



ELECTRICITY COMMISSION

Security of Supply Policy

October 2008

1 Approach to Security of Supply

The Electricity Commission (Commission) will adopt an approach to ensuring security of supply that includes:

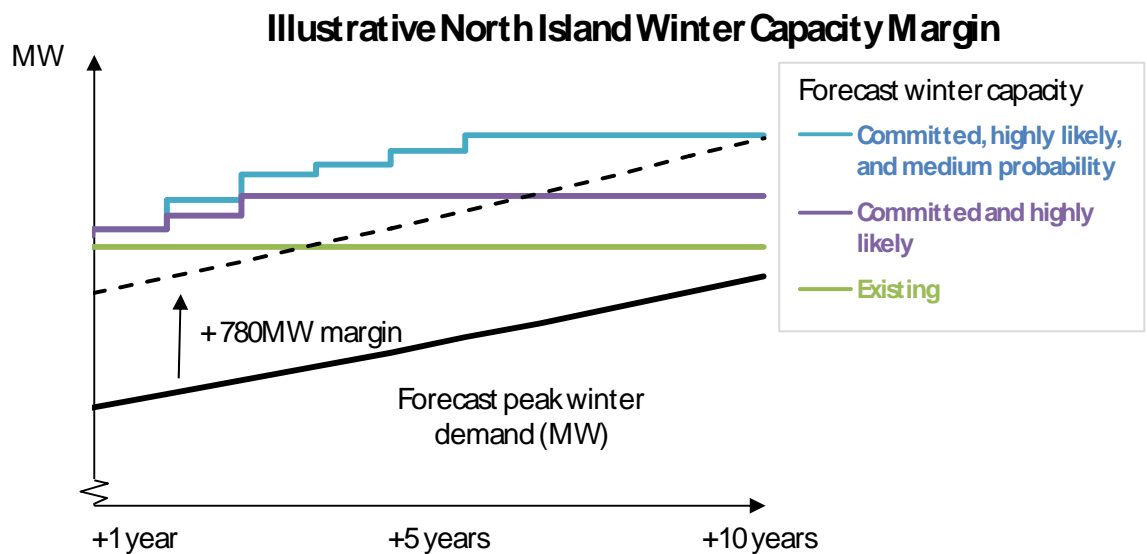
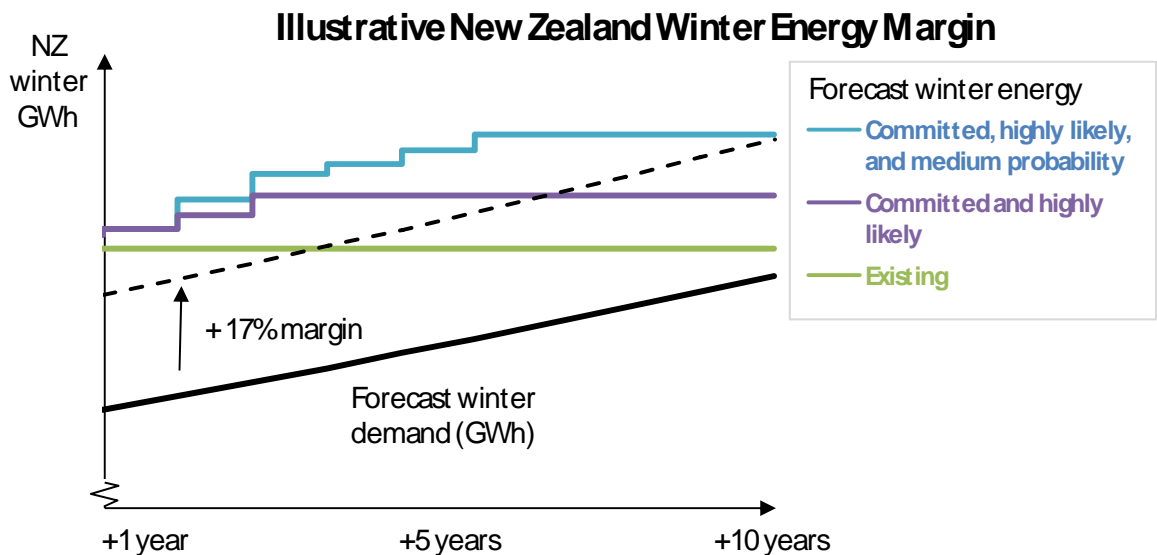
- A strong focus on providing information and analysis of supply and demand and security of supply, in order to maximise the opportunity for market participants to manage security of supply risks.
- Monitoring security of supply in the long term (up to 10 years) and publishing forecasts to provide information to assist participants to assess future supply risk and investment decisions. The aim is to avoid the requirement for reserve energy by encouraging timely investment decisions.
- Assessing **Reserve Energy and Capacity** needs in the medium term (2 to 5 years) by forecasting supply and demand and calculating the **Winter Energy Margin** and the **Winter Capacity Margin**. If insufficient new generation or demand side initiatives are forthcoming then additional **Reserve Energy or Capacity** may be required to be contracted. The decision to contract will be delayed as long as possible in order to provide as much opportunity for other solutions to be implemented and to reduce the possibility of redundant **Reserve Energy or Capacity**.
- Monitoring security of supply in the short-term (less than eighteen months) and regularly publishing assessments of current hydro storage levels relative to **Hydro Risk Curves** in order to encourage participants to understand supply risks and manage security of supply as much as possible.
- Monitoring market outcomes as a security of supply situation develops and publishing expectations of outcomes that would be consistent with ensuring security of supply.
- Closely monitoring supply and demand whenever storage falls to a level assessed as a 1% risk of future electricity shortage and assessing whether all non-hydro plant is operating at levels consistent with the assumptions that underpin the **Hydro Risk Curves**.
- Considering whether to trigger the utilisation of contracted **Reserve Energy if storage falls below the relevant Hydro Storage Guideline**, and the **Reserve Energy** option is not already in operation due to the price trigger.
- Considering what other action may be necessary if all non-hydro plant is not operating at levels consistent with the assumptions that underpin the **Dispatch Guidelines**.

