Review of regulatory settings for official conservation campaigns (OCCs)

Consultation paper

Submissions close: 5pm Monday 11 February 2019

11 December 2018

Market Design

Executive summary

OCCs are a tool used to manage security of supply

Hydro storage is an important contributor to security of supply for the New Zealand electricity system. High penetration of hydro is good for the country as it provides a relatively low cost and reliable source of renewable energy. However, dry periods can occur when hydro storage levels fall or there are generating plant or transmission outages, and we need extra tools to manage the risk these pose.

One of the tools used is the ability to call official conservation campaigns (OCCs), when consumers are asked to voluntarily reduce electricity consumption. The arrangements used to trigger the start and exit of these campaigns involve the calculation of hydro risk curves (HRCs). These indicate the current state of hydro storage and level of risk around that, and OCCs are called when the 10% HRC is breached.

Since the introduction of triggers in the use of OCCs in 2011, the uncertainty around when an OCC will be called has reduced and this is likely to have been a key contributor to the positive market response subsequent dry spells. This period helped inform the system operator's (SO) proposed amendments to the calculation of HRCs – they are suggesting they would be improved if contingent storage was included in the assessment. We agree with the intent of this change and are proposing some complementary changes to make it work.

This review of OCCs was partially triggered by the 2017 dry spell, and has been on the Authority work programme for both 2017/18 and 2018/19. We are not making changes in response to the period of high prices experienced in Spring 2018. It would be useful to introduce the benefits from this review before Winter 2019.

Together, the changes proposed by the Authority and the system operator are likely to affect when OCCs are triggered and hence how dry-year risk will be managed, so we would value your feedback on the proposals.

We propose to amend the Code

We are proposing changes to the Code relating to OCC start and exit triggers.

For start triggers, the proposed change would mean the system operator is required to start an OCC when storage in the hydro lakes is equal to or less than the greater of—

a) the 10% HRC

b) the combination of:

  i. any contingent storage available only in the event of an OCC, plus

  ii. any gigawatt hour buffer of controlled storage determined in accordance with the Security of Supply Forecasting and Information Policy (SOSFIP).

This is different to the current situation, where only (a) is used.

For exit triggers, currently the OCC is exited when the amount of stored hydro rises above the 8% HRC. Instead, we are proposing the OCC is exited when storage has risen back above the start trigger, and the SO doesn't expect it to fall beneath the start trigger again in the next fortnight.

We expect the change would promote reliability of electricity supply and the efficient operation of the electricity industry.

In section 5 of the paper we have prepared a regulatory statement for the proposed Code amendment. We believe the qualitative benefits from proceeding with the Code amendment would be larger than the quantified and qualitative costs.

A proposed change to the SOSFIP has implications for regulatory settings

The SOSFIP is a document prepared by the system operator, which describes how the system operator prepares and publishes information to help electricity industry participants to manage security of supply risks. The SOSFIP is incorporated by reference into the Code.

The system operator is proposing some changes to the SOSFIP (refer to the system operator's consultation paper available at https://www.transpower.co.nz/system-operator/stakeholder-interaction/invitation-comment-draft-SOSFIP).

The primary change the system operator is proposing to the SOSFIP is to calculate hydro risk curves (HRCs) *inclusive* of contingent hydro storage. This is hydro storage not ordinarily available for generating electricity, but which becomes available only under emergency conditions or specifically to mitigate a risk of electricity shortage. Currently, the system operator calculates HRCs *exclusive* of contingent storage. That is, the HRCs currently only take account of hydro storage ordinarily available for electricity generation, known as 'controlled storage'.

For the reasons set out in the system operator's consultation paper, we agree that including contingent storage in the calculation of the HRCs would—

(a) provide a better estimate of the risk of electricity shortage caused by exhausting hydro storage available for electricity generation, and therefore

(b) be for the long-term benefit of consumers.

We consider the system operator's proposal to amend the SOSFIP has implications for—

(a) the Code

(b) the Authority's standing reserve supply determination.

We also expect to amend our reserve supply determination

As well as proposing to amend the Code, we expect to amend our standing reserve supply determination to ensure Contact Energy and Genesis Energy continue to have access to contingent storage. The reserve supply determination is a determination we have made in accordance with section 136(3) of the Electricity Industry Act 2010 (Act). It replaces a determination by the Electricity Commission regarding reserve generation capacity.

The exact form of any change to the reserve supply determination would only be known once any changes to the SOSFIP were finalised.

We seek feedback on New Zealand-wide and South Island-only OCCs

We are also considering whether South Island-only OCCs and New Zealand-wide OCCs remain the appropriate form of OCC.

As part of this consultation, we are seeking initial feedback from interested parties on whether these two forms of OCC remain appropriate, given various changes that have occurred in the electricity industry since 2011.

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1 What you need to know to make a submission

What this consultation paper is about

1.1 The purpose of this paper is to consult with interested parties on:

(a) our proposal to amend the triggers in the Code for starting and ending an OCC

(b) our intention to amend the standing reserve supply determination made in accordance with section 136(3) of the Act

(c) whether it is appropriate to have South Island-only OCCs and New Zealand-wide OCCs.

1.2 We believe the proposed Code amendment set out in this paper would promote reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.

The system operator is consulting on changes to the SOSFIP

1.3 In parallel with our consultation on the matters in this paper, the system operator is consulting on proposed changes to the SOSFIP. The SOSFIP is a document incorporated by reference into the Code.

1.4 We recommend interested parties consider this consultation paper and the system operator's consultation paper together, because of the interdependencies between the documents. The system operator's consultation paper is available at https://www.transpower.co.nz/system-operator/stakeholder-interaction/invitation-comment-draft-SOSFIP.

How to make a submission

1.5 Our preference is to receive submissions in electronic format (Microsoft Word) in the format shown in Appendix B. Submissions in electronic form should be emailed to submissions@ea.govt.nz with "Consultation Paper—Review of regulatory settings for OCCs" in the subject line.

1.6 If you cannot send your submission electronically, post one hard copy to either of the addresses below, or fax it to 04 460 8879.

Postal address	Physical address
Submissions Electricity Authority PO Box 10041 Wellington 6143	Submissions Electricity Authority Level 7, Harbour Tower 2 Hunter Street Wellington

1.7 Please note we want to publish all submissions we receive. If you consider that we should not publish any part of your submission, please

(a) indicate which part should not be published

(b) explain why you consider we should not publish that part

(c) provide a version of your submission that we can publish (if we agree not to publish your full submission).

1.8 If you indicate there is part of your submission that should not be published, we will discuss with you before deciding whether to not publish that part of your submission.

1.9 However, please note that all submissions we receive, including any parts that we do not publish, can be requested under the Official Information Act 1982. This means we would be required to release material that we did not publish unless good reason existed under the Official Information Act to withhold it. We would normally consult with you before releasing any material that you said should not be published.

When to make a submission

1.10 Please deliver your submissions by **5pm** on Monday **11 February 2019**.

1.11 We will acknowledge receipt of all submissions electronically. Please contact the Submissions' Administrator if you do not receive electronic acknowledgement of your submission within two business days.

2 The system operator proposes to change the SOSFIP

New Zealand's reliance on hydro generation carries risk

2.1 The majority of New Zealand's electricity production is from hydro generation. However, New Zealand's hydro lakes do not have a lot of storage—approximately 33 days of typical electricity demand.[1] This makes New Zealand's power system vulnerable to:

(a) periods of sustained low hydro inflows (dry years)

(b) periods of sustained higher-than-anticipated hydro lake draw down, because of a shortfall in other non-hydro sources of electricity supply.

2.2 If a shortage of electricity due to a lack of hydro generation were to occur, demand might have to be curtailed involuntarily until adequate hydro supplies were restored. This could last for a number of weeks.

2.3 Part 9 of the Code sets out a framework to manage potential, and actual, energy shortages, including the use of:

(a) customer compensation schemes (CCSs) and OCCs to assist in delaying or avoiding energy shortages

(b) rolling outages to manage energy shortages.

The system operator starts and ends OCCs

2.4 The purpose of an OCC is to encourage consumers to voluntarily save electricity. Clause 9.23 of the Code specifies when the system operator must start and end OCCs.

2.5 The system operator must start an OCC:

(a) for the South Island when the risk of electricity shortage for the South Island is 10 per cent or more, and is forecast to be 10 per cent or more for at least a week

(b) for New Zealand when the risk of electricity shortage for New Zealand is 10 per cent or more, and is forecast to be 10 per cent or more for at least a week

(c) despite paragraphs (a) and (b), if the system operator has agreed a date with the Authority for an OCC to start for New Zealand or the South Island (as the case may be), on that date.

2.6 The system operator must end an OCC:

(a) when the risk of electricity shortage for New Zealand or the South Island (as the case may be) is 8 per cent or less

(b) despite paragraph (a), if the system operator has agreed a date with the Authority for an OCC to end, on that date.

2.7 The risk of electricity shortage in the South Island referred to in paragraphs 2.5(a) and 2.6(a) is determined by comparing storage in the South Island hydro lakes with the South Island HRCs, as that term is defined in the SOSFIP. The risk of electricity shortage in New Zealand referred to in paragraphs 2.5(b) and 2.6(a) is determined by comparing storage in New Zealand's hydro lakes with the New Zealand HRCs.

2.8 Appendix C contains background information on OCCs and HRCs.

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[1] Based on 3,850 GWh of hydro storage ordinarily available for electricity generation over a 12 month period, and average daily electricity generation of 117 GWh over a 12 month period.

The system operator proposes changing how it calculates HRCs

2.9 The system operator proposes to amend the SOSFIP, with the main change being a different basis for calculating HRCs. Under the system operator's proposal, HRCs will be calculated *inclusive* of 'contingent storage'. The SOSFIP defines contingent storage to mean hydro storage not ordinarily available for generating electricity, but which becomes available only under emergency conditions or specifically to mitigate a risk of electricity shortage.

2.10 Currently, resource consents provide for 834 GWh of contingent storage. The Otago Regional Council has designated as contingent storage 68 GWh of hydro storage in Lake Hawea. The Canterbury Regional Council (Environment Canterbury) has designated as contingent storage—

(a) 546 GWh of hydro storage in Lake Pukaki

(b) 220 GWh of hydro storage in Lake Tekapo.

2.11 Of the 546 GWh of contingent storage in Lake Pukaki, only 178 GWh is physically useable. Engineering constraints mean the remaining 368 GWh of contingent storage in Lake Pukaki cannot physically be used. Therefore, the system operator considers there to be only 178 GWh of contingent storage in Lake Pukaki at present.

2.12 Currently, the system operator calculates HRCs *exclusive* of contingent storage. That is, the HRCs currently only take account of hydro storage ordinarily available for electricity generation, known as 'controlled storage'. When calculating the HRCs for New Zealand, the system operator uses hydro storage in New Zealand's six largest lakes— Pukaki, Tekapo, Hawea, Manapouri, Te Anau and Taupo. When calculating the HRCs for the South Island, the system operator uses the same lakes, except Lake Taupo.

2.13 Approximately 85 per cent of New Zealand's controlled storage capacity is in the five South Island lakes listed above,[2] while 100 per cent of New Zealand's contingent storage is in the South Island (Lake Hawea, Lake Pukaki and Lake Tekapo).

We agree HRCs should be calculated inclusive of contingent storage

2.14 For the reasons set out in the system operator's consultation paper, we agree that including contingent storage in the calculation of the HRCs would:

(a) provide a better estimate of the risk of electricity shortage caused by exhausting hydro storage available for electricity generation, and therefore

(b) be for the long-term benefit of consumers.

2.15 By excluding contingent storage, the current HRCs are not providing an accurate indication of the overall risk of electricity shortage. For example, if less contingent storage were to be available for electricity generation, the risk of electricity shortage would increase. The reverse is also true. Currently, the change in this risk would not be reflected in the HRCs and therefore would not be visible to industry participants and other stakeholders.

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2 The five largest South Island hydro lakes have between 2,980 MW and 3,350 MW of controlled storage, depending on the time of year. The sole North Island lake (Lake Taupo) has 600 MW of controlled storage. Refer to https://www.transpower.co.nz/system-operator/security-supply/hydro-storage-information, and https://www.transpower.co.nz/system-operator/security-supply/hydro-risk-curves.

3 The system operator's proposal has implications for OCC regulatory settings

3.1 We have identified three implications for the regulatory settings for OCCs, if the system operator's proposed changes to the SOSFIP go ahead.

1st implication: The risk of rolling outages changes a little

3.2 The system operator's proposal to calculate HRCs inclusive of contingent storage would mean a small change in the risk of rolling outages if an OCC were to start. This change in risk would stem from a change in the estimated period between an OCC starting, at the 10% HRC, and rolling outages starting, when hydro storage falls below the 50% HRC.[3]

3.3 Figure 1 shows the 1% HRC, 4% HRC and 10% HRC calculated—

(a) exclusive of contingent storage (the status quo), and

(b) inclusive of contingent storage (the system operator's proposal).

3.4 If the Authority were to approve the system operator's proposal, then continuing to use the 10% HRC to trigger the start of an OCC would mean the remaining GWh stored in hydro lakes at the start of an OCC was—

(a) higher from early December to late March

(b) lower from late March to the end of September

(c) the same from the beginning of October to early December.

