levy.

Castalia puts forward the following reasons to support retaining the current levy:

- The process of sharing the costs amongst loads to the extent they were not hedged would be complex to implement;
- The plant cost is now largely sunk so we see no signalling role for the existing levy;
- Retailers and major users who at the time the policy was first introduced were already adequately hedged, will have lost some value in their existing hedges but will often have had some opportunity to trade to readjust their position;
- “A shift to recovering Whirinaki costs through general taxation is unwarranted. Reserve energy is not a public good. The beneficiaries of reserve energy ... are electricity consumers not tax payers in general, even though there is a strong overlap.”<sup>6</sup>
- Appealing to fairness seems inconclusive here:
  - The uniform levy is “clearly unfair to fully hedged major users, but

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<sup>6</sup> Castalia, p. 66.

- Reallocating the costs just to those loads that were less hedged at the time would seem unfair because they were given no opportunity to “opt-out” by hedging more themselves.”<sup>7</sup>

The principal point of disagreement we have with Castalia is over its claim that electricity consumers are the beneficiaries of reserve energy. We believe that the intended and actual beneficiaries of the purchase and contracting of Whirinaki was politicians and not consumers. The policy was adopted without consultation or public debate in reaction to 2003 being the second “dry year” in three years. The policy was a response to a perception among politicians they had to be seen to act decisively to increase the ‘security of supply’.

Castalia’s work shows that the 1-in-60 criteria set by politicians in the early 1990s and used to define the current regime is well above the optimal security level when the marginal costs of security are equated to the marginal value of its benefits. In our view, Castalia’s work also shows that if the yardstick of at least a 15 percent energy margin had been used, Whirinaki would never have been acquired for security of supply reasons by the Government.

Whirinaki is an asset which was bought principally for political purposes, and not for rational economic ones. As such, the costs of the plant in excess of its revenue should be a charge on the general tax payer. This will provide a clear signal that if politicians want to acquire assets for the management of their own political risks they should raise the taxes to pay for them transparently rather than foist the costs on consumers through a general levy.

There is clear precedent in the legislative provisions under which Crown Research Institutes and State-owned Enterprises operate for our suggested approach. If the Ministers in charge of these entities wants them to take on liabilities or activities that they do not want to take on then the organisations are entitled to request to have the consequential costs covered from general revenue.

If charging the net costs of Whirinaki to general revenue is not acceptable, then we consider that those organisations which have adequate hedge arrangements of their own should be exempt from the levy, despite the transaction costs of doing so. Not to allow opt-out in this way is to disincentivise organisations from managing dry year risk using their own initiative. This exemption should extend to users who have entered into hedge arrangements on the market, operate their own back-up and generation plants, or are willing to disconnect as load if required to do so for security reasons.

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<sup>7</sup> Castalia p. 66.

Since we can see no reason to suspect the market will fail to deliver an optimal level of security of supply, we do not envisage that if Castalia's recommendations are adopted any further purchases of reserve energy assets will be required. If assets are bought to satisfy political objectives then, in our view, they should be funded by general taxation. If evidence of market failure does emerge then we consider it important that any charges to cover additional reserve energy requirements should not fall on those that have already taken steps to adequately manage the risk themselves. To impose costs on this group will disincentivise self-management of such risks and is inefficient.

### **3.3.3 Other matters not considered by Castalia**

We agree with Castalia's proposal that the Whirinaki reserve energy plant should be offered into the market at its SRMC. However, this raises a point that is not discussed by Castalia. If the plant was privatised it would be offered into the market by its owner at its SRMC, the same as Castalia are now proposing. The reason for the plant staying in public ownership disappears if this is to be its offer strategy. Given the savings on contract negotiation and monitoring that a one-off sale would achieve relative to on-going operation by contract for the Commission and ownership by the Crown, net benefit considerations appear to suggest the plant should be privatised. This would allow the capital loss resulting from the decision to purchase the plant to be crystallised and written off.

A further matter not considered by Castalia is the economics of the location of reserve energy assets. From time to time it is suggested that the Whirinaki plant should be relocated to Auckland so as to allow the upgrade of the grid from the central North Island to Auckland to be deferred for some time. It would be desirable if Castalia considered this issue as part of its review of the reserve energy policy; the efficiency of reserves may depend in part on their location and Castalia have not addressed this issue.

## **4. Summary and conclusions**

- We agree with Castalia's decision to adopt an economic approach to defining the optimal level of security of supply.
- We agree with the actual definition of the optimal level of security of supply Castalia has adopted.
- We consider Castalia's estimates of the marginal costs of demand restraint and security reserves to be appropriate.
- We agree the marginal costs of demand constraint by voluntary measures and arrangements made considerably in advance of implementation is likely to be relatively low, and significantly below the VoLL which relates to the cost of unexpected and indiscriminate power cuts, including at peak times of power usage.

