Meeting Date: 24 October 2018

Review of Regulatory Settings for Official Conservation Campaigns

Security and Reliability Council

The Electricity Authority and the system operator are coordinating interdependent projects to review the set of arrangements governing official conservation campaigns. The key issue is whether to include (and if so, how to include) in the relevant modelling any hydro storage that can be used only during electricity shortages.

Note: This paper has been prepared for the purpose of the Security and Reliability Council (SRC). Content should not be interpreted as representing the views or policy of the Electricity Authority.

Contents

Review of regulatory settings for official conservation campaigns

The Authority and the system operator are running projects to review security of supply related arrangements

This paper seeks the SRC's feedback on the key issues from two related and inter-dependent projects:

a) The Authority's review of regulatory settings for official conservation campaigns (OCCs)

b) The system operator's review of the Security of Supply Forecasting and Information Policy (SOSFIP).

The two projects are interdependent for several reasons:

a) If the review of the SOSFIP changes how risk is measured, the Authority would need to revisit:

   i. its previous decisions about appropriate levels of risk to start and stop OCCs

   ii. its reserve supply determination that enables access to some of the water in lakes Tekapo and Haweā.

b) If the Authority's review changes Code requirements relating to OCCs, the system operator needs to reflect these in its proposed version of the SOSFIP.

The scopes of the projects dovetail with each other to ensure coverage of all relevant issues.

The relevant project teams expect to consult with stakeholders beginning in late November. Following consultation, the system operator will recommend a version of the SOSFIP for the Authority Board's approval.

Staff from the Authority and Transpower project teams will attend the SRC's meeting and present a condensed version of the attached presentations.

Background

Simplified security of supply concepts relevant to this paper are as follows.

a) Controlled hydro storage is water stored in one of six key lakes that can be used to generate electricity at a time of the generator's choosing.

b) Contingent hydro storage is otherwise identical to controlled hydro storage except that it has resource consent conditions that mean it can be used by the generator only during times of hydro shortage.

c) The system operator calculates and regularly updates hydro risk curves (HRCs) for comparison against controlled hydro storage (excludes contingent hydro storage). Each HRC represents a probability of controlled storage falling to zero in the following year given a variety of assumptions about the entire power system. The system operator calculates HRCs for 1%, 2%, 4%, 6%, 8% and 10% probabilities.

d) The key aspects of the methodology to calculate HRCs are specified in the SOSFIP, though the system operator also publishes a set of HRC assumptions.

e) The SOSFIP is a document incorporated by reference into the Code. The system operator is the author of the SOSFIP; the Authority is the approving body for SOSFIP changes.

f) If storage falls below the 10% HRC, the system operator declares an OCC.

g) If, despite the OCC, storage falls to levels where unplanned outages are likely, the system operator declares rolling outages. During rolling outages, consumers endure periodic planned outages.

h) An OCC ends when controlled storage is above the 8% HRC.

More detailed background is included in Appendix A on slides 4-7, 9, 13 and 15.

Key issues

The key issues in the Authority's project are:

a) The trigger for starting OCCs

b) The trigger for stopping OCCs

c) The trigger for accessing some pre-emergency contingent hydro storage

d) Geographic application of OCCs.

The key issues in the system operator's project are:

a) Whether to include contingent hydro storage in the HRCs

b) The trigger for accessing pre-emergency contingent hydro storage.

The earliest the Authority could announce any decision is late-March 2019. If Code amendments were approved, implementation could take place in late-April 2019. The existence of these projects adds to the uncertainty of electricity trading, especially in relation to winter of 2019. If the HRC methodology were amended in late-April, this could come as a surprise to some electricity traders.

Questions for the SRC to consider

The SRC may wish to consider the following questions.

Q1. Does the SRC have strong views on any of the key issues in either project?

Q2. Does the SRC consider that implementation in late-April would have a security or reliability impact?

Q3. What further information, if any, does the SRC wish to have provided to it by the secretariat?

