2020 North Island Hydro Storage Projections

The system operator’s role is to identify and assess potential risks to the power system.

The upcoming HVDC outage and overlapping outages on the gas system have potential to place a greater reliance on North Island hydro generation. This is at a time when the North Island generally experiences low inflows but can experience the occasional large inflow events from tropical weather systems moving south.

We wanted to understand the risk extremely low North Island hydro storage could have on capacity and energy. We found that:

1. Due to the size of North Island storage relative to the South Island it posed no risk to energy. Even if an extreme dry sequence saw North Island storage fall to the bottom of it operating range, this alone would not cause national storage to cross the Electricity Risk Curves.
2. Even if the North Island storage fell to the bottom of the operating range, daily energy output would then be constrained by the previous days inflows. Assuming the previous days inflows were sufficient, output could be maximised over the daily peak demand periods.
As part of developing our understanding of this risk, we also wanted to understand the likelihood based of historical inflow sequences that North Island hydro storage could drop to the bottom of its operating range. We modelled this using the Simulated Storage Trajectory’s (SSTs) we use in our modelling of Security of Supply. For the purposes of transparency, we wanted to share the projections and insights we drew from them.

In summary, our modelling of the North Island SSTs indicated:

1. North Island hydrology is expected to decline through the period of the HVDC outage. But this happens even if there was no HVDC outage.
2. While we can expect a declining trend, under all scenarios, there is a greater risk of North Island going above its operating range as a result of single large inflow events.
3. Under all scenarios it would take an event outside the 10th percentile to cause North Island storage to reach the bottom of its operating range.
4. Even though the modelling indicates it would take an extreme scenario before storage would reach the bottom of its operating range we will monitor North Island Storage throughout the HVDC outage.

North Island SST projections without an HVDC outage

This chart indicates:

1. As expected, North Island storage drops through Q1 2020.
2. While the trend shows a general downward decline, there would need to be a scenario outside the 10th percentile before North Island Storage was to reach the bottom of the operating range.
3. While there is a general declining trend, there are more SSTs that going above the operating range, generally a reflection of large single inflow events, such as tropical systems moving south.
Impact of the HVDC outage

1. A similar rate of decline as “No HVDC outage”
2. The 10th percentile drops from 100GWh to 50GWh, but still above the bottom of the operating range.
3. Based on historical inflows there is still a greater number of SSTs showing above the operating range from single large inflows events.

Constrained availability of gas to generators during the HVDC outage

1. A slightly faster rate of decline than the previous scenarios
2. The 10th percentile line drops to 50GWh like the “HVDC outage” chart.
3. There are more extreme events that could see the North Island reach the bottom of the operating range, but these are all outside the 10 percentile line.
4. There are still more SSTs that going above the operating range than below.

Please note that the information provided in this document is intended to provide indicative projections about North Island hydro storage, using historical inflow data to model potential outcomes. While we have taken all care in preparing this information, you should confirm the accuracy and currency of the information before relying on it.