3.5 If everything else were to be held constant, this would mean that continuing to use the 10% HRC to trigger the start of an OCC would result in—

(a) a longer period between the start of an OCC and the start of rolling outages (triggered by overall hydro storage falling below the 50% HRC), from early December to late March

(b) a shorter period between the start of an OCC and the start of rolling outages, from late March to the end of September

(c) no change in the period between the start of an OCC and the start of rolling outages, from the beginning of October to early December.

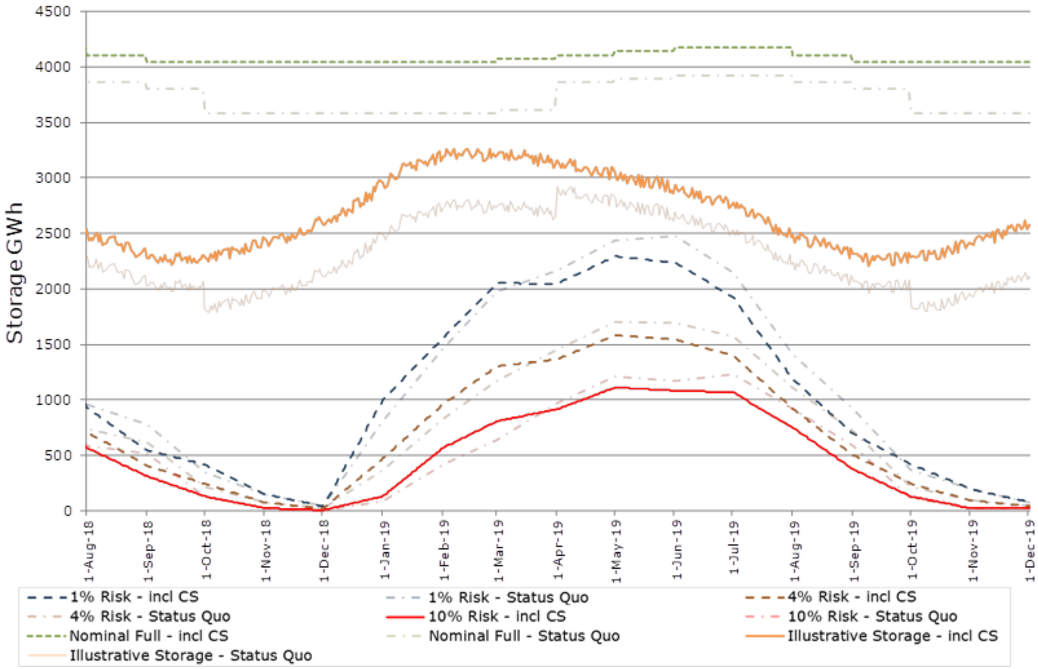
3 Clause 9.14 of the Code says the system operator may make a supply shortage declaration in certain circumstances. Under a supply shortage declaration the system operator may direct that outages be implemented, provided the direction is consistent with the system operator rolling outage plan (SOROP), a document incorporated by reference into the Code. In accordance with clause 3.5 of the SOROP, the system operator will—

(a) make a supply shortage declaration when it considers the probability of unplanned outages occurring as a result of a supply shortage is greater than 50%; and

(b) revoke the supply shortage declaration when it considers the probability of unplanned outages occurring as a result of the supply shortage is 50% or less.

Therefore, for the purposes of this paper, we have assumed rolling outages would start if overall hydro storage fell below the 50% HRC.

Figure 1: New Zealand HRCs inclusive and exclusive (status quo) of contingent storage



Source: System operator

3.6 It is important to understand how much shorter the period would be from the start of an OCC to the start of rolling outages, at those times when the risk of an OCC is highest.

3.7 To illustrate this, we estimated the time from the start of an OCC to the start of rolling outages—

(a) during the months when the largest quantity of hydro storage is needed to avoid the possibility of electricity shortage (May to July inclusive)

(b) during three of the lowest historical hydro inflow sequences on record (being the worst ever and the lowest 5% and 10% historical inflow sequences)

(c) using a 'prudent rate of decline' of hydro storage, which assumes:

(i) the current generation fleet operates (with allowance for outages)

(ii) thermal generation is utilised at the levels seen in the 2017 dry year once the second Rankine unit at Huntly began generating electricity at a higher level

(d) assuming the OCC operates continuously from when it is triggered until the start of rolling outages

(e) under different assumptions about consumer savings rates.

3.8 Table 1 compares the estimated period between an OCC starting and rolling outages starting, under:

(a) the current basis for calculating HRCs, and

(b) the system operator's proposed basis for calculating HRCs.

3.9 Under the system operator's proposal, starting an OCC using the 10% HRC would mean the estimated period from the OCC starting to rolling outages starting would be three or four days shorter, if—

(a) the hydro inflow sequence was as low as the lowest hydro inflow sequence on record[4]

(b) the OCC were to occur between 1 May and 31 July.

3.10 If we assumed that consumers would save approximately the same percentage of electricity under a future OCC as they did during the 2000s,[5] then the period from the OCC starting to rolling outages starting would be—

(a) 4.75 weeks under the status quo

(b) 4.25 weeks under the system operator's proposal.

Table 1: Estimated weeks of OCC from its start to start of rolling outages (using 50% HRC trigger)

Savings rate	HRC used to trigger OCC	Weeks from OCC start to 50% HRC — assuming 1% inflow probability[6]	Weeks from OCC start to 50% HRC — assuming 5% inflow probability[7]	Weeks from OCC start to 50% HRC — assuming 10% inflow probability[8]
0%	10% exclusive (status quo)[9]	4	6	7
	10% inclusive (proposed)[10]	3.5	5.75	6
2.5%	10% exclusive	4.25	7	8.25
	10% inclusive	3.75	6	7
5%	10% exclusive	4.5	8	9.25
	10% exclusive	4	7	8
7.5%	10% exclusive	**4.75**	9.5	10.25
	10% inclusive	**4.25**	8.75	9
10%	10% exclusive	5	11	11.5
	10% inclusive	4.5	9.75	10

4 Being the worst in 86 years.

5 The average savings rate across the OCCs during the 2000s was 7.8 per cent.

6 The number of weeks of OCC from its start to the start of rolling outages (rolling outages triggered by overall hydro storage falling below the 50% HRC) based on the worst historical inflow sequence since 1932.

7 The number of weeks of OCC from its start to the start of rolling outages (rolling outages triggered by overall hydro storage falling below the 50% HRC) based on the fourth worst historical inflow sequence since 1932.

8 The number of weeks of OCC from its start to the start of rolling outages (rolling outages triggered by overall hydro storage falling below the 50% HRC) based on the eighth worst historical inflow sequence since 1932.

9 10% HRC calculated exclusive of contingent storage.

10 10% HRC calculated inclusive of contingent storage.

We intend to keep the 10% HRC as the start trigger for OCCs

3.11 Based on our analysis above, we consider that using the 10% HRC, inclusive of contingent storage, to trigger an OCC would not materially increase the risk of rolling outages starting, should an OCC occur.

3.12 Therefore, if the system operator's proposal to calculate HRCs inclusive of contingent storage goes ahead, we do not propose to amend clause 9.23 of the Code to change the references to a 10 per cent risk of electricity shortage as the trigger for the system operator to start an OCC.

Q1. Do you agree the 10% HRC, calculated inclusive of contingent storage, should be used to trigger the start of an OCC? If you disagree, please provide reasons.

2nd implication: The HRCs should not fall below a level linked to contingent storage

The 4% HRC and 10% HRC trigger the right to use contingent storage

3.13 Of the 834 GWh of contingent storage theoretically available for use, the majority (618 GWh) is permitted to be used at the 4% HRC, including all contingent storage in Lake Hawea and Lake Tekapo. The remainder (216 GWh—all of which is in Lake Pukaki) is permitted to be used only if an OCC starts (ie, at the 10% HRC).

Under the proposed SOSFIP changes the 4% HRC and 10% HRC would not always trigger the use of contingent storage

3.14 If the only change to calculating the HRCs were to be the inclusion of contingent storage, then the HRC calculation would assume the use of contingent storage was able to be triggered by the necessary resource consent conditions being met.

3.15 In reality this assumption would not hold. For certain periods of each year, the 4% HRC and the 10% HRC (each of which permit the use of contingent storage) would both equate to less overall storage in the hydro lakes than the amount of contingent storage to be released at the respective HRC.

3.16 For example, Meridian Energy has consent to use 216 GWh of contingent storage in Lake Pukaki if an OCC starts. For the purpose of this example, we assume Meridian Energy can access the 216 GWh of contingent storage (despite engineering constraints preventing this).

3.17 Figure 2 shows that from approximately early January 2019 (point A) to mid-September 2019 (point B), the 10% HRC, calculated inclusive of contingent storage would equate to more than 216 GWh of hydro storage. During this period, an OCC would be started by overall hydro storage (comprising controlled and contingent storage) falling to the 10% HRC.

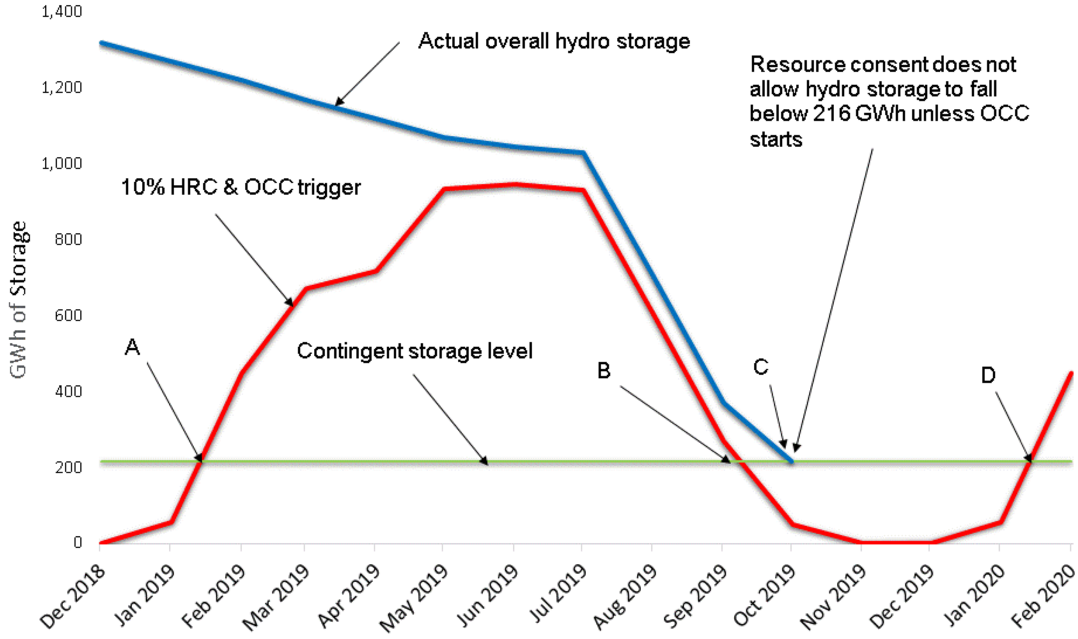
3.18 From approximately mid-September 2019 (point B) to early January 2020 (point D), the 10% HRC, calculated inclusive of contingent storage, would equate to less than 216 GWh of hydro storage. During this period, an OCC would not be started by overall hydro storage falling to the 10% HRC. This is because resource consent conditions would prohibit Meridian Energy using the remaining 216 GWh of overall hydro storage (which is in Lake Pukaki). Overall hydro storage would fall to 216 GWh (point C) and remain there until such time as it started to increase.

3.19 The 216 GWh of contingent storage that Meridian Energy's resource consent allows Meridian Energy to use when an OCC starts cannot be used because:

(a) the trigger for starting an OCC relies on overall hydro storage falling to the 10% HRC, but

(b) overall hydro storage cannot fall to the 10% HRC because the 10% HRC equates to less than 216 GWh of overall hydro storage.

Figure 2: Example of when 10% HRC cannot trigger an OCC



Source: Electricity Authority

3.20 For the purpose of this paper, we refer to this situation as an infeasible solution. The same infeasible solution occurs when the 4% HRC equates to less GWh of overall hydro storage than there is contingent storage allowed to be used at the 4% HRC.

The system operator proposes two approaches to triggering the use of contingent storage

3.21 To address the problem described above, the system operator proposes to provide one of the following two approaches to triggering the release of contingent storage:

(a) The trigger points for using contingent storage would be based on comparing overall *controlled* hydro storage against HRCs that include *only controlled storage*—in other words, the system operator would calculate, solely for the purpose of triggering the release of contingent storage, the 4% HRC and 10% HRC on the same basis as it does now (that is, exclusive of contingent storage).

(b) The trigger points for using contingent storage would be based on comparing overall hydro storage, comprising controlled and contingent storage, against the greater of—

(i) an HRC that includes *controlled storage and contingent storage*

(ii) a GWh quantity that reflects the GWh of contingent storage that is allowed to be used at each of the 4% HRC and the 10% HRC (for the purpose of this paper we refer to this as an HRC floor).