Q4. What advice, if any, does the SRC wish to provide to the Authority?

Attachments

The following items are included as attachments to this paper:

- *Review of official conservation campaigns* by Authority staff (Appendix A)
- *Security of supply forecasting and information policy review and consultation* by Transpower (Appendix B).

Appendix A: Review of official conservation campaigns

ELECTRICITY AUTHORITY
TE MANA HIKO

PRESENTATION TO THE SRC

REVIEW OF OFFICIAL CONSERVATION CAMPAIGNS

Reviewing the suitability of security of supply arrangements

24 October 2018

COMPETITION • RELIABILITY • EFFICIENCY

Disclaimer

This presentation has been developed by Electricity Authority staff involved in our project to review the regulatory settings for official conservation campaigns.

The project is nearing consultation, but has not yet had its consultation paper seen or approved by the Electricity Authority Board.

As such, the material in this presentation should be taken as indicative only and not necessarily reflective of the Electricity Authority's views.

Overview of this presentation

This presentation describes aspects of our project to review the regulatory settings for official conservation campaigns (OCCs):

1. Key concepts
2. The trigger for starting OCCs
3. The trigger for stopping OCCs
4. The trigger for accessing some contingent hydro storage
5. Geographic application of OCCs

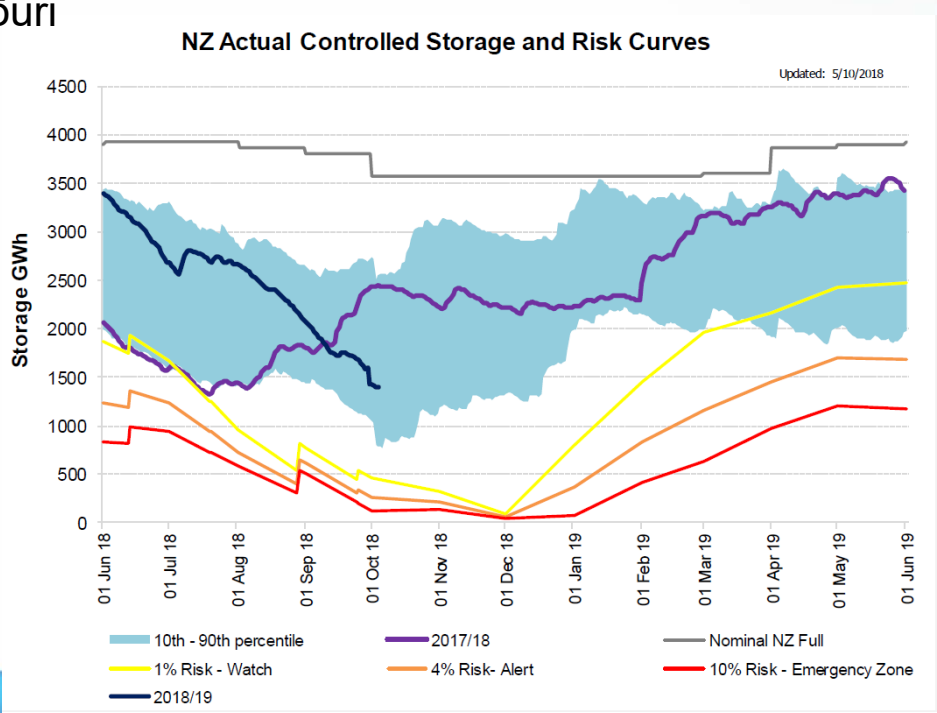
There are two interdependent projects that we will need to consider the costs and benefits of together:

- Our review of the regulatory settings for OCCs
- The system operator's review of the security of supply forecasting and information policy (SOSFIP)

Key concepts

In New Zealand, a key risk to security of supply is caused by variability in hydro inflows. The system operator publishes hydro risk curves and a hydro risk meter

- Despite the naming, these instruments approximate the capability of the *entire* power system and not just hydro-generation
- Hydro storage is counted in only the six largest lakes: Taupō, Tekapo, Pūkaki, Haweā, Te Anau and Manapōuri



Key concepts

When the risk meter reaches ‘emergency’, the system operator will:

- declare an official conservation campaign (OCC)
- lead publicity efforts to encourage consumers to voluntarily save electricity.