2 Long-term Security of Supply

Forecasting Long-term Supply and Demand

The Commission will publish, at least annually, ten year forecasts of supply and demand for each of the North and South Islands. These forecasts will include assessments of energy and capacity adequacy.

The forecasts will include an assessment of committed generation projects, projects that are assessed as highly likely to proceed, and projects that could possibly proceed. The forecasts will include an assessment of the **Winter Energy Margin** and **Winter Capacity Margin** for each year, as illustrated (conceptually) in the following charts.



Monitoring New Supply

The Commission will monitor and record generation investment intentions and actual generation investments, with a view to determine if market participants are consistently failing to deliver new capacity sufficient to meet energy and capacity adequacy standards.

If the Commission determines that there is a market failure, it will investigate alternative approaches to the reserve energy regime (including the possibility of energy adequacy hedges) and consider whether to recommend an alternative approach to the Minister.

Assessing the Need for Reserve Energy or Capacity

The Commission will undertake and publish, at least annually, assessments of the need for **Reserve Energy or Capacity** by calculating projections of the **Winter Energy Margin** and **Winter Capacity Margin**. These assessments will include committed generation projects and projects that are assessed as highly likely to proceed.

Determining the Winter Energy Margin

The **Winter Energy Margin** will be determined by dividing **Expected Supply** for the whole of New Zealand (or the South Island) by **Expected Demand** for the whole of New Zealand (or the South Island) and subtracting one.

The Commission will review **Expected Supply** and **Expected Demand** at least every six months and whenever there is a change in supply or demand that could lead to a material change in the **Winter Energy Margin**.

Expected Supply (ES) will be determined by the following formula (all units in GWh):

$$ES = T + W + B + H$$

T = Maximum expected thermal generation available to meet winter (1 April to 30 September) energy demand allowing for forced and scheduled outages, available fuel supply and transmission constraints

W = Expected winter (1 April to 30 September) wind generation based on long-run average supply

B = Expected winter (1 April to 30 September) generation available from geothermal and cogeneration plants based on long-run average supply

H = Expected winter (1 April to 30 September) hydro generation based on mean inflows and including expected 1 April start storage of 2750 (2400) GWh for New Zealand (South Island).

The calculation of the South Island margin will account for the effect of transmission and other factors limiting the contribution of all North Island supply to South Island demand.

