Security and Reliability Council

Hydro storage reporting and measurement

8 November 2012

Note: This paper has been prepared for the purpose of SRC discussion. Content should not be interpreted as representing the views or policy of the Electricity Authority.

1 Background on the hydro risk curves

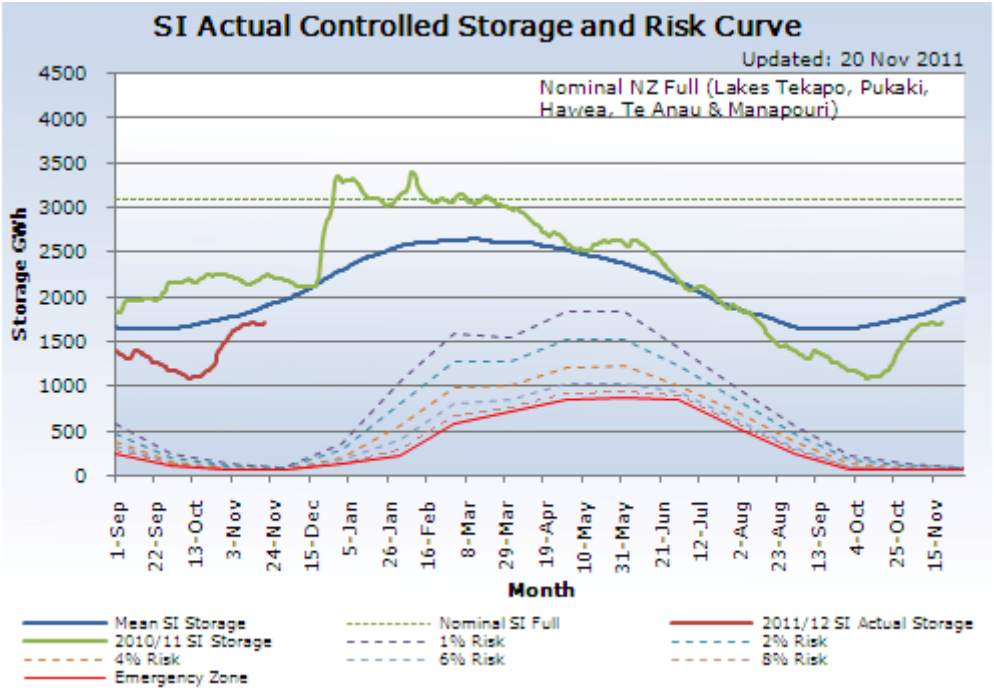
1.1 Responsibility for monitoring security of supply risks was transferred from the Electricity Commission to the system operator on 1 November 2010. The Security of Supply Forecasting and Information Policy (SOSFIP, which is incorporated by reference into the Code1) sets out that the SO will monitor short-term security of supply risks by publishing a weekly security of supply report, which must include:

a) a comparison of total storage in key hydro lakes with Hydro Risk Curves (HRCs); and

b) various other data including (but not limited to) hydro inflows, thermal generation, demand, and inter-island transfers.

1.2 The HRCs (illustrated in Figure 1) are the primary instrument for monitoring the risk of running out of water as a result of dry conditions and/or some calamitous event(s).

Figure 1: Comparison of storage with Hydro Risk Curves



[1] http://systemoperator.co.nz/sos-policy

1.3 HRCs are produced for the South Island and for New Zealand as a whole and are based upon a range of assumptions about generation and fuel availability, electricity demand, and transmission capability. These input assumptions are documented on the SO website2, as is the methodology used to prepare the HRCs.3 The HRCs are updated occasionally – at present, whenever something happens that changes the curves by at least 200 GWh.

1.4 The use of hydro storage profiles to monitor short-term security of supply risks has a long tradition in New Zealand. The HRCs were developed to succeed the "minzone" which had been used to monitor security risks since the 1980's.

1.5 The HRCs are generally intended to provide information to a wide range of market participants about security risks so that they can plan and manage their own risks accordingly. However the 10% HRC has a particular function specified in Part 9 of the Code – if hydro storage falls below the 10% HRC, an Official Conservation Campaign is triggered.