The system operator can apply to use a multi-million dollar fund to pay for such publicity efforts.

If hydro storage declines to extremely low levels despite an OCC, the system operator must initiate rolling outages (in addition to the OCC). During rolling outages, consumers experience periodic, planned blackouts to create mandatory saving of electricity.

Key concepts

Three of New Zealand's six largest hydro lakes have resource consents that restrict consent holders' access to the lowest usable lake levels to occur only when there is some sort of shortage of electricity. These consent conditions exist because there is some extra environmental or social sensitivity associated with the use of that storage.

As that storage is contingent upon electricity shortage conditions, it has become known as 'contingent storage'.

Contingent storage is excluded from the system operator's risk curves and risk meters. The possibility of *including* contingent storage creates potential costs and benefits and is the catalyst for our project.

There is ~466 GWh of contingent storage consented and available. There is a further ~367 GWh of contingent storage consented and unavailable due to engineering constraints.

OCC start-trigger – background

The system operator has an obligation to start and manage OCCs. The system operator must start an OCC:

- When actual hydro storage (excluding contingent hydro storage) is less than the 10% hydro risk curve (HRC) and is projected to remain so for at least one week; or
- On a date agreed with us

The 10% HRC represents a 10% risk of running out of non-contingent hydro storage, under a range of assumptions:

- Rolling outages do not exist
- The market behaves to minimise the use of hydro-generation
- Historical inflows are the best predictor we have of future inflows

OCC start-trigger

Key questions for the project:

- If it is desirable to instead measure risk inclusive of contingent hydro storage:
  - should OCCs be started at the 10% HRC or some other figure? (such as 6% or 8%)
  - should OCCs also be able to start when a minimum GWh level ("floor") is breached?
- If a floor is appropriate, should it be set equal to the GWh of contingent hydro storage linked to the declaration of an OCC, or something higher?

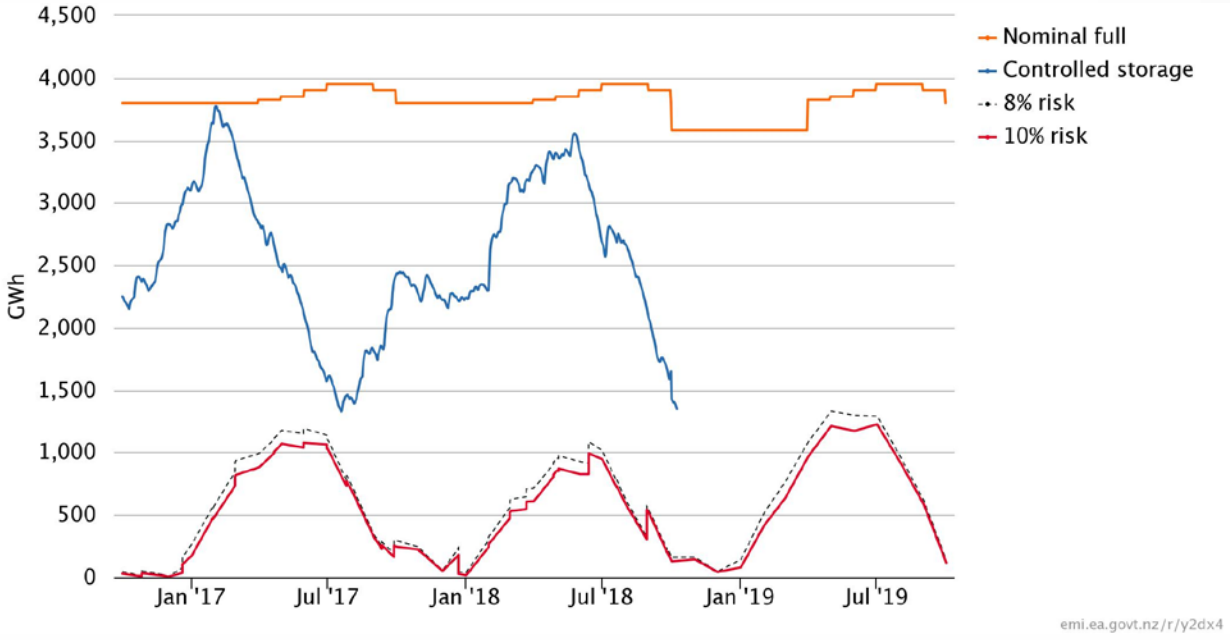
Key considerations:

- The decision about the appropriate percentage of risk needs to balance:
  - The costs to consumers of starting OCCs earlier than necessary
  - The costs to consumers of starting OCCs too late to avoid rolling outages
- It is imperative that OCCs can be started and that contingent storage not be rendered inaccessible. Floors can achieve this but:
  - create a more complicated and confusing set of arrangements
  - could create 'pinch-points' in the operation of the power system and market behaviour.

OCC stop-trigger – background

The system operator must stop an OCC:

- When actual hydro storage (excluding contingent hydro storage) is greater than the 8% hydro risk curve (HRC); or
- On a date agreed with us



OCC stop-trigger

Key question for the project:

- Should OCCs be stopped at the 8% HRC, or some other measure?

Key considerations:

- The decision about the appropriate stop-trigger needs to balance:
  - The costs to consumers of continuing OCCs longer than necessary
  - The risk of confusion to consumers caused by ending an OCC so quickly that another OCC starts shortly afterwards

OCC stop-trigger

Leading options are to stop an OCC when:

1. There is a >90% chance of actual hydro storage remaining above the start-trigger for two weeks, based on either:
   A. recent observed demand and supply, and perhaps actual short-term weather forecasts (Option 1A)
   B. demand and supply predicted months earlier (Option 1B)
2. Actual hydro storage is above the greater of either (Option 2)
   A. the 8% HRC
   B. the 10% HRC plus 50 GWh

Under any option, OCCs stop if the system operator agrees a date with us

OCC stop-trigger

Assessment criteria	Option 1A	Option 1B	Option 2
Relates to risk of repeat OCC?	✓	✓	✗
Most accurate inputs?	✓	✗	✗
Publishable prediction?	✗	✓	✓
Familiar/similar to status quo?	✗	✗	✓
Lowest administrative cost?	✗	✗	✓

The assessment criteria are listed roughly in order of importance

Accessing contingent hydro storage – background

Section 136 of the Electricity Industry Act 2010 enables us to make a reserve supply determination (RSD). We have published the conditions under which an RSD is automatically made or rescinded. This is equivalent to the current 4% HRC

The RSD serves to preserve access to contingent hydro storage in lakes Tekapo and Haweā, which have resource consent conditions linked to the defunct reserve energy scheme administered by the Electricity Commission

The existence of the RSD is a relic of previous regulatory arrangements. We prefer not to intervene in the market to suggest or require when generating plant ought to operate.

Accessing contingent hydro storage

Key questions for the project:

- If it is desirable to instead measure risk inclusive of contingent hydro storage, what trigger should the RSD be linked to?

Key considerations:

- What approach would best reflect the intentions/expectations of the relevant consenting authorities?
  - Using expert judgement to choose a suitable pre-emergency trigger?
  - Ensuring continuity with the (current) status quo?
  - Recreate the original trigger from the time the resource consents were granted?

Geographic application of OCCs – background

At the time OCCs were legislated for, the power system had considerably less ability to transfer electricity to the South Island. This partly explains why OCCs can be run for either:

- all of New Zealand; or
- the South Island only

As such, the system operator maintains HRCs and risk meters for all of New Zealand, and for the South Island only

If a South Island-only OCC were run:

- only South Island consumers would be asked to conserve power
- only South Island consumers would be eligible for $10.50/ICP/week payments under the customer compensation scheme

Geographic application of OCCs

Key questions for the project:

- Is it desirable to run an OCC for some subset of New Zealand?
- If so, what subset? South Island only? The South Island plus the lower-North Island?
- Regardless, what lakes should be counted when determining whether an OCC should start/stop?