Expected Demand will be determined by forecasting the demand for electricity generation during the period 1 April to 30 September, at the points on the national transmission system at which generation enters the grid, allowing for the **Normal Demand Response** to electricity prices.

The **Normal Demand Response** will be determined by estimating the demand reduction that typically occurs in the electricity market in response to periods of high spot prices and excludes any demand response that arises from energy savings campaigns or the forced rationing of demand.

Determining the Winter Capacity Margin

The **Winter Capacity Margin** will be determined by subtracting a measure of North Island **Expected Demand** from North Island **Expected Capacity**.

The Commission will review **Expected Capacity** and **Expected Demand** at least every six months and whenever there is a change in supply or demand that could lead to a material change in the **Winter Capacity Margin**.

Expected Capacity (EC) will be determined by the following formula (all units in MW):

- $$EC = T + W + B + H + DRIL + SI$$
- T** = Installed capacity of North Island thermal generation sources allowing for forced and scheduled outages
 - W** = 20% of North Island wind capacity
 - B** = Expected winter daytime (1 April – 31 October between 7am and 10pm) generation available from North Island geothermal plant, the aggregate of all North Island cogeneration plants, and the aggregate of all North Island uncontrolled hydro schemes.
 - H** = Installed capacity of North Island controllable hydro schemes allowing for forced and scheduled outages and derated to account for energy and other constraints which affect output during peak times
 - DRIL** = Expected demand response and interruptible load over the highest 200 half hours of winter demand (1 April – 31 October between 7am and 10pm)
 - SI** = The effective contribution of South Island capacity to North Island demand accounting for factors such as transmission limits and South

Island demand (1 April – 31 October between 7am and 10pm).

Expected Demand will be determined as the average of the highest 200 half hours of forecast North Island winter daytime demand (1 April – 31 October between 7am and 10pm) at the points on the national transmission system at which generation enters the grid (with losses added). Unless noted otherwise, the relevant timeframe for these calculations is winter daytimes, which is defined as 1 April to 31 October between 7am-10pm¹.

Procuring Reserve Energy or Capacity

The Commission will consider the procurement of **Reserve Energy**, if, within a period of three years from the time of the assessment:

- the **Winter Energy Margin** is forecast to fall below 17%² for New Zealand as a whole; or
- the **Winter Energy Margin** is forecast to fall below 30%² for the South Island.

The Commission will consider the procurement of **Reserve Capacity**, if, within a period of two years from the time of the assessment:

- the **Winter Capacity Margin** is forecast to fall below 780MW².

Procurement of **Reserve Energy** or **Capacity** is contingent on the Commission considering that it is unlikely that sufficient new supply-side or demand-side options will be put in place by any market participant. In procuring **Reserve Energy** or **Capacity** the Commission will consider all the options available to it including a tender process, direct negotiation with possible suppliers of **Reserve Demand**, and direct negotiation with possible suppliers of **Reserve Generation**.

The Commission will procure the option that it considers will, in combination, best satisfy the following requirements;

- Minimising the cost of the **Reserve Energy** or **Capacity**;
- Minimising the risk that **Reserve Energy** or **Capacity** affects the incentives for market participants to respond to high spot prices;

¹ This definition of winter is different from that used for determining winter energy margins as it reflects the period over which thermal capacity is typically planned to be available.

² These figures are the Commission's assessment of the margins that minimise the cost of reserve energy and/or capacity and the expected cost of unserved energy.

- Minimising the risk that **Reserve Energy or Capacity** affects the incentives for market participants to invest in new capacity;
- Minimising the risk that **Reserve Energy or Capacity** affects the incentives for market participants to invest in demand-side management;
- Minimising the risk that **Reserve Energy or Capacity** affects the incentives for market participants to enter into hedge contracts and other risk management arrangements.

The assessment of **Reserve Energy and Capacity** options will be undertaken with the overall objective of maximising welfare by assessing the likely impacts on static and dynamic efficiency, noting that reserve energy contracted for meeting the **Winter Energy Margin** may improve the **Winter Capacity Margin**, and vice versa.

The Commission notes that application of these requirements should provide a preference for **Reserve Energy and Capacity** options which tend to have low fixed cost and high variable costs. It would also require that the Commission provide the market every opportunity to respond to the risks without intervention, to delay intervention as long as possible and to have a preference for short term contracts.