3.22 For the reasons set out in the system operator's consultation paper on proposed amendments to the SOSFIP, either approach would require the system operator to prepare and publish separately:

(a) a contingent storage release boundary chart

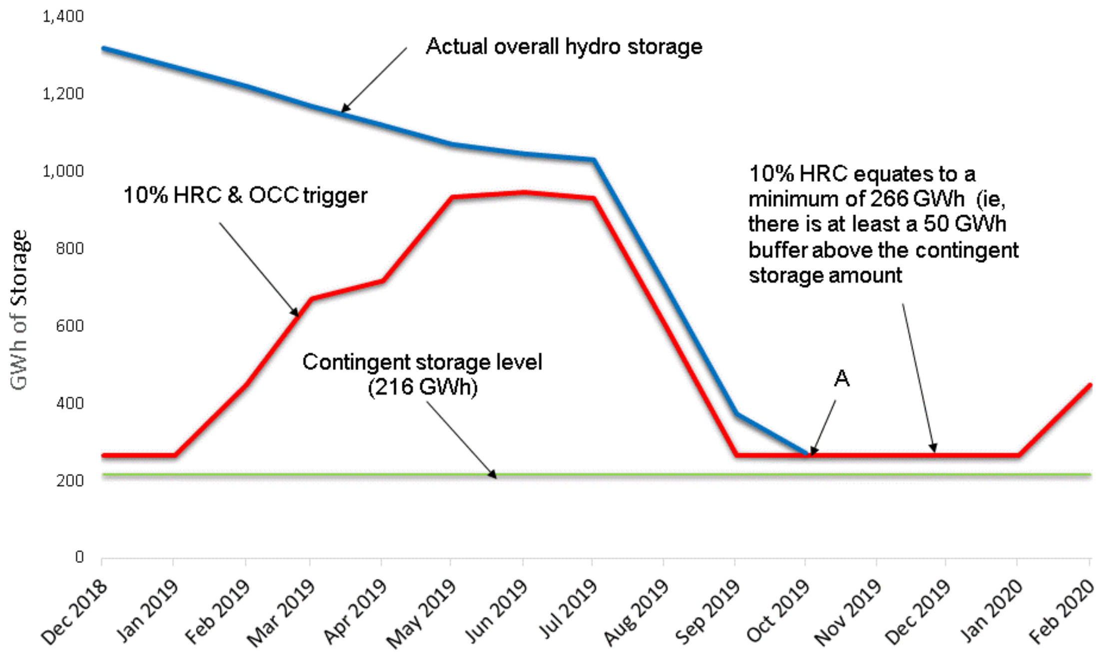
(b) the HRC charts used for monitoring security of supply and triggering an OCC.[11]

We consider the second approach should include a buffer

3.23 If the system operator were to use an HRC floor to ensure contingent storage could be used when the relevant resource consent conditions were met, we think a buffer should be added to the HRC floor.

3.24 Figure 3 shows what a buffer would look like under our example of the 216 GWh allowed to be used when overall hydro storage falls to the 10% HRC. In this example, there is a 50 GWh buffer between the HRC floor and the 216 GWh of contingent storage.

Figure 3: Example of buffer added to HRC floor



Source: Electricity Authority

3.25 A buffer would address the following risks in the use of an HRC floor that reflected exactly the GWh of contingent storage (ie, contained no buffer—216 GWh in the example shown in Figure 3):

(a) With no buffer above a floor, contingent storage might not be released despite being needed for system security purposes. Hydro lakes may be drawn down unevenly during a very low inflow sequence. Some generators may consider it

11 Refer to section 2.5.2 of the system operator's consultation paper.

prudent to retain minimum volumes of controlled storage (eg, to manage the operation of generation plant). This could result in some hydro lakes having controlled storage while others did not. The absence of controlled storage in certain hydro lakes could have adverse consequences for the power system's capacity to meet demand during peak periods.

(b) A floor may create an artificial 'pinch point' in market conditions. As hydro generators would be understandably reluctant to use all of their controlled storage, we would expect their market offers to reflect that. So, as overall storage fell towards a floor, we would expect wholesale electricity prices to rise above the level expected during an OCC, even though contingent storage is available to help avoid an OCC.

(c) There is an incentive for generators to withhold controlled storage in order to raise spot prices.

(d) There is the potential for hydro storage to be overestimated, because of—

(i) errors in measuring hydro storage

(ii) changes in the conversion factor used when calculating GWh of potential generation from hydro lake levels.

3.26 We have discussed the use of a buffer with the system operator. The system operator would instead prefer to exercise its discretion, as required, to determine whether or not overall hydro storage has fallen to the point where it equals contingent storage. If the system operator considered an amount of hydro storage was not, in fact, available as either controlled or contingent storage, the system operator would remove this quantity from the GWh of overall hydro storage.

3.27 Our main concerns with the system operator's proposed approach are:

(a) that it provides participants with less certainty over when contingent storage would be triggered than would a predetermined buffer

(b) that it may provide more of an incentive for inefficient lobbying of the system operator by generators.

We propose to introduce an HRC floor for the purpose of starting an OCC

3.28 We propose to amend the Code to include a requirement for the system operator to start an OCC when storage in the hydro lakes is equal to or less than, for at least one week—

(a) any contingent storage usable only in the event of an OCC, plus

(b) any GWh buffer of hydro storage determined in accordance with the SOSFIP.

3.29 This addresses the potential inability for the 10% HRC to trigger the start of an OCC because of the infeasible solution described in paragraphs 3.14 to 3.20.

3.30 We note this problem could be solved by the system operator agreeing a date with the Authority for an OCC to start, instead of relying on the 10% HRC to trigger the OCC. However, this would expose the system operator and the Authority to inefficient lobbying from interested parties over what the most appropriate OCC start date should be.

3.31 Therefore, we consider it appropriate for the Code to provide a non-discretionary means for using any contingent storage triggered by an OCC. This would further the efficiency limb of our statutory objective.

3.32 Although the proposed Code amendment is not necessary at the current time, making the amendment now would mean no Code amendment was needed if contingent storage triggered by the start of an OCC were to become physically useable. We note that, until relatively recently, the 178 GWh of contingent storage in Lake Pukaki that is physically useable could only be accessed when an OCC started, rather than at the 4% HRC (which represents a lower hydro storage level) that is now the case.

Q2. Do you agree a buffer should be added to any HRC floor? Please provide reasons.

Q3. Do you agree a Code amendment putting in place a floor on the 10% HRC is necessary and desirable to avoid the infeasible solution described in paragraphs 3.14 to 3.20? If you disagree, please provide reasons.

3rd implication: We expect to change our reserve supply determination

3.33 We have published on our website a standing reserve supply determination, the purpose of which is to enable Contact Energy and Genesis Energy to access the contingent storage in Lake Hawea and Lake Tekapo, respectively, in accordance with the applicable resource consents.[12]

3.34 The reserve supply determination is as follows:

> *A reserve supply determination is made when the energy risk meter for either the South Island or for New Zealand as a whole indicates that the current security of supply situation is in the 'alert' or 'emergency' status, as published in the system operator's weekly security of supply report.*
>
> *A reserve supply determination is rescinded when the energy risk meters for both the South Island and for New Zealand as a whole, indicate that the current security of supply situation is 'normal' or 'watch' status, as published in the system operator's weekly security of supply report.*

3.35 The 'alert' status of the energy risk meter equates to the 4% HRC, while the 'emergency' status of the energy risk meter equates to the 10% HRC.

3.36 Appendix D provides further information on our standing reserve supply determination.

3.37 We expect we would need to change our reserve supply determination under—

(a) either of the system operator's proposed approaches to triggering the release of contingent storage, and

(b) an approach to triggering the release of contingent storage that included a floor with an appropriate GWh buffer.

3.38 This would be to ensure the reserve supply determination continued to give effect to the trigger for releasing contingent storage in Lake Hawea and Lake Tekapo.

The amended reserve supply determination must be consistent with consenting regional authorities' expectations

3.39 We consider it appropriate for any new standing reserve supply determination to ensure the contingent storage in Lake Hawea and Lake Tekapo continues to be available for

12 The reserve supply determination is available at https://www.ea.govt.nz/operations/wholesale/security-of-supply/reserve-supply-determination/.

electricity generation at a trigger point that reflects the original expectations of the consenting regional authorities. We consider this to be consistent with the intent of section 136 of the Act.

3.40 Our understanding is that the consenting regional authorities expected all thermal generating stations would be running at, or near, capacity for a sustained period before contingent storage was used for electricity generation. This expectation was reflected in the trigger for accessing contingent storage being linked to:

(a) the running of reserve generation,[13] or

(b) the minzones for the South Island and New Zealand.[14]

3.41 We understand the other key expectation of the consenting regional authorities was that the contingent storage would be used to generate electricity to defer or avoid electricity savings campaigns.[15]

3.42 Inherent in these expectations was an acceptance, on the part of the consenting regional authorities, that the trigger point for releasing the contingent storage may move over time. This was pragmatic. As noted in paragraph D.3, the trigger for dispatching Whirinaki reserve generation moved three times between 2005 and 2009. The 2005 trigger for dispatching Whirinaki equated to the 1-2% HRC, while the 2009 trigger equated to the 4% HRC.[16] The resource consent conditions for Lake Hawea and Lake Tekapo both specifically envisage the consents lasting beyond the lifetime of the Electricity Commission.

Our preferred change to the reserve supply determination

3.43 We consider the reserve supply determination should allow the contingent storage in Lake Hawea and Lake Tekapo to be used at the 4% HRC, calculated <u>inclusive</u> of contingent storage, provided there is an appropriate buffer.

3.44 In relation to the risk of an electricity shortage, this would retain the current risk differential between:

(a) when the use of contingent storage in these lakes is permitted, and

(b) when an OCC could start.[17]

3.45 We considered linking the reserve supply determination to the 4% HRC, <u>inclusive</u> of contingent storage and <u>without a buffer</u>. However, we consider the risks described in paragraph 3.25 are sufficiently material to justify the use of a buffer.

3.46 We considered linking the reserve supply determination to the 4% HRC, <u>exclusive</u> of contingent storage. However, we are not convinced this approach would have been deemed more appropriate by the consenting regional authorities when they granted the

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13 For Lake Hawea and Lake Tekapo.

14 For Lake Tekapo only.

15 Since 2011, termed OCCs.

16 Electricity Commission, June 2009, Hydro risk curves and reserve energy dispatch guidelines – Explanatory Paper, p. 21.

17 Ie, the change in the risk of an electricity shortage between the 4% HRC, <u>inclusive</u> of contingent storage, and the 10% HRC, <u>inclusive</u> of contingent storage, would be the same as the change in the risk of an electricity shortage between the 4% HRC, <u>exclusive</u> of contingent storage, and the 10% HRC, <u>exclusive</u> of contingent storage.

relevant resource consents. This is because, in relation to the risk of an electricity shortage, this third approach would not retain the current risk differential between:

(a) when the use of contingent storage in Lake Hawea and Lake Tekapo was permitted, and

(b) when an OCC could start.

Q4. Do you agree with our preferred potential change to the reserve supply determination? If you disagree, please provide reasons.

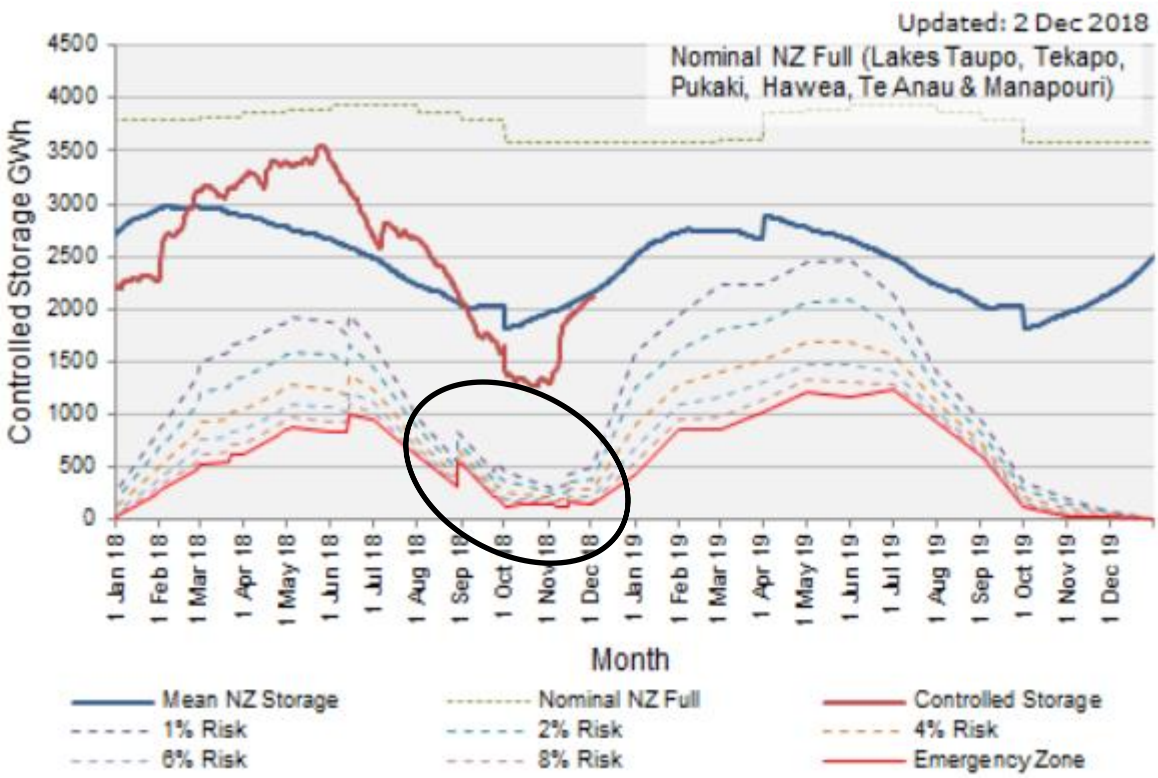
4 We are considering two related matters

4.1 We are considering two matters related to the issues identified in the previous section.

1st related matter: The current OCC end trigger may cause an OCC to end too soon

4.2 As Figure 4 shows, ordinarily the HRCs become tightly converged from September to December. For this four-month period the 8% HRC and the 10% HRC are very close together.

