Market Operations Weekly Report - Week Ended 16 November 2025

Overview

New Zealand hydro storage remains at 137% of the historic mean, well above the 90th percentile and approaching the maximum capacity of 4,400 GWh.

This week's insight looks at the effect of space weather on the grid on 12 and 13 October.

Security of Supply

Energy

National hydro storage remains at 137% of the historic mean. North Island hydro storage increased from 131% to 133% of the historic mean while South Island hydro storage remains at 138%.

Capacity

Residuals were high last week (all above 700 MW) with relatively low demand peaks, one Huntly Rankine unit running, and most weekday demand peaks having significant wind generation and some solar generation.

The possibility of low capacity residuals remains at this time of year with increased outages and low thermal unit commitment. However, generally low and flat demand and the low probability of cold snaps makes low residuals unlikely. At this time of year, higher temperatures result in higher electricity demand for some weekday peaks due to cooling load.

The N-1-G margins in the NZGB forecast are healthy through to the start of January. Within seven days we monitor these more closely through the market schedules. The latest NZGB report is available on the NZGB website.

Electricity Market Commentary

Weekly Demand

Total demand last week decreased to 737 GWh from 752 GWh the week prior, and is in line with demand levels usually seen at this time of year. The highest demand peak at 5,366 MW occurred at 5:30 pm on Monday 10 October.

Weekly Prices

Average wholesale spot prices decreased last week, with very low prices over the weekend. The average wholesale electricity spot price at Ōtāhuhu last week was $72/MWh, down from $107/MWh the week prior. Wholesale prices peaked at $200/MWh at Ōtāhuhu at midday on Monday 10 November.

With significant northward power flow on the grid and some planned outages on the North Island 220 kV transmission network, some price separation occurred between Haywards and Ōtāhuhu from Monday 10 November to Friday 14 November. Inter-island price separation occurred on Tuesday 11 November and Friday 14 November, with the HVDC reaching its maximum northward transfer limit during these periods. Due to sufficient reserve availability, the full capacity of the HVDC was able to be economically dispatched.

Generation Mix

Wind generation remained at 10% of the generation mix, just above its average contribution of 9%. Hydro generation was above average at 68%, just below its 69% share the week prior. Thermal generation remained at 2% of the mix. The geothermal share remained below average at 17% of the mix due to planned outages.

HVDC

HVDC flow last week was entirely northward with high hydro generation and decreased geothermal generation. The peak HVDC transfer was 898 MW at 8:00am on Friday 14 November. In total, 83 GWh was transferred north.

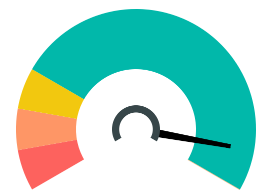
Consultations

Cross-submissions on our draft amendment to the System Operator Forecasting and Information Policy (SOSFIP) have now closed. Two cross-submissions were received and have been posted on the consultation page.

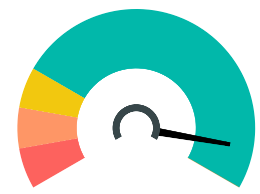
Consultation on the Security of Supply Assessment (SOSA) reference case assumptions and sensitivities is open. Submissions are due by Monday 24 November. We have also opened our survey of planned generation investment for the SOSA. If this applies to you then you should have received an email. If you have not, please contact market.operations@transpower.co.nz.

We have published our response to submissions on tie-breaker provisions in the Scheduling, Pricing and Dispatch model.

New Zealand Energy Risk