Key considerations:

- More complicated arrangements may produce more confusion and resentment with the public
- More complicated arrangements may be able to produce more efficient outcomes, as the benefits of electricity savings differ by location and time-of-day. But those differences are less pronounced due to changes in the power system between 2011 and 2018
- Flexible arrangements can better cater for unusual situations
- The extent to which arrangements incentivise inefficient market behaviour

This is a discussion - no Code amendments are being proposed at this time

Appendix B: Security of supply forecasting and information policy review and consultation

SECURITY OF SUPPLY FORECASTING AND INFORMATION POLICY REVIEW AND CONSULTATION

PRESENTATION TO THE SECURITY AND RELIABILITY COUNCIL

OCTOBER 2018

TRANSPOWER

PURPOSE

We seek the SRC's feedback on our review of the Security of Supply Forecasting and Information Policy (SOSFIP), with a focus on whether our proposals for modifying the supply risk assessment model are:

- sufficiently accurate to ensure effectiveness, while
- not too complex so as to inhibit understanding

KEY ELEMENTS OF THE PROPOSED CHANGES

Hydro risk curves	• SOSFIP be changed so that contingent storage is included in the Hydro Risk Curve (HRC) assessment, where we reasonably believe that the contingent storage will be operationally available during a security of supply event. • Amend the SOSFIP to include contingent storage when determining the risk of shortage. • Make changes in how we present the information in the HRC curves.
Security of supply annual assessments	• Extend the SSAA deadline from the start of March to the end of April, to avoid the need for our consultation falling over the Christmas / New Year period, and to allow time for full analysis of the latest calendar year demand forecast.
Inclusion of other hydro resources	• Retain the requirement to include the major lakes specified in the current SOSFIP, but add the ability for the system operator to include other lakes for which reliable information becomes available and where such inclusion is material. • We would make public any such decision.
Timeframes for publishing the hydro storage projection	• To increase certainty for the industry, we propose including a requirement that we publish the projection for each calendar year by end January, and revise it if necessary by end April. • The January date codifies and commits us to existing practice, while by April we can have better information on demand and storage.
Winter Energy Margin (WEM) and Winter Capacity Margin (WCM) methodology	• Remove the WEM and WCM requirements from the SOSFIP as they are now included in the Authority's Security of Supply Assumptions Document (SSAD).
Gas supply disruptions	• Expand the requirements for publishing scenarios to thermal fuels generally, thus including coal and oil