Figure 4: New Zealand controlled storage and HRCs



Source: System operator

4.3 As a result, the current arrangements for ending an OCC could lead to the following outcomes:

(a) an OCC could end shortly after it began, if hydro storage quickly rebounded from the 10% HRC to the 8% HRC, and then

(b) another OCC could start almost immediately (ie, after less than a week), if storage fell to the 10% HRC again.

4.4 Figure 5 shows this.

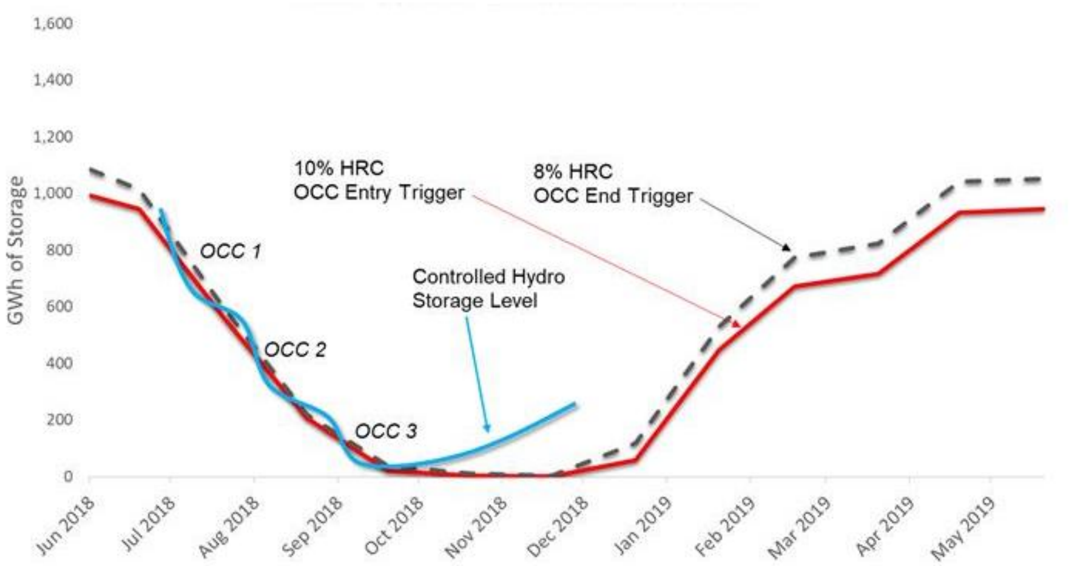
4.5 Therefore, the current arrangements for ending an OCC could:

(a) confuse consumers and participants, undermining conservation efforts

(b) impose additional effort and cost on the system operator, the Authority and industry participants encouraging electricity savings, because of the additional confusion amongst consumers

(c) erode the credibility of OCCs with electricity consumers, reducing the durability of the OCC policy and the CCS arrangements within which the OCC policy sits.

Figure 5: Status quo possible rapid OCC entry and exit scenarios



Source: Electricity Authority

4.6 The system operator could avoid the adverse outcomes listed in paragraph 4.5 by agreeing with the Authority an end date for an OCC that differed from when the risk of electricity shortage fell to less than 8 per cent.[18] However, this would expose the system operator and the Authority to inefficient lobbying over what the end date should be.

A minimum period between OCCs would address this problem

4.7 The most direct way to address the problem described above would be to specify a minimum period between OCCs.

4.8 While this appears straightforward, there is one key issue to be addressed. Quite simply, the system operator should not delay starting a subsequent OCC until the minimum period had been met, if hydro storage again dropped below the OCC start trigger. Doing so would increase the risk of electricity shortage.

4.9 Therefore, it is necessary to predict when ending an OCC would be unlikely to result in another OCC being called within the desired minimum period.

We consider a fortnight to be an appropriate period between OCCs

4.10 We consider a fortnight would be an appropriate minimum period between OCCs.

4.11 In reaching this view we first assessed the suitability of timeframes from one to four weeks. We only considered timeframes measured in weeks, rather than in days or part weeks (eg, 2.5 weeks). This was for reasons of simplicity, knowing anything more granular is false precision.

4.12 We consider one week between OCCs is likely too short. It would not address the problems we are seeking to resolve under the proposed Code amendment, in terms of—

18 Refer to clause 9.23(4)(b)(ii) of the Code.

(a) an overly short period between OCCs

(b) confusing consumers

(c) undermining consumer goodwill towards conserving electricity in the subsequent OCC, and possibly towards future OCCs.[19]

4.13 We consider that, in comparison with a two-week delay, a three-week or four-week delay would risk imposing unnecessary economic costs on consumers, by making an OCC longer than necessary. This would come about because the system operator might be expected to require a relatively higher level of overall hydro storage before ending an OCC, to account for the greater difficulty forecasting demand and supply beyond a fortnight.

We consider a 10 per cent chance of an OCC recurring within a fortnight would be an appropriate level of risk

4.14 After forming a view on an appropriate minimum period between OCCs, we then considered what should be an appropriate level of risk surrounding this period. We concluded that a 10 per cent chance of an OCC recurring within a fortnight would be an appropriate level of risk.

4.15 We believe the risk of an OCC recurring within two weeks should be set low, but should not be eliminated. In reaching this decision we again considered:

(a) the risk of undermining consumer goodwill towards conserving electricity by starting an OCC soon after the end of a prior OCC

(b) unnecessary electricity conservation, by making the OCC longer than necessary.

4.16 The risk of lower electricity conservation from reduced consumer goodwill supports adopting little or no risk—say 0 per cent to 25 per cent chance of another OCC within a fortnight. On the other hand, the cost associated with unnecessary electricity conservation, from an OCC running for longer than necessary in order to avoid the possibility of another OCC within a fortnight, supports accepting some risk of another OCC being needed within a fortnight.

4.17 On balance, we consider that a 10 per cent risk of a subsequent OCC within a fortnight represents a reasonable trade-off between the two key costs discussed above.

4.18 The green line in Figure 6 shows where a 10 per cent chance of an OCC recurring within a fortnight of a prior OCC ending would sit relative to:

(a) the OCC start trigger, being the 10% HRC (shown by the red line)

(b) the 6% HRC (of the two dashed black lines, the one higher on the y-axis)

(c) the 8% HRC (of the two dashed black lines, the one lower on the y-axis) .

4.19 It can be seen that a 10 per cent chance of an OCC recurring within a fortnight of a prior OCC ending moves from being aligned with the 8% HRC (around March) to being above the 6% HRC (October to December).

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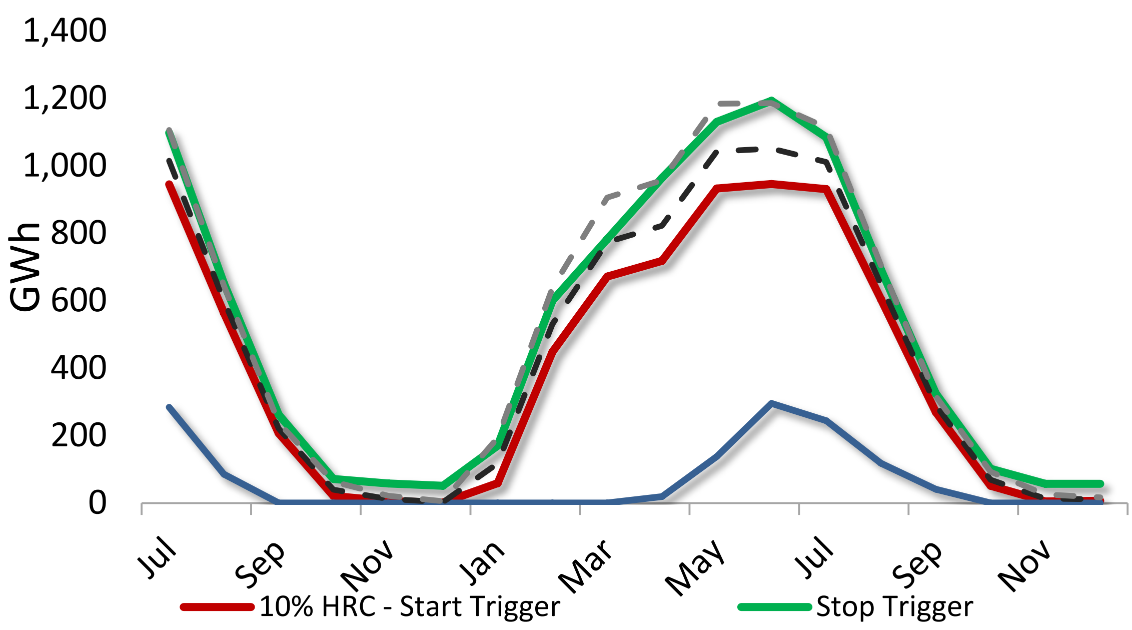
[19] The longer the period until the next OCC, the less material this last issue is expected to be. Consumers should be more accepting of the need for electricity conservation if they perceive the electricity industry has mitigated as far as practicable the need for an OCC.

Figure 6: Proposed OCC end trigger compared with 6% HRC, 8% HRC, 10% HRC



Source: Electricity Authority

How would the system operator give effect to this policy proposal?

4.20 During an OCC, the system operator would need to assess whether hydro storage had risen above the 10% HRC or the level of storage that triggered the OCC. If this were the case, the system operator would then need to assess the likelihood of commencing another OCC within a fortnight, if the current OCC were to end that day. If the system operator considered there was a less than 10 per cent chance of needing another OCC within a fortnight, the system operator would end the current OCC.

4.21 We propose the system operator develop, publish and maintain a methodology for assessing the probability of needing another OCC within a fortnight, but have considerable discretion about this methodology. A suitable methodology might be as follows:

(a) electricity demand and supply over the preceding fortnight is used in predicting demand and supply over the coming fortnight, with adjustments made as appropriate to account for expected changes in demand and supply behaviour (eg, due to weather, fuel stock changes, distributed energy resource changes)

(b) forecast demand and supply are combined with historical inflows to estimate hydro storage over the coming fortnight

(c) if, for the duration of the coming fortnight, hydro storage is expected to be above the OCC start trigger in 90 per cent or more of historical hydro inflow sequences, the system operator must end the OCC.

Q5. Do you agree there are adverse effects on reliability of supply and market efficiency from the current arrangements for ending an OCC?

Q6. Do you agree with our proposed approach to addressing these adverse effects?

2nd related matter: Are South Island-only OCCs and New Zealand OCCs appropriate?

The Code specifies two forms of OCC

4.22 Clause 9.23 of the Code specifies two forms of OCC:

(a) South Island only

(b) New Zealand-wide.

4.23 There is no "North Island-only" OCC, or OCCs for other regions.

The rationale for two forms of OCC

4.24 When clause 9.23 of the Code was drafted in 2011, winter low inflow sequences had occurred previously either:

(a) across all New Zealand hydro lakes approximately equally, or

(b) across predominantly South Island hydro lakes only.

4.25 In addition, at the time (2011), relatively limited southward transfer capacity existed on the HVDC link.

4.26 These factors created the possibility of:

(a) a New Zealand-wide dry winter scenario

(b) a South Island-only dry winter scenario.

4.27 The possibility of only these scenarios arising was (and still is) reflected in the HRCs being New Zealand-wide and South Island only.

4.28 In 2011, the Authority therefore concluded that the two forms of OCC specified in clause 9.23 of the Code were appropriate.

There are four reasons for removing South Island-only OCCs

4.29 There are four reasons to remove the Code provision enabling the system operator to call a South Island-only OCC:

1st reason – There is better transfer of energy from the North Island to the South Island

4.30 Changes in the physical power system since 2011 have improved the ability to transfer energy from the North Island to the South Island:

(a) Pole 3 of the HVDC is now in place, enabling a larger transfer of energy from the North Island to the South Island than in 2011, when only Pole 2 transferred energy south

(b) there is more electricity generation in the lower North Island, which enables more energy to be transferred from the North Island to the South Island when there is wind in the lower North Island (the additional generation being wind generation)

(c) the North Island AC transmission grid has been reinforced in a manner that enables a greater transfer of energy from the North Island to the South Island.

4.31 The improved ability to transfer energy from the North Island to the South Island means North Island electricity savings would now have a more substantial effect on slowing the rate of decline of South Island hydro storage than in 2011.