- We accept as appropriate Castalia’s estimates and ranges for the optimal points of un-served energy (0.05%, 0.025% to 0.1%), probability of demand restraint (1-in-20, 1-in-11 to 1-in-35) and annual energy margin (15%, 12% to 17%).
- We support Castalia’s view that the current security of supply criteria of 1-in-60 is a higher level than is optimal when the marginal costs of security of supply are compared with the marginal benefits.
- In our view, the evidence presented by Castalia does not support it agreeing as readily as it appears to do that there is some risk the market will fail in the provision of security of supply.
- We think the situation would be better characterised as one in which the evidence does not support any claim there is or has been market failure or anything to suggest it will fail in future in regard to security of supply, but the evidence is not robust enough to completely rule out the possibility of failure in the future.
- We think the “watchdog” role is still the appropriate one as this will allow the Commission to act if market failure does emerge, even though we do not see anything to suggest it will.
- We agree with Castalia’s recommendations relating to: the clear delineation of roles; the need for a clear trigger and process for the procurement of additional reserve energy; the dispatch of Whirinaki at its SRMC; the provision of more information and explanation about minzone; and, the retention of the voluntary approach to information gathering.
- We disagree with Castalia’s view that the existing universal levy should be retained for the present assets and used for any additional assets.
- We believe the existing assets should be a charge on general revenue to reflect the political objectives for which they were bought and if that is not possible, parties with their own hedge arrangements should be exempt.
- We believe these same criteria should be applied to charges for any additional reserve assets acquired. If bought for political reasons then should be paid for by general taxation. If bought to deal with market failure, then levy should exempt those adequately hedged already.
- We question why Whirinaki should not be privatised if, as Castalia suggests, and we agree, it should be offered at its SRMC.
- We also consider that Castalia should consider the common suggestion that Whirinaki should be relocated to Auckland to defer the need for additional investment in the grid from the central North Island to Auckland.

## Appendix A Castalia's Questions and Responses

Castalia Question	Response
What are your views on adopting an economic approach to choosing the level of security of supply?	We support the economic approach. We also support Castalia's suggestion that this approach will need to be explained to politicians and the general public.
Can the predominant energy security of supply problem be quantified adequately as a winter energy deficit?	Yes. This is the issue for New Zealand and, as Castalia notes, this is a relatively unusual characteristic of the New Zealand electricity market.
What marginal costs should be attributed to demand restraint at various levels?	We believe Castalia's estimates are appropriate.
Do you agree with the proposed use of a simple percentage annual energy margin as the operational standard for security of supply?	Yes. We support the use of the energy margin as the operational indicator of security of supply but think locational factors might also be considered in some instances.
What are your views on the acceptable expected level of un-served energy each year relative to the range between 0.03 percent and 0.1 percent of total annual demand identified in this paper?	We consider Castalia's estimates of the optimal expected level of un-served energy to be appropriate.
What are your views on how to translate the acceptable level of un-served energy into a probability of	We agree with Castalia's approach.

demand restraint and an energy margin?	
Do you agree that there is insufficient evidence to be able to assess the likely frequency or magnitude of any electricity market failure in respect of security of supply?	We believe the evidence does not support any claim there is or has been market failure or anything to suggest it will fail in future in regard to security of supply, but the evidence is not robust enough to completely rule out the possibility of failure in the future.
Do you agree that, given the uncertainty about market failure, the best policy going forward is to adopt a “watch dog” approach?	We agree this is the best policy for the Commission.
Do you agree that the scope of the regime and policy should be clarified to give the Commission more operational flexibility?	We agree.
Do you agree the current levy arrangements should remain in place?	No we do not agree. We believe that Whirinaki was bought and commissioned for essentially political reasons and that as a result it should be funded out of general taxation to ensure that there are clear signals that if politicians want to buy assets for political objectives they should also be responsible for raising the taxes to pay for them transparently. If this approach is unacceptable, then the levy should not impose charges on those that have made adequate arrangements themselves to manage security of supply through entering hedges, installing reserve capacity or their own-co-generation facilities or to provide interruptible load.
Do you agree that the procurement process should be pre-announced and that a clear trigger for procurement be established in terms of an annual energy margin?	We agree.

<p>Do you agree that no further compulsory requirements should be imposed for the provision of information to the Commission?</p>	<p>We agree with no further compulsory requirements for provide information in relation to security of supply matters unless the quality of information being provided deteriorates and there is a clear net benefit from imposing compulsory information disclosure obligations.</p>
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