WE PLAN TO CONSULT NOVEMBER THROUGH JANUARY

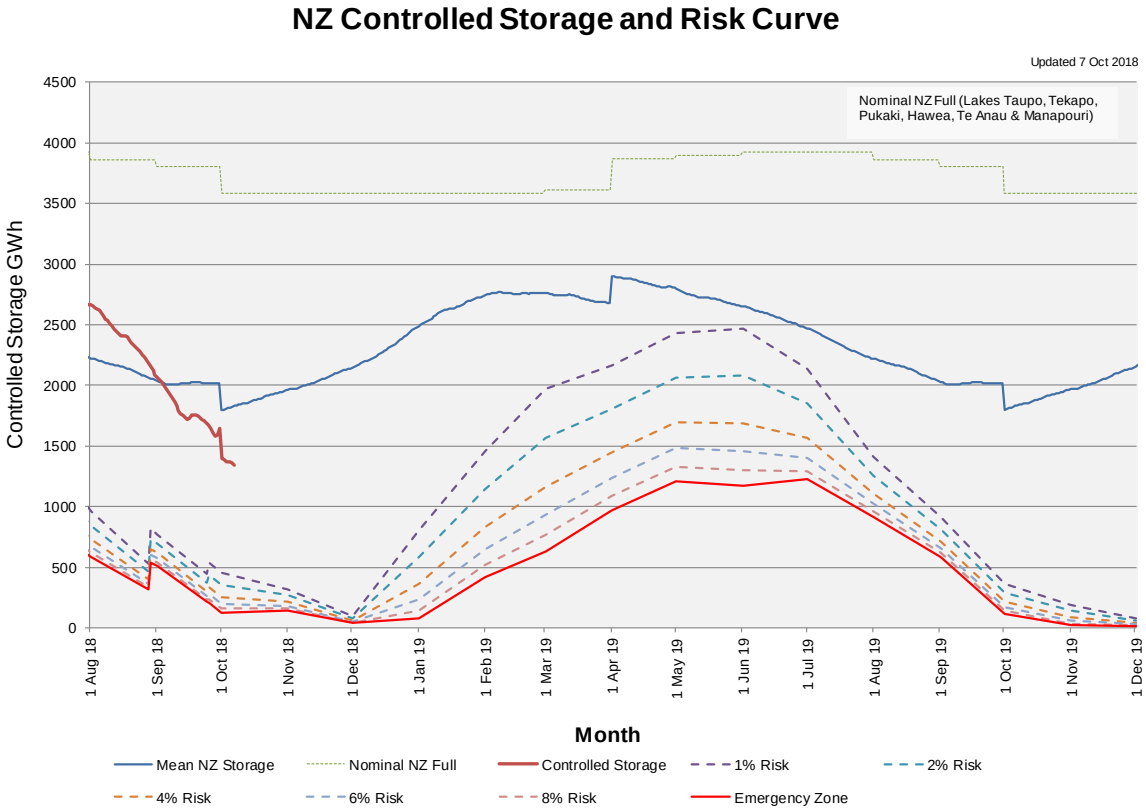
- We are currently preparing for consultation, and intend to consult in conjunction with the Electricity Authority's review of the Official Conservation Campaign (OCC) start and stop triggers in mid to late-November
- Due to consultation taking place over the Christmas period, we have extended the consultation to 8 weeks
- Assuming no significant changes to the position proposed in the paper (and the need for a subsequent re-consultation), we aim to publish a final decision paper in late March 2019

WE HAVE REVIEWED THE SOSFIP AND PROPOSE CHANGES TO THE TREATMENT OF CONTINGENT STORAGE

- Our review of the SOSFIP has primarily focused on the treatment of contingent hydro storage—storage that is reserved for use only in emergencies
- The majority of effort in this review has been to determine if there is a way to include contingent storage in the Hydro Risk Curves (HRCs), without reducing the value of the HRCs
- The changes should not make the HRCs overly complex, or cause them to no longer usefully represent security of supply risk

HYDRO RISK CURVES (HRC)

- HRCs are presented as charts that compare the current level of storage in hydro lakes with levels of risk of a supply shortage.
- The curves at the bottom of the chart are the HRCs for 1%, 2%, 4%, 6%, 8% and 10% (the ‘Emergency Zone’) risk of controlled storage running out.
- When controlled storage reaches any of these risk curves, the percentage chance of controlled storage falling to zero is equal to that of the risk curve.
- These risk curves are derived from the proportion of historical inflow sequences that fall to zero when storage is at that level.