2nd reason – A South Island-OCC may cause confusion and resentment among consumers

4.32 Negative consumer perception of a South Island-only OCC could undermine its perceived legitimacy, weaken its effectiveness, and damage long-term confidence in the electricity industry.

4.33 South Islanders may resent having to conserve electricity when North Islanders make no contribution. This may be exacerbated by South Islanders viewing North Islanders as contributing more to the low lake levels, because more electricity is consumed in the North Island than the South Island.

4.34 This negative perception could lead to the following adverse outcomes:

(a) If South Islanders conserve little electricity in the absence of North Islanders doing likewise, a South Island-only OCC could largely fail. This could lead to a New Zealand-wide OCC (assuming no major inflow event).

(b) The durability of the CCS arrangements could be adversely affected by negative publicity and the effects of lobbying for change to the arrangements.

4.35 While the $10.50/week minimum weekly amount paid to South Island consumers may provide some compensation for energy conservation, it may be insufficient to fully compensate for the perceived inequity.

4.36 In addition, North Islanders may be confused as to whether or not they should conserve electricity. This confusion could impact on the effectiveness of a subsequent New Zealand-wide OCC if it is declared soon after a South Island-only OCC. We note this risk could be mitigated by strengthening the communication of a South Island-only OCC.

3rd reason – Normally there would be little difference in timing between the start of New Zealand-wide and South Island-only OCCs

4.37 The third reason is that, for 10 months of the year, the difference in timing between calling a South Island-only OCC and a New Zealand-wide OCC could be a week or less. This stems from South Island hydro lakes dominating the hydro storage in the New Zealand-wide and South Island HRCs.

4.38 In recently-calculated HRCs, for seven months of the year, the New Zealand-wide 10% HRC and the South Island 10% HRC are identical. For three months of the year, the New Zealand-wide 10% HRC and the South Island 10% HRC, although not identical, are often quite similar. In a New Zealand-wide dry winter scenario, in which Lake Taupo's hydro storage was correlated with the South Island hydro storage, a New Zealand-wide OCC would most probably be called less than a week after a South Island-only OCC.

4.39 During February and March the national 10% HRC and the South Island 10% HRC are usually significantly different. However, the risk of an OCC being needed in either of these months is very low. Therefore, the usefulness of having separate OCCs for the South Island and New Zealand-wide for these two months is not obvious.

4th reason – A South Island-only OCC may be too rigid in its geographic scope

4.40 A South Island-only OCC may be too rigid in its geographic scope. For example, if it was allowed, an OCC that applied to the South Island and the Wellington region would enable more power to be transferred from the North Island to the South Island. This is because relatively high electricity use in the Wellington region limits southward power transfer between the islands (by constraining the transfer capacity of the Bunnythorpe – Haywards transmission line).

4.41 This suggests that, rather than providing for New Zealand-wide and South Island-only OCCs, it may be better for the Code to provide for:

(a) New Zealand-wide OCCs, and

(b) Less than national OCCs, with the geographic area determined by the Authority on advice from the system operator.[20]

Two Code amendment options could address these problems

4.42 Two Code amendment options could address the problems identified with the current design of the OCCs:

(a) Revise the Code so that it allows for:

(i) New Zealand-wide OCCs, and

(ii) OCCs for geographic regions determined by the Authority on advice from the system operator

(b) Have the Code provide only for New Zealand-wide OCCs.

We would need to consider several issues

4.43 We would need to consider at least the following issues under either of the Code amendment options above:

(a) The significance of the issues with the current OCC design.

(b) The extent to which South Island hydro storage levels are affected by electricity conservation measures applied:

(i) across the North Island

(ii) across parts of the North Island.

(c) The economic cost to New Zealand if North Island electricity conservation is less effective at conserving South Island hydro storage than is South Island electricity conservation.

(d) The trigger settings that should apply under New Zealand-only OCCs and sub-national OCCs. For example, if the Code were to be amended to provide for only New Zealand-wide OCCs, should the OCC trigger be:

(i) the current New Zealand-wide 10% HRC

(ii) the current South Island 10% HRC; or

(iii) some other HRC, such as one composed of all South Island storage lakes and some subset of Taupo storage?

(e) The predicted effectiveness of sub-national OCCs, other than an island-based OCC), given the potential for various of the issues identified with South Island-only OCCs to arise (eg, the potential for a sub-national OCC to cause confusion and resentment among the consumers asked to conserve electricity).

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20 The obvious risk from adopting OCCs that are not national or island-based is the potential for confusion amongst consumers as to whether they should be conserving electricity. Careful targeting and messaging of the OCC may reduce this, but probably not remove it.

We welcome feedback on the current forms of an OCC

4.44 We welcome feedback from interested parties on the current forms of an OCC, set out in clause 9.23 of the Code.

Q7. Do you agree there should be two forms of OCC – a South Island-only OCC and a New Zealand-wide OCC? Please give reasons with your answer.

5 Regulatory statement for changing the start and end triggers for OCCs

5.1 Sections 39(1)(b) and (c) of the Act require the Authority to prepare and publish a regulatory statement on any proposed amendment to the Code, and to consult on the proposed amendment and regulatory statement.

5.2 Section 39(2) of the Act provides that the regulatory statement must include:

(a) a statement of the objectives of the proposed amendment

(b) an evaluation of the costs and benefits of the proposed amendment

(c) an evaluation of alternative means of achieving the objectives of the proposed amendment.

We propose to amend clause 9.23 of the Code

5.3 This section contains the regulatory statement for a proposed amendment to clause 9.23 of the Code (the proposal). The proposal relates to when the system operator—

(a) must start an OCC

(b) must end an OCC.

We propose to amend the start trigger for an OCC

5.4 Under the proposal the system operator would be required to start an OCC for New Zealand or the South Island—

(a) when a comparison of storage in the hydro lakes with the HRCs—

(i) showed a risk of shortage for New Zealand or the South Island (as the case may be) of 10 per cent or more, and

(ii) the system operator forecasted the risk of shortage for New Zealand or the South Island (as the case may be) would be 10 per cent or more for at least one week, or

(b) when storage in the hydro lakes was equal to or less than, and was forecast by the system operator to be equal to or less than for at least one week,—

(i) any contingent storage usable only in the event of an OCC, plus

(ii) any GWh buffer of hydro storage determined in accordance with the SOSFIP, or

(c) despite paragraphs (a) and (b), if the system operator had agreed a date with the Authority for an OCC to start, on that date.

5.5 This proposed amendment to clause 9.23 of the Code relies on the system operator's proposed change to calculating HRCs inclusive of contingent storage going ahead. If this did not happen, we would not seek to amend the start trigger for an OCC, since an HRC floor would be unnecessary.

We propose to amend the end trigger for an OCC

5.6 Under the proposal the system operator would be required to end an OCC—

(a) when the system operator reasonably considered the likelihood of not starting another OCC within a fortnight was 90 per cent or more, when—

(i) a comparison of storage in the hydro lakes with the HRCs showed a risk of shortage for New Zealand or the South Island (as the case may be) of less than 10 per cent, and

(ii) storage in the hydro lakes was greater than:

1. any contingent storage usable only in the event of an OCC, plus

2. any buffer of hydro storage determined in accordance with the SOSFIP, or

(b) despite paragraph (a), if the system operator had agreed a date with the Authority for an OCC to end, on that date.

5.7 The part of this proposed amendment to clause 9.23 of the Code set out in paragraph 5.6(a)(i) does not rely on the system operator's proposed change to calculating HRCs inclusive of contingent storage going ahead. We propose to replace the 8% HRC as the end trigger for an OCC with the end trigger set out in paragraph 5.6(a)(i) regardless of whether the system operator's proposal goes ahead.

5.8 The part of this proposed amendment to clause 9.23 of the Code set out in paragraph 5.6(a)(ii) relies on the system operator's proposed change to calculating HRCs inclusive of contingent storage going ahead. If this did not happen, the system operator would not need to factor in contingent storage when ending an OCC.

The proposal's objective is to improve reliability and efficiency

5.9 The proposal's objective is to promote reliable supply by, and the efficient operation of, the electricity industry, by:

(a) ensuring the Code sets out, to the extent practicable, a non-discretionary means by which to trigger the start and end of an OCC

(b) reducing the possibility of the system operator needing to start an OCC within a fortnight of ending an OCC.

Q8. Do you agree with the proposal's objective? If not, why not?

We have analysed the proposal's benefits and costs

5.10 We have assessed the proposal's expected benefits and costs, using a combination of qualitative and quantitative analysis. We have compared the proposal against a counterfactual of not changing the Code should the system operator's proposal be approved (the status quo).

We have undertaken a qualitative assessment of the proposal's benefits

We expect the proposal would improve reliability of supply

5.11 Compared with the status quo, the proposal would improve the reliability of electricity supply. It would do this by reducing the risk of an overly short gap between OCCs, which is inherent in the current arrangements for ending an OCC, and which could mean an OCC is needed within several days of a previous OCC ending.

5.12 An overly short gap between OCCs could confuse consumers and reduce their goodwill, which we expect would diminish their electricity conservation efforts. Diminished conservation efforts increase the risk of rolling outages being required, at significantly higher cost to consumers than voluntary conservation. By way of context, the cost to consumers of—

(a) voluntary electricity conservation is estimated to be in the hundreds of dollars per megawatt hour (MWh)[21]

(b) rolling outages is estimated to be in the thousands, or tens of thousands, of dollars per MWh.[22]

We expect the proposal would improve the efficient operation of the electricity industry

5.13 We expect the proposal would also improve the efficient operation of the electricity industry, in at least three ways. First, the proposal would reduce discretion around when an OCC was started or ended. This reduces the potential for lobbying of the system operator and the Authority over the start and end dates of an OCC.

5.14 This improves the productivity of the electricity industry and reduces regulatory risk.

5.15 Second, the proposal would lower the risk of confidence in the electricity industry being damaged by an overly short gap between OCCs. A loss of confidence could adversely affect the durability of the CCS arrangements, through lobbying and reviews about the most efficient means of promoting security of supply. This too would reduce the productivity of the electricity industry and create regulatory risk.

5.16 Third, less confusion amongst consumers over whether to conserve electricity under a further OCC should reduce the effort and cost required by the system operator, the Authority, and industry participants to encourage electricity savings.

We have undertaken a partial quantitative assessment of the proposal's costs

The system operator would incur some implementation costs

5.17 The system operator would incur the following implementation costs:

(a) the cost to implement the HRC floor for triggering an OCC

(b) the cost to create and maintain the methodology for assessing the probability of needing another OCC within a fortnight of an OCC ending.

5.18 The system operator estimates the cost for it to implement the proposal would be approximately $50,000. This cost is broken down as follows:

(a) Developing processes and procedures – $33,000

(b) Information technology (IT) changes – $17,000.

5.19 To provide stakeholders with greater regulatory certainty, the system operator would immediately develop a methodology for ending an OCC. This comprises the majority of the estimated $33,000 for developing processes and procedures.

5.20 We believe it would be sensible to defer the system operator's IT changes until an OCC was needed. This would reduce the present value of these costs. If we assume an OCC

21 See, for example, the Electricity Commission's September 2010 consultation paper on the design of the CCS arrangements, available at http://www.ea.govt.nz/dmsdocument/8138.

22 See, for example, the July 2013 technical report on the Authority's study of the value of lost load, available at http://www.ea.govt.nz/dmsdocument/15385.

will not be needed for 10 years, the present value of the estimated IT implementation cost would be a little over $7,700, rather than $17,000.[23]

We expect the proposal would lead to a minor increase in uncertainty over when an OCC may end

5.21 We have considered whether the proposal would increase uncertainty for industry participants and consumers over when an OCC was expected to end. An increase in this uncertainty would represent a cost of the proposal, since participants and consumers would incur costs managing the additional uncertainty.

5.22 Under the status quo, the system operator publishes the expected level of storage needed to end an OCC at any point in the next 12 months (the 8% HRC).[24] Under the proposal, the system operator would instead only be required to publish, during an OCC, the results of its daily assessment of whether the likelihood of not starting another OCC within a fortnight is 90% or more.

5.23 We do not expect this increase in uncertainty over when an OCC might end to impose a material additional cost on participants and consumers. Over the longer-term, the incentive on retailers to hedge is linked to the OCC start trigger, rather than the OCC end trigger. During an OCC, industry participants will be focussed on delivering outcomes that minimise the use of hydro storage and will have little scope to modify this behaviour.

We expect the proposal would make stakeholder communication slightly more difficult

5.24 We consider the proposed OCC end trigger would be slightly harder to communicate to stakeholders than the status quo, ordinarily. Under the status quo, a stakeholder can be shown the 8% HRC—it is a “bright line” trigger. Under the proposal, a stakeholder could only be shown the methodology.

5.25 However, we do not expect this to be a significant issue. We believe it should be relatively easy to communicate to stakeholders that an OCC will not end unless there is at least a 90% chance of not starting another OCC within a fortnight. Therefore, we consider this to be a relatively minor expected cost.

5.26 We also note the status quo could be more confusing than the proposal. If the system operator were to become aware of information that led it to recalculate the HRCs, the 8% HRC could change, creating confusion for many stakeholders.