2 Treatment of hydro storage that is only made available in shortage situations creates challenges for the development of the hydro risk curves

2.1 A number of hydro generators have negotiated access to additional storage during energy shortage events (such as dry years) as part of their resource consent decisions. The trigger for access to this storage is typically that actual hydro storage has reached a specifically identified HRC.

2.2 The incorporation of this storage directly into the HRCs creates the risk of a 'circularity' in the derivation of the curves, i.e. the storage is only available when the 10% curve is reached, but the additional storage will then lift total available storage back above the 10% curve. This has particular ramifications for the initiation of official conservation campaigns, as discussed in paragraph 1.5 above.

2.3 As this storage can only be accessed if and when storage reaches critical levels, it should not be considered as readily available storage in the calculation of the HRCs (i.e. it is only available to enable a shortage situation to be managed, and not to avoid a shortage from occurring in the first place). The system operator's proposed approach to the inclusion of this 'contingent storage' into the HRCs is discussed in the attached presentation.

3 Requested Action

3.1 The SRC's advice is requested on whether they consider the system operator's approach to presenting contingent storage in the HRCs to be appropriate.

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[2] http://www.systemoperator.co.nz/f3933,76542178/hydro-risk-curve-input-assumptions-effective-jan-2013.pdf

[3] http://systemoperator.co.nz/f3933,60083041/HRC_methodology_explanation_October_2011_web.pdf

Hydro Storage Reporting and Measurement

SRC Briefing,

8th November, 2012

SYSTEM OPERATOR

Background

- The ability of generators to utilise hydro storage has a major bearing on energy security for New Zealand & South Island
- This ability is governed by resource consents negotiated between individual generators and regional councils
- Under these resource consents, there can be any number of conditions associated with the release of hydro storage for generation
- This can make the reporting of hydro storage and the definition of the emergency zone* highly complex

* The area within the 1% curve on the hydro risk curves, with the 10% curve particularly important due to its links to official conservation campaigns.

Contingent storage

- Storage that is available for generation only under specific, negotiated, emergency conditions is referred to as “Contingent Storage” in this presentation
- The SO is aware Contingent Storage is available at various hydro schemes,
- At present its release is linked to the Hydro Risk Curves (HRCs) in varying ways, some more loosely than others