PROPOSAL TO INCLUDE CONTINGENT STORAGE IN THE HYDRO RISK CURVES

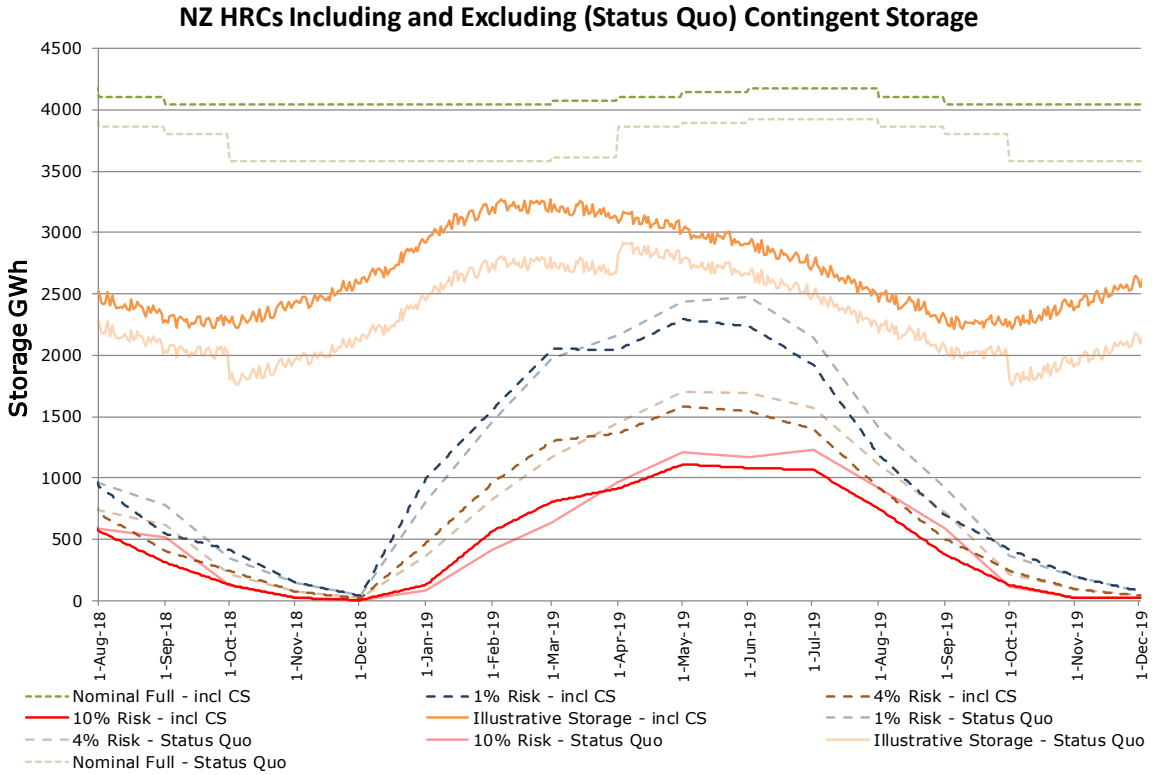
- Contingent storage is hydro storage which can only be accessed when security of supply risk is high
- Currently, contingent storage is excluded from the derivation of the HRCs due to the complexity associated with including it
- Following the 2017 dry winter, we undertook an initial review of the treatment of contingent storage
- The review found:
    - a change to the policy under urgency was not justified
    - there was some merit to attempting to include contingent storage, and a comprehensive review was scheduled for 2017/18

CONTINGENT STORAGE REPRESENTS A SOURCE OF ELECTRICITY SUPPLY

- Contingent storage represents a potential source of electricity and, in principle, it follows that it should be included in our risk modelling (which is primarily the HRCs)
- An earlier review of the SOSFIP also recommended including contingent storage in the risk assessment, if a series of other issues were first dealt with:
    - Resolving a calculation infeasibility whereby the intersection of available hydro storage and risk curves would not occur
    - Verifying the start/stop triggers for an OCC
    - Verifying engineering and operational issues associated with accessing contingent storage
- These recommendations are largely resolved by our proposal, the Authority's concurrent proposals, and recent advice from generators

EFFECT OF INCLUDING CONTINGENT STORAGE

- This graph indicates how the HRCs would change by including contingent storage.
- The lighter lines in the figure represent current HRCs (which exclude contingent storage).
- The darker lines show new proposed HRCs inclusive of contingent storage.
- HRCs including contingent storage are slightly higher from October to March, and slightly lower in other months, due to the seasonality of contingent storage at Lake Tekapo.

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