We expect the proposal would have a net benefit

5.27 Having assessed its benefits and costs, on balance we expect the proposal would offer a net benefit over the status quo.

5.28 We consider there is a relatively small probability of the proposal’s benefits and costs being realised, apart from the cost for the system operator to develop a methodology for ending an OCC. We hold this view because retailers have a strong incentive to avoid OCCs. This view is supported by the way in which the electricity industry has avoided the need for OCCs over the past eight years, by carefully managing several instances of

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23 Assuming an 8 per cent discount rate.

24 The system operator usually updates the HRCs monthly, to reflect changes in the assumptions underpinning the HRCs (eg, changes to generation outages and transmission outages).

very low hydro inflows. Therefore, we should discount the materiality of the identified benefits and costs (except for $33,000) to reflect the possibility they may not eventuate.

5.29 We should also discount the materiality of the identified benefits and costs because, if they do eventuate, they represent future, rather than current, benefits and costs.

5.30 Overall, we do not expect the proposal's benefits and costs to be significant. This is because the proposed changes to the regulatory settings for OCCs are relatively minor, and because of the uncertainty over when most of the benefits and costs will arise.

5.31 However, we expect the potential reliability and durability benefits associated with the proposal would be more significant than the proposal's costs. This is because of the high value that consumers place on reliability of electricity supply.

5.32 Therefore, on balance, we consider the proposal would have a net benefit.

Q9. Do you agree the benefits of the proposed amendment outweigh its costs?

We have considered alternatives to the proposal

Contact Energy suggested an OCC end trigger similar to the proposal

5.33 In its submission on our 2016 review of the CCS arrangements, Contact Energy suggested the Code be amended so an OCC ends once controlled storage returns to the 8% HRC for a specified time. Our proposal is a refinement of Contact Energy's suggestion.

5.34 The key benefit this alternative offers over the proposal is that it would be lower cost to implement.

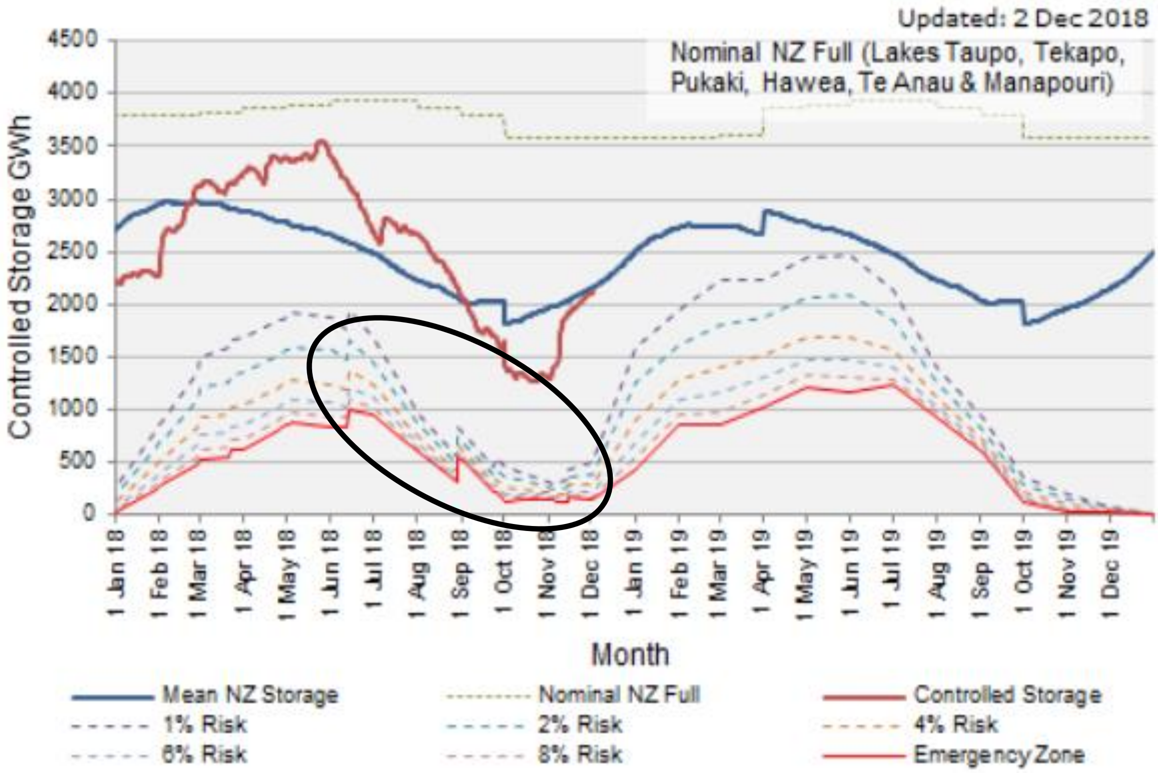
5.35 However, we see some drawbacks with this alternative compared with the proposal. It may lead to OCCs that are longer than necessary, in times when HRCs are trending downwards. The level of hydro storage may fluctuate around the 8% HRC, or be between the 10% HRC and 8% HRC, but because of the declining HRCs there is little risk that it will fall below the 10% HRC. Figure 7 shows this.

5.36 A further drawback of this alternative vis-à-vis the proposal is that the system operator's decision on whether to end an OCC may not be based on the same richness of information (eg, the latest weather forecasts).

5.37 Lastly, we believe setting a minimum time between OCCs, rather than a minimum time at the 8% HRC is easier to explain to stakeholders, particularly consumers.

5.38 Overall, we consider the proposal is preferable to this alternative.

Figure 7: New Zealand controlled storage and HRCs



Source: System operator

An alternative is to set a minimum quantity of hydro storage as the exit trigger

5.39 An alternative to specifying a minimum expected time between OCCs, or a minimum time at the 8% HRC, is to require hydro storage to be a minimum quantity before an OCC ends. The Code could, for example, specify that the system operator ends an OCC when hydro storage is 100 GWh above the 10% HRC.

5.40 The key benefit this alternative offers over the proposal is that it would be lower cost to implement.

5.41 Specifying a minimum quantity of hydro storage before an OCC ends is another way of providing for a minimum expected time between OCCs. Its key drawback, compared with specifying a minimum expected time, is the additional uncertainty associated with how long a given quantity of storage defers the possible need for another OCC. For example, 100 GWh of storage lasts longer in September than it would in June or July.

5.42 We consider it is preferable to regulate for a minimum expected time between OCCs, than to regulate for a minimum quantity of hydro storage. Additionally, we believe setting a minimum expected time between OCCs is easier to explain to stakeholders, particularly consumers.

5.43 Overall, we consider the proposal is preferable to this alternative.

An alternative is to use as the exit trigger an HRC that uses the 10% HRC as its baseline

5.44 A further alternative is to use as the exit trigger an HRC that uses the 10% HRC as its baseline. Under this alternative, when, during an OCC, hydro storage rose above the 10% HRC, the system operator would look at the probability of hydro storage dropping back below the 10% HRC in the next fortnight, using historical inflow sequences. The OCC exit trigger would be set at the point at which hydro storage did not drop back below the 10% HRC under 90 per cent or more of historical inflow sequences.

5.45 Compared with the proposal, this alternative offers the benefits of:

(a) being more familiar to participants, which we expect to reduce the difficulty, and therefore cost, of stakeholder communications

(b) providing participants with the expected level of storage needed to end an OCC, which we expect to reduce uncertainty.

5.46 However, this alternative has a key drawback when compared with the proposal. The exit trigger under this alternative is not as efficient as a trigger that is based on up-to-date information. When calculating the exit-HRC in advance, the system operator is not using up-to-date information on electricity demand and supply. This means the system operator's decision on whether to end an OCC is not as well informed under this alternative as under the proposal.

5.47 For this reason, we consider the proposal is preferable to this alternative.

5.48 However, we consider this alternative is preferable to the other alternatives. Like the proposal, and unlike the other alternatives, this alternative focusses on the risk we wish to manage (the risk of another OCC being needed within a fortnight of ending an OCC).

Q10. Do you agree the proposed amendment is preferable to the status quo and the alternatives? If you disagree, please explain your preferred option in terms consistent with the Authority's statutory objective in section 15 of the Electricity Industry Act 2010.

Q11. How far in advance of the start of winter 2019 (ie, 1 June 2019) would you need the proposed changes implemented to be of use in your operational decision-making for winter 2019?

The proposed amendment complies with section 32(1) of the Act

5.49 The Authority's objective under the Act is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.

5.50 The Act says the Code may contain any provisions that are consistent with the Authority's objective and are necessary or desirable to promote one or all of the matters set out in Table 2.[25]

5.51 The proposal's expected net benefit means the proposal complies with the reliability and efficiency limbs of the Authority's objective and is for the long-term benefit of consumers. Therefore, the proposal complies with section 32(1) of the Act.

[25] Refer to section 32(1) of the Act.

Table 2: How the proposal complies with section 32(1) of the Act

(a) Competition in the electricity industry	The proposal is expected to have a negligible effect on competition in the electricity industry.
(b) The reliable supply of electricity to consumers	The proposal is expected to have a positive effect on the reliable supply of electricity to consumers. The proposal ensures the Code permits the release of any contingent storage that is to be released when an OCC starts. The proposal reduces the risk of an overly short gap between OCCs. This is expected to result in better electricity conservation efforts by consumers in any subsequent OCC, by reducing consumer confusion as to whether they should conserve electricity, and from better goodwill amongst consumers.
(c) The efficient operation of the electricity industry	The proposal is expected to have a positive effect on the efficient operation of the electricity industry. The proposal would support the durability of the CCS arrangements, and should reduce the effort required to encourage electricity savings if a further OCC was required after an OCC ended.
(d) The performance by the Authority of its functions	The proposal would not materially affect the Authority's performance of its functions.
(e) any other matter specifically referred to in this Act as a matter for inclusion in the Code.	The proposal would not materially affect any other matter specifically referred to in the Act for inclusion in the Code.

Q12. Do you agree that the Authority's proposal complies with section 32(1) of the Electricity Industry Act 2010?

The Authority has given regard to the Code amendment principles

5.52 When considering an amendment to the Code, the Authority must have regard to the Code amendment principles in its consultation charter, to the extent that it considers them applicable.[26] Table 3 describes the Authority's regard for the Code amendment principles during its consideration of the proposal.

[26] The consultation charter is one of our foundation documents and is available at: http://www.ea.govt.nz/about-us/documents-publications/foundation-documents/.

Table 3: Regard for Code amendment principles

Principle	Comment
1. Lawful	The proposal is lawful and consistent with the empowering provisions of the Act. The proposal is consistent with the Authority's objective because it is for the long-term benefit of consumers.
2. Provides clearly identified efficiency gains or addresses market or regulatory failure	The evaluation of the proposal's benefits and costs in section 5 sets out the proposal's efficiency gains. We consider the proposal would deliver a net efficiency gain over the status quo.
3. Net benefits are quantified	Our evaluation of the proposal's benefits and costs in section 5 sets out the extent to which we have been able to quantify the proposal's net benefit. We consider the proposal's qualitative benefits would outweigh its qualitative and quantitative costs.

Q13. Do you agree with the Authority's assessment of the proposal against the Code amendment principles? Please give reasons if you do not.

Appendix A Proposed amendment

We propose to amend Part 9 of the Code

A.1 We propose to amend Part 9 of the Code as set out below.

Subpart 4—Customer compensation schemes

Official conservation campaign

9.23 System operator commences official conservation campaign

(1) The **system operator** must commence an **official conservation campaign** for the South Island—

(a) when a comparison of storage in the South Island hydro lakes with the South Island hydro risk curves, as that term is defined in the **security of supply forecasting and information policy**,—

(i) shows a risk of shortage for the South Island of 10% or more; and

(ii) forecasts that the risk of shortage for the South Island will be 10% or more for 1 week or more; or

(ab) when storage in the South Island hydro lakes is, and the **system operator** forecasts will remain for 1 week or more, equal to or less than—

(i) that part of available hydro storage in the South Island hydro lakes that in accordance with relevant resource consent conditions is usable only in the event of an **official conservation campaign**; plus

(ii) any buffer of hydro storage in the South Island hydro lakes determined in accordance with the **security of supply forecasting and information policy**; or

(b) despite paragraphs (a) and (ab), if it has agreed a date with the **Authority** for an **official conservation campaign** to commence for the South Island, on that date.

(2) The **system operator** must commence an **official conservation campaign** for New Zealand—

(a) when a comparison of storage in New Zealand's hydro lakes with the hydro risk curves, as that term is defined in the **security of supply forecasting and information policy**,—

(i) shows a risk of shortage for New Zealand of 10% or more; and

(ii) forecasts that the risk of shortage for New Zealand will be 10% or more for 1 week or more; or

(ab) when storage in New Zealand's hydro lakes is, and the **system operator** forecasts will remain for 1 week or more, equal to or less than—

(i) that part of available hydro storage in New Zealand's hydro lakes that in accordance with relevant resource consent conditions is usable only in the event of an **official conservation campaign**; plus

(ii) any buffer of hydro storage in New Zealand's hydro lakes determined in accordance with the **security of supply forecasting and information policy**; or

(b) despite paragraphs (a) and (ab), if it has agreed a date with the **Authority** for an **official conservation campaign** to commence for New Zealand, on that date.