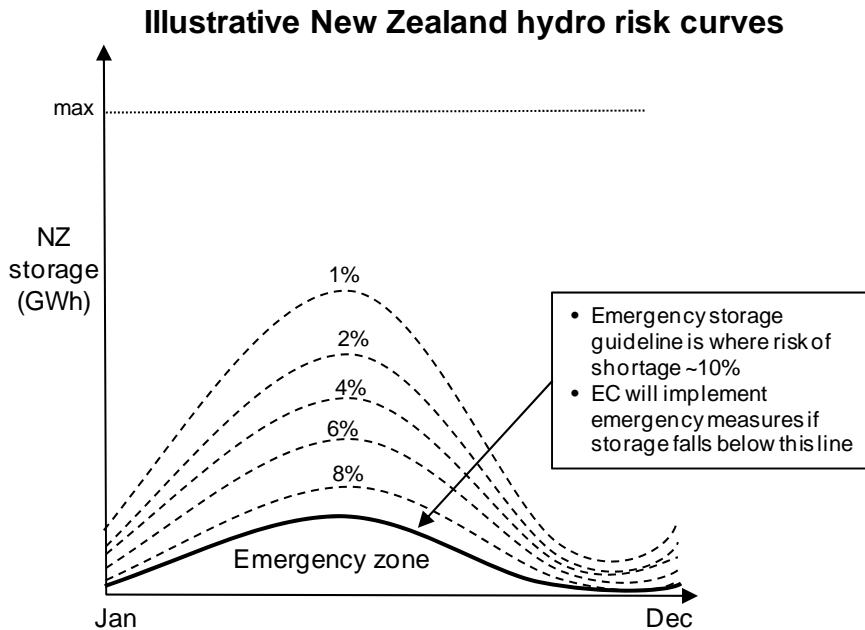
3 Short-term Security of Supply

Monitoring Hydro Storage

The Commission will monitor hydro storage and publish assessments of short-term security of supply at least monthly by comparing hydro storage against **Hydro Risk Curves**. **Hydro Risk Curves** will be determined for New Zealand as a whole and for the South Island and will take into account any transmission constraints that are likely to have a material effect on the curves.

The **Hydro Risk Curves** will reflect the risk of future electricity shortages taking into account the range of likely inflows to hydro catchments. The **Hydro Risk Curves** will be updated whenever there is a change in supply, demand, or transmission that is likely to yield a material change to the curves.

The **Hydro Risk Curves** will reflect estimates of 1%, 2%, 4%, 6%, 8%, and 10% risk of electricity shortages taking into account the range of likely inflows to hydro catchments. The **Emergency Storage Guideline** will correspond to a 10% risk of electricity shortages. The risk curves will take the form illustrated in the following chart.



Dispatching Reserve Energy or Capacity

Consistent with the requirements of the Government Policy Statement, **Reserve Energy** or **Capacity** options will normally be offered for dispatch at the higher of \$200 per MWh or the variable cost of the particular **Reserve Energy** or **Capacity** option.

The Commission will develop and publish a specific **Dispatch Policy** for each **Reserve Energy** or **Capacity** option that takes into account the characteristics of the option (for example to account for the likely cost of running for very short periods). Individual dispatch policies could lead to complex offer structures involving several offer prices reflecting different circumstances.

The Commission will also develop a **Dispatch Guideline** for each **Reserve Energy** option that reflects the level of storage at which it expects each particular **Reserve Energy** option to be dispatched.

If storage falls below the **Dispatch Guideline** for a particular **Reserve Energy** option, and the market price is not sufficiently high for that **Reserve Energy** option to be operating, and the Commission is satisfied that the **Reserve Energy** option would contribute a material benefit to security of supply, it will adjust the offer for dispatch of that option to ensure that it does operate. Under these circumstances the Commission will investigate why market prices were not sufficiently high for Reserve Energy to operate and consider whether any changes to security of supply policy may be necessary.

Managing Emergencies

If storage falls below the ***Emergency Storage Guideline*** the Commission will initiate a series of emergency measures that are set out in the ***Emergency Response Plan***.