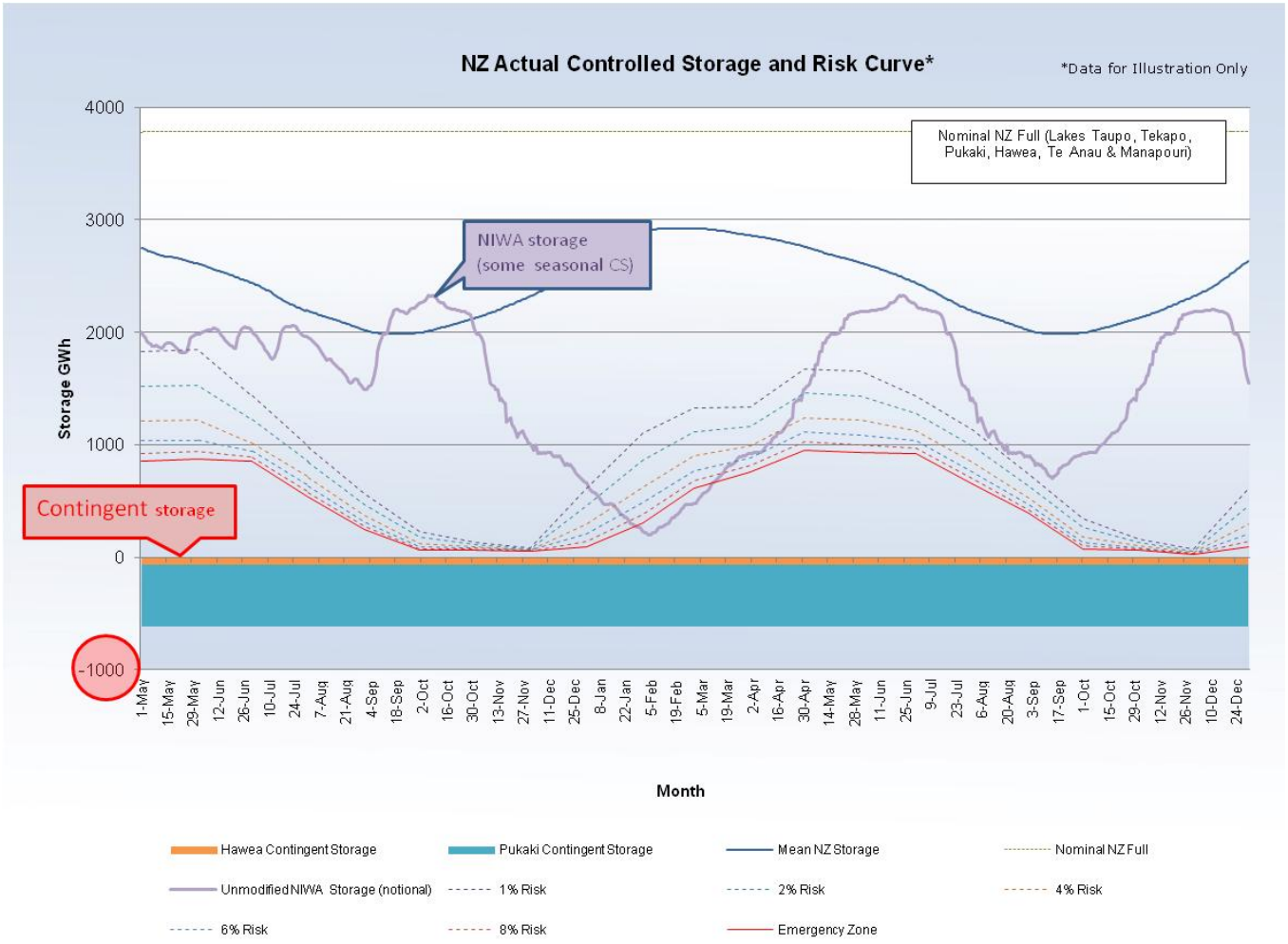
Examples of contingent storage

- 65 GWh at Hawea released when NZ/SI storage is at the 4% HRC
- 550 GWh at Pukaki released during an Official Conservation Campaign (i.e. the 10% HRC)
- An assumed 227 GWh at Tekapo released between October – March when NZ/SI storage is at a somewhat vaguely defined level relative to the hydro risk curves
- There is likely to be other, less significant CS across the various hydro schemes, both now and in future…

Reporting of hydro storage

- Reporting of hydro storage for Security of Supply purposes should include all storage available for generation, irrespective of whether it is contingent or not
- This is to provide clarity on energy security to all stakeholders, market participants and traders
- However, there are practical limits to reporting storage in this way within the current Security of Supply arrangements.
- The SO has considered various options, and proposes the following:

Most Contingent Storage treated as "below zero"



Consequences

- Contingent Storage helps reduce the risk of energy shortage in NZ and SI
- However, its contribution will not be counted in determining an Official Conservation Campaign (OCC).
- i.e. the probability of an OCC as not been reduced

Measurement of storage

- Notwithstanding issues around the reporting of contingent storage, there is also complexity in the physical measurement of storage
- It is important this complexity is referenced and understood, as overtime things may change
- For example: some inflows may be diverted, assumptions change, tectonic movements gradually shift storage measurements (e.g. Taupo)
- NIWA is an important partner in this

SO work plan

- Hydro storage reporting and measurement are on the SO work plan
- To facilitate industry awareness and participation in this work, the SO proposes to form a group to consider hydro related reporting and measurement (Hydrological Advisory Group)
- Group should include NIWA, Authority & generators

Summary

- SO is pursuing appropriate reporting of contingent hydro storage to maintain transparency of energy security, whilst “meshing” with the current Security of Supply arrangements
- SO will keep up to date with the complexity of physical measurement of storage and inflows
- Proposal to form a Hydrological Advisory Group, comprising the SO and reps from generators, the Authority, and NIWA in order to study and maintain awareness of these effects

Questions