(3) The **system operator** must use reasonable endeavours to give each **participant** and the **Authority** at least 2 weeks' notice of an **official conservation campaign** commencing.

(4) ~~If the **system operator** has commenced an **official conservation campaign**, it must—~~

~~(a)~~ ~~d~~During the period of ~~the~~an **official conservation campaign**, the **system operator** must regularly review the steps that it~~the **system operator**~~ must take, and encourage **participants** to take, under the **emergency management policy**~~; and~~

~~(b) end the **official conservation campaign**—~~

~~(i) when a comparison of storage in the hydro lakes with the hydro risk curves, as that term is defined in the **security of supply forecasting and information policy**, shows a risk of shortage for New Zealand or the South Island (as the case may be) of 8% or less; and~~

~~(ii) despite paragraph (i), if it has agreed a date with the **Authority** for an **official conservation campaign** to end, on that date~~.

(5) If the **system operator** and the **Authority** agree under subclause (1)(b) or (2)(b) that an **official conservation campaign** will commence, the **system operator** must **publish** the reasons for agreeing that the **official conservation campaign** will commence.

9.23A System operator ends official conservation campaign

(1) If the **system operator** has commenced an **official conservation campaign** under clause 9.23, it must end the **official conservation campaign**—

(a) in respect of an **official conservation campaign** for the South Island, when the **system operator** reasonably considers the likelihood of it not being required to start another **official conservation campaign** under clause 9.23 within a fortnight is 90% or more, when—

(i) a comparison of storage in the South Island hydro lakes with the South Island hydro risk curves, as that term is defined in the **security of supply forecasting and information policy**, shows a risk of shortage for the South Island of less than 10%, and—

(ii) storage in the South Island hydro lakes is greater than—

(A) that part of available hydro storage in the South Island hydro lakes that in accordance with relevant resource consent conditions is usable only in the event of an **official conservation campaign** for the South Island; plus

(B) any buffer of hydro storage in the South Island hydro lakes determined in accordance with the **security of supply forecasting and information policy**; or

(b) in respect of an **official conservation campaign** for New Zealand, when the **system operator** reasonably considers the likelihood of it not being required to start another **official conservation campaign** under clause 9.23 within a fortnight is 90% or more, when—

(i) a comparison of storage in New Zealand's hydro lakes with the New Zealand hydro risk curves, as that term is defined in the **security of supply forecasting and information policy**, shows a risk of shortage for New Zealand of less than 10%, and

(ii) storage in New Zealand's hydro lakes is greater than—

(A) that part of available hydro storage in New Zealand's hydro lakes that in accordance with the relevant resource consent conditions is usable only in the event of an **official conservation campaign** for New Zealand, plus

(B) any buffer of hydro storage in New Zealand's hydro lakes determined in accordance with the **security of supply forecasting and information policy**; or

(c) despite paragraphs (a) and (b), if it has agreed a date with the **Authority** for an **official conservation campaign** to end, on that date.

(~~6~~2) The **system operator** must, as soon as practicable after ending an **official conservation campaign**, give notice to each **participant** and the **Authority** of the date on which the **official conservation campaign** ended.

Q14. Do you have any comments on the drafting of the proposed amendment?

Appendix B Format for submissions

Submitter	

Question		Comment
Q1.	Do you agree the 10% HRC, calculated inclusive of contingent storage, should be used to trigger the start of an OCC? If you disagree, please provide reasons.	
Q2.	Do you agree a buffer should be added to any HRC floor? Please provide reasons.	
Q3.	Do you agree a Code amendment putting in place a floor on the 10% HRC is necessary and desirable to avoid the infeasible solution described in paragraphs 3.14 to 3.20? If you disagree, please provide reasons.	
Q4.	Do you agree with our preferred potential change to the reserve supply determination? If you disagree, please provide reasons.	
Q5.	Do you agree there are adverse effects on reliability of supply and market efficiency from the current arrangements for ending an OCC?	
Q6.	Do you agree with our proposed approach to addressing these adverse effects?	
Q7.	Do you agree there should be two forms of OCC – a South Island-only OCC and a New Zealand-wide OCC? Please give reasons with your answer.	
Q8.	Do you agree with the proposal's objective? If not, why not?	
Q9.	Do you agree the benefits of the proposed amendment	

	outweigh its costs?	
Q10.	Do you agree the proposed amendment is preferable to the status quo and the alternatives? If you disagree, please explain your preferred option in terms consistent with the Authority's statutory objective in section 15 of the Electricity Industry Act 2010.	
Q11.	How far in advance of the start of winter 2019 (ie, 1 June 2019) would you need the proposed changes implemented to be of use in your operational decision-making for winter 2019?	
Q12.	Do you agree that the Authority's proposal complies with section 32(1) of the Electricity Industry Act 2010?	
Q13.	Do you agree with the Authority's assessment of the proposal against the Code amendment principles? Please give reasons if you do not.	
Q14.	Do you have any comments on the drafting of the proposed amendment?	

Appendix C Some background on HRCs and OCCs

HRCs track the risk of low water levels in hydro storage lakes

C.1 In New Zealand the risk of running out of water to generate electricity can become unacceptably high in dry years. Since hydro generation supplies the majority of New Zealand's electricity, low water levels could relate to either or both of:

(a) a shortage of available water, predominantly in hydro storage lakes (from low inflows)

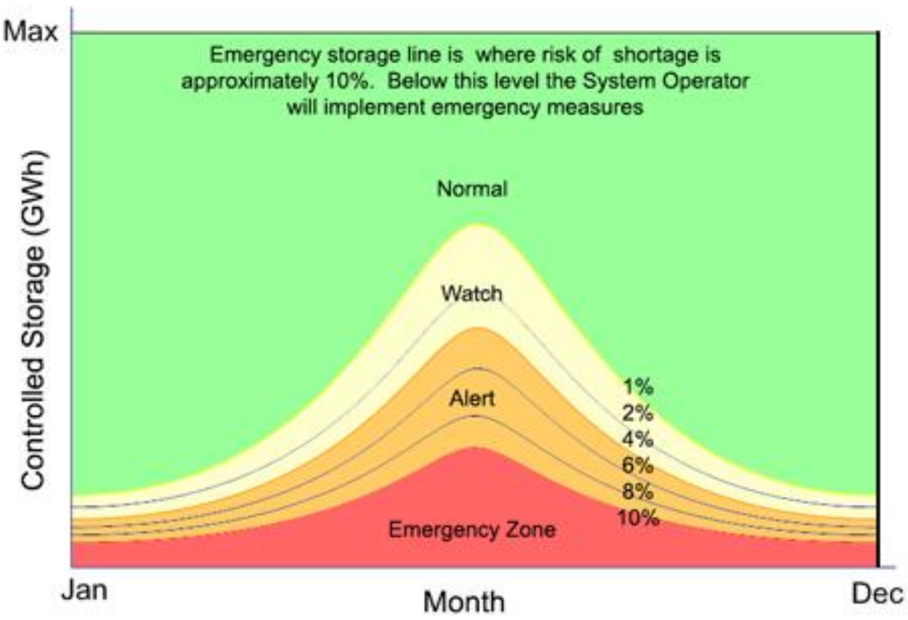
(b) water being used at higher rates than anticipated because of shortfalls in other sources of electricity supply.

C.2 This type of electricity shortage is a slow-onset security threat, characterised by spot prices rising over days and weeks as supply becomes increasingly constrained.

C.3 If an electricity shortage of this type were to occur, load may have to be curtailed involuntarily until adequate electricity supplies were restored. This curtailment could potentially last for several weeks, perhaps longer. Therefore, intervention would be required to avoid such an electricity shortage before it occurred, unless the supply situation otherwise improved (eg, rain fell, snow melted, or more thermal generation became available).

C.4 The system operator will act when the probability this type of electricity shortage will occur exceeds some explicit safety margin. This safety margin is determined by the HRCs. Figure 8 shows a stylised form of the HRCs, illustrating the progressive risk levels.

Figure 8: Stylised representation of the hydro risk curves



Source: System operator: *Hydro risk curves explanation*, available at https://www.transpower.co.nz/system-operator/security-supply/hydro-risk-curves-explanation.

C.5 Each HRC represents a probability that controlled storage in hydro lakes[27] will fall to zero in a given year, based on the distribution of historical inflow sequences. For example, at the 10% HRC, controlled storage would fall to zero in 10% of historical inflow sequences (dating back to 1932). A video on security of supply may be found at the system operator's learning centre. This video illustrates how HRCs are calculated.[28]

C.6 Figure 9 shows New Zealand controlled storage and the New Zealand HRCs for 2018, as at 30 September 2018.

C.7 The probability described by each HRC is calculated:

(a) assuming non-hydro generation is not constrained by fuel (except for Whirinaki, constrained to 15 GWh a year)

(b) accounting for relevant generation plant outages:

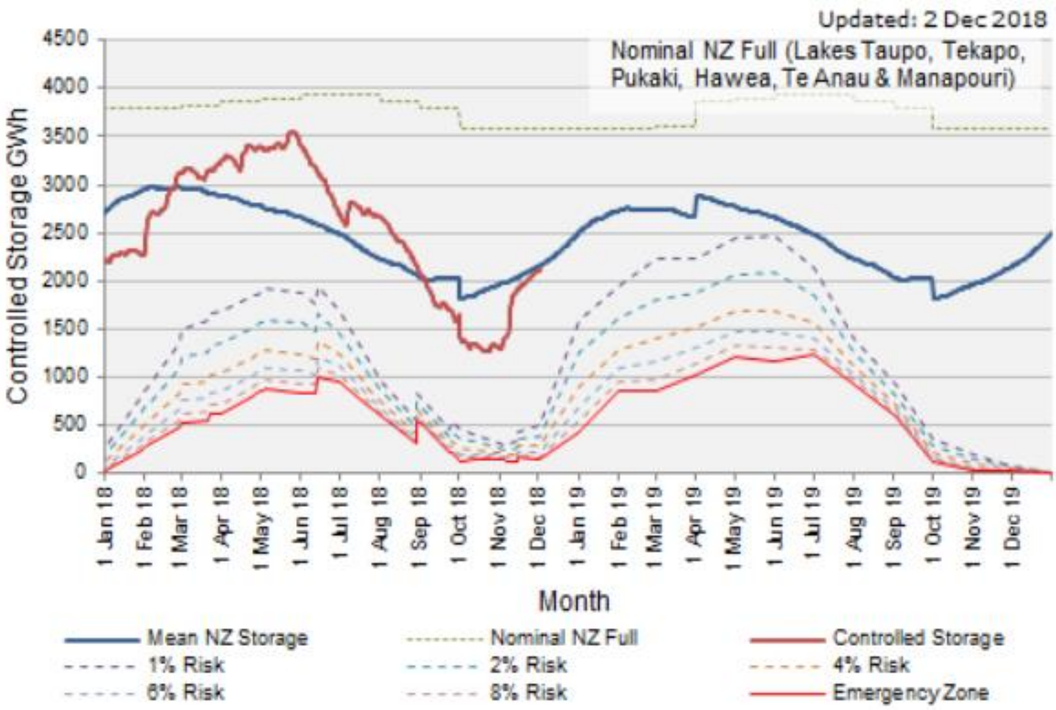
(i) planned outages considered critical for safe operation

(ii) a forced outage rate of 3% for thermal and geothermal generation capacity

(c) assuming the transmission grid operates normally (including security constraints that could limit generation in a dry year)

(d) assuming market behaviour minimises use of hydro storage.

Figure 9: New Zealand controlled storage and HRCs



Source: System operator

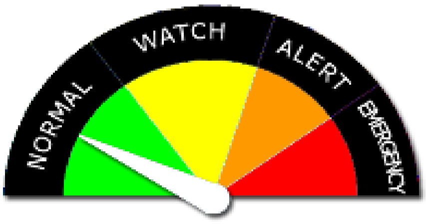
[27] The volume of water stored in hydro lakes is expressed as energy available to produce electricity (in GWh).

[28] The video is available at https://www.youtube.com/watch?v=D66rLV3VVgY&feature=youtu.be&list=PLXUccGn4ptEMlfsPENqBmZd_5JbArGpMW.

C.8 Importantly, controlled storage falling to zero does not mean that hydro lakes have been exhausted. Material volumes of water are set aside as contingent hydro storage and become available under emergency conditions or specifically to mitigate a risk of electricity shortage. The exact conditions are specific to each lake and are governed by factors such as the resource consent granted by the relevant consenting regional authority. Currently, only Lake Hawea, Lake Pukaki and Lake Tekapo have contingent storage.

C.9 Currently, 67 GWh of hydro storage designated as contingent storage in Lake Hawea becomes available for electricity generation when the hydro storage risk meter published by the system operator has a status of 'Alert' (see Figure 10).

Figure 10: Hydro storage risk meter



Source: System operator: https://www.transpower.co.nz/system-operator/security-supply/hydro-risk-curves

C.10 This same arrangement applies to 330 GWh of hydro storage in Lake Pukaki (although due to engineering constraints, only 178 GWh of this is usable). The same arrangement also applies to 220 GWh of contingent storage in Lake Tekapo for the period 1 October to 31 March (inclusive). For the period 1 April to 30 September, the contingent storage in Lake Tekapo is available as controlled storage.

C.11 A second tranche of 216 GWh of hydro storage in Lake Pukaki is consented but not presently available for hydro generation when an OCC is started. This equates to entering the 'emergency' zone in the hydro storage risk meter

The system operator will call OCCs when controlled storage reaches the 10% HRC for a week

C.12 Under the current security of supply arrangements, the system operator will implement emergency security of supply measures if controlled storage falls below the 10% HRC. These measures include the system operator initiating an OCC, which encourages consumers to voluntarily save electricity. OCCs are intended to reduce aggregate electricity consumption until rain or snow melt replenishes the hydro lakes, or until high winter demand passes.

C.13 OCCs are triggered under clause 9.23 of the Code either nationally or only in the South Island. The system operator must:

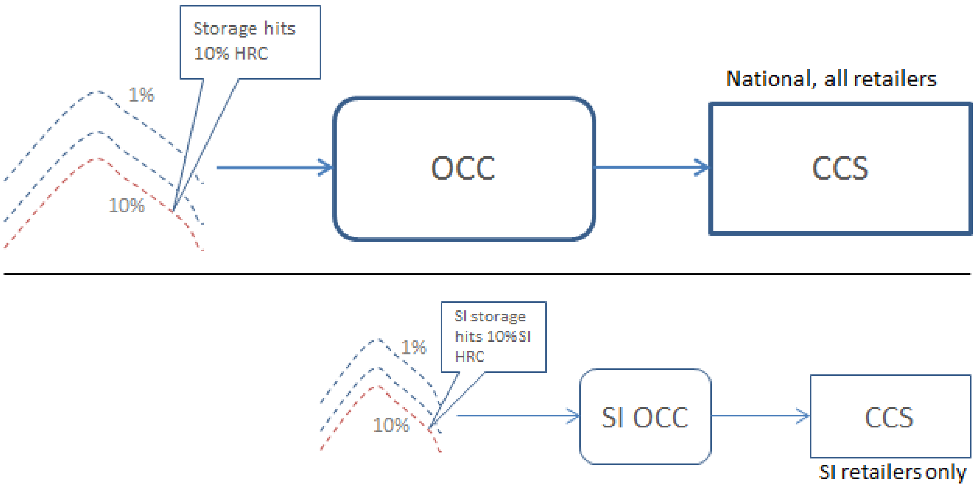
(a) start an OCC for the South Island when the risk of electricity shortage for the South Island is 10 per cent or more, and is forecast to be 10 per cent or more for at least a week

(b) start an OCC for New Zealand when the risk of electricity shortage for New Zealand is 10 per cent or more, and is forecast to be 10 per cent or more for at least a week.

C.14 In other words, the system operator must start an OCC when South Island or New Zealand controlled storage (as the case may be) reaches the 10 per cent South Island HRC or 10 per cent New Zealand HRC (as the case may be) and is forecast to be at or below the relevant 10 per cent HRC for at least a week.

C.15 An OCC triggers the obligation on retailers to compensate consumers in the South Island or across New Zealand (as the case may be) a minimum of $10.50 a week. This obligation remains in place until the OCC ends. Figure 11 illustrates this.

Figure 11: OCCs can be national or for the South Island only



Source: Electricity Authority

C.16 The system operator must end an OCC:

(a) when the risk of shortage for New Zealand or the South Island (as the case may be) is 8% or less (in other words, when controlled storage increases to the 8% HRC)

(b) despite (a), if the system operator has agreed a date with the Authority for an OCC to end, on that date.

C.17 The diagrams below (Figure 12 and Figure 13) demonstrate the current arrangements. In Figure 12, the blue line provides an example of changing hydro storage over time.

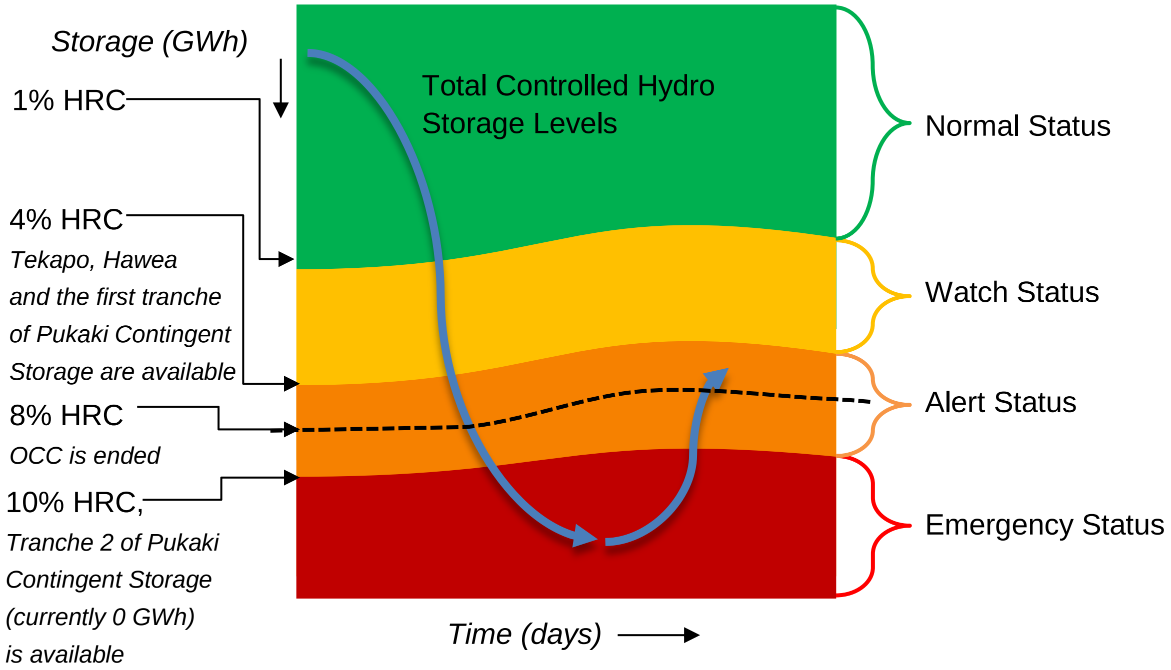
(a) 1% HRC: Risk meter is set to “Watch” (yellow zone)
This is intended to show the hydro storage level as being of some concern. (Hydro storage levels above the 1% HRC are considered normal.)

(b) 4% HRC: Risk meter is set to “Alert” (orange zone)
This is intended to show greater concern over the hydro storage levels, and inform stakeholders that an OCC could be triggered if hydro storage continues to fall.

(c) 10% HRC: Risk meter is set to “Emergency” (red zone)
This is the highest level of concern indicated by the risk meter. It shows that controlled storage will run out in 10 per cent of historical inflow sequences. At the 10% HRC the system operator implements emergency security of supply measures, including starting an OCC.

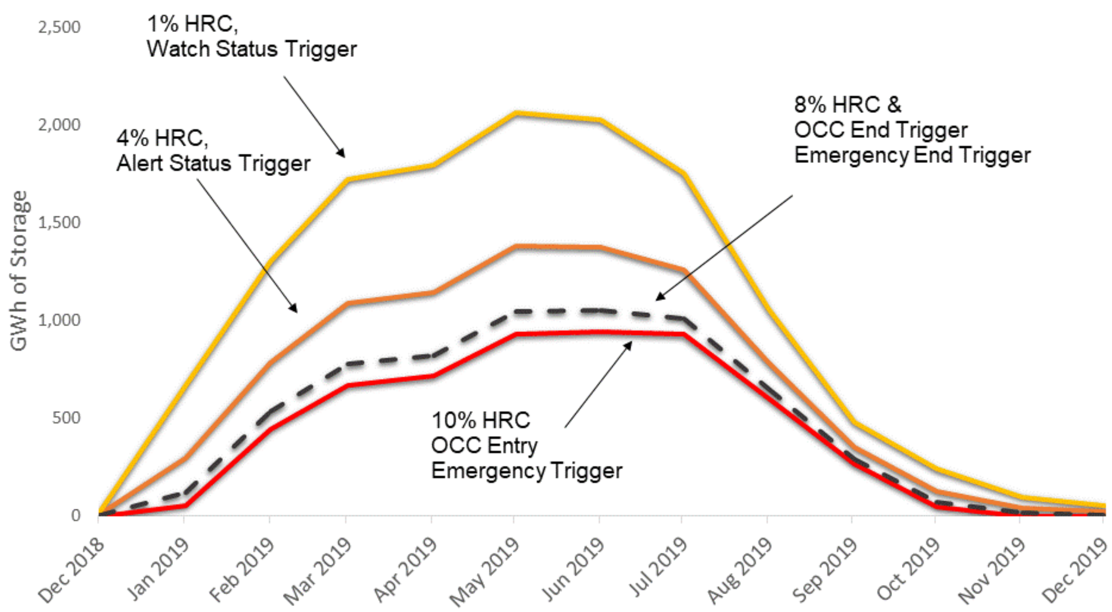
(d) 8% HRC: The end of the OCC (dotted black line)
The 8% HRC defines the conditions where an OCC can be ended.

Figure 12: The HRCs and hydro storage risk statuses



Source: Electricity Authority

Figure 13: The HRCs, hydro storage risk statuses, and OCC end/exit triggers



Source: Electricity Authority

Appendix D Some background on the reserve supply determination

D.1 The Electricity Commission operated a reserve energy scheme. At the time, the Government wanted the Electricity Commission to contract for reserve energy (electricity generation or demand response) to provide security of supply that was additional to that provided by the electricity market. The Electricity Commission was to use this contracting for reserve as a primary mechanism for ensuring security of supply in a 1-in-60 dry year.

D.2 Under the reserve energy scheme, the Electricity Commission established a trigger point for dispatching reserve energy from the Whirinaki power station to help preserve hydro storage.

D.3 Initially, this trigger point was when hydro storage fell below the level required to ensure no demand restraint (either voluntary or forced rationing) was required in a 1-in-60 dry year, with all non-hydro supply fully committed.[29] The Electricity Commission then changed the trigger point to refer to a 1-in-74 dry year.[30] Subsequently, the Electricity Commission adopted the 4% HRC as the trigger point for dispatching Whirinaki reserve generation.[31]

D.4 The Authority does not intervene in the electricity market to suggest, or require, when generating plant operates. However, we are aware that Contact Energy and Genesis Energy have hydro lake consent conditions linked to the Electricity Commission's reserve generation trigger.

D.5 Contact Energy has consent to use water from Lake Hawea for electricity generation. A condition within the consent enables the water level to be lowered from 338 metres above mean sea level to 336 metres above mean sea level when—

> "*the Electricity Commission (or any statutory body exercising like powers and functions to the Electricity Commission) determines that reserve generation capacity (such as that currently located at Whirinaki) should generate electricity.*"

D.6 Genesis Energy has consent to use water from Lake Tekapo for electricity generation. A condition within the consent enables the water level to be lowered from 704.1 metres above mean sea level to 701.8 metres above mean sea level during October to March (inclusive) when—

> "*the Electricity Commission (or any statutory body exercising like powers and functions to the Electricity Commission) determines:*
>
> *that reserve generation capacity (such as Whirinaki Power Station) is required to generate electricity: or*
>
> *the National or South Island minzones (or their future equivalents) have been breached.*"

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29 Electricity Commission, July 2005, Initial Security of Supply Policy, p.3; Electricity Commission, October 2008, Security of Supply Policy Explanatory Paper, p.8.

30 Electricity Commission, April 2006, Press Release: The Minzone and How Low Hydro Levels Are Managed.

31 Electricity Commission, June 2009, Hydro risk curves and reserve energy dispatch guidelines – Explanatory Paper.

D.7 Under transitional provisions in section 136 of the Act:

(a) conditions in resource consents that refer to a determination by the Electricity Commission regarding reserve generation capacity must be read as if they referred to the Authority making or rescinding a reserve supply determination

(b) the Authority may make or rescind a reserve supply determination but only in accordance with criteria that it has set and made publicly available.

D.8 We have published a standing reserve supply determination to ensure continued access to contingent storage at a trigger point that reflects the original expectations of the consenting regional authorities.

Our reserve supply determination does not apply to all contingent storage

D.9 Our reserve supply determination does not apply to the contingent storage available in Lake Pukaki. Meridian Energy's consent to use water from Lake Pukaki for electricity generation has a condition that permits Meridian Energy to lower the water level in Lake Pukaki, as follows.

(a) from 518 metres above mean sea level to 515 metres above mean sea level when the energy risk meter for either the South Island or for New Zealand indicates the current security of supply situation is in the 'alert' status

(b) from 515 metres above mean sea level to 513 metres above mean sea level when an OCC is declared.

Glossary of abbreviations and terms

Act	Electricity Industry Act 2010
Authority	Electricity Authority
CCS	Customer compensation scheme
Code	Electricity Industry Participation Code 2010
GWh	Gigawatt hour
HRC	Hydro risk curve
HVDC	High voltage direct current
MWh	Megawatt hour
OCC	Official conservation campaign
SOROP	System operator rolling outage plan
SOSFIP	Security of supply forecasting and information policy