As storage falls towards the ***Emergency Storage Guideline*** the Commission anticipates that industry participants will, either individually or collectively, take actions to assist security of supply. If this is the case, some of the emergency measures contemplated by the ***Emergency Response Plan*** may already be in place when storage falls below the ***Emergency Storage Guideline***.

Managing Conflicts of Interest

The Commission will manage any conflict of interest between its role as a contractor for ***Reserve Energy*** and its role as a regulator, by the publication of (and transparent compliance with) clearly articulated security of supply policies including:

- The key details of ***Reserve Energy*** contracts;
- The key details of the dispatch policy for each ***Reserve Energy*** option;
- Ex-post information on ***Reserve Energy*** offers and operations.

It is intended that the Commission will not have an operational role and will not be making day-to-day decisions about offers to the market. Compliance with the Electricity Governance Regulations is therefore the responsibility of the party managing the operational interface with the wholesale electricity market.

4 Glossary

<i>Base-load Generation</i>	Electricity generation that is designed to operate continuously for most of the year (typically with high fixed costs and low running costs)
<i>Capacity</i>	The capability of generating plant to produce energy per unit of time (often expressed in megawatts)
<i>Capacity adequacy</i>	Having enough capacity to meet high levels of demand while allowing for generation plant outages
<i>Dispatch policy</i>	A policy developed by the Commission which determines the basis on which <i>Reserve Energy</i> will be offered into the wholesale electricity market
<i>Emergency Response Plan</i>	A plan developed and published by the Commission which sets out the particular emergency measures and the sequence they will be called upon, in the event that storage falls below the <i>Emergency Storage Guideline</i>
<i>Emergency Storage Guideline</i>	The profile of New Zealand (or South Island) hydro storage over a calendar year which represents a 10% risk of future electricity shortages
<i>Energy adequacy</i>	Having enough generating plant and fuel to meet electricity demand over a defined time period
<i>Energy adequacy hedges</i>	A generic term encompassing a range of possible <i>hedge contract</i> arrangements designed to ensure that retailers and major users have sufficient energy supply available to them in a dry year
<i>Expected Capacity</i>	An estimate of electricity capacity over a particular period of time (MW)
<i>Expected Demand</i>	A mean estimate of electricity demand over a particular period of time (GWh or MW)
<i>Expected Supply</i>	A mean estimate of electricity generation over a particular period of time (GWh)
<i>Forced outages</i>	Outages of generation or transmission equipment that are unexpected or un-planned

<i>Hedge contracts</i>	Contracts between generators and wholesale electricity market purchasers which have the effect of fixing the wholesale price of electricity for a certain quantity for a certain time regardless of the actual wholesale electricity market spot price at that time
<i>Hydro Risk Curve</i>	The profile of New Zealand (or South Island) hydro storage over a calendar year which represents a certain risk of future electricity shortages (curves for 1%, 2%, 4%, 6%, 8%, and 10% risk are produced)
<i>Dispatch Guideline</i>	The profile of New Zealand (or South Island) hydro storage at which a reserve energy option is expected to be dispatched.
<i>Long-run average supply</i>	The average generation from a wind farm calculated over many years of history
<i>Mean inflows</i>	The average of hydro inflows across all available history for particular catchments for a particular time period
<i>Non-hydro plant</i>	All electricity generating power stations that are not hydro-electric and including geothermal, wind and thermal power stations
<i>Normal Demand Response</i>	The demand reduction that typically occurs in the electricity market in response to periods of high spot prices and excludes any demand response that arises from energy savings campaigns or the forced rationing of demand
<i>Reserve Capacity</i>	Energy procured to meet security of supply objectives relating to capacity adequacy
<i>Reserve Demand</i>	Electricity demand reductions procured to meet security of supply objectives
<i>Reserve Energy</i>	Energy procured to meet security of supply objectives relating to energy adequacy
<i>Reserve Generation</i>	Electricity generation procured to meet security of supply objectives
<i>Scheduled outages</i>	Outages of generation or transmission equipment that are planned to occur (typically to allow for maintenance)
<i>Winter Energy Margin</i>	The difference between the expected amount of energy that can be supplied and expected demand during the period 1 April to 30 September, expressed as a percentage of expected demand
<i>Winter Capacity Margin</i>	The difference between a measure of the expected capacity and demand from 1 April – 31 October between 7am and 10pm, expressed as a MW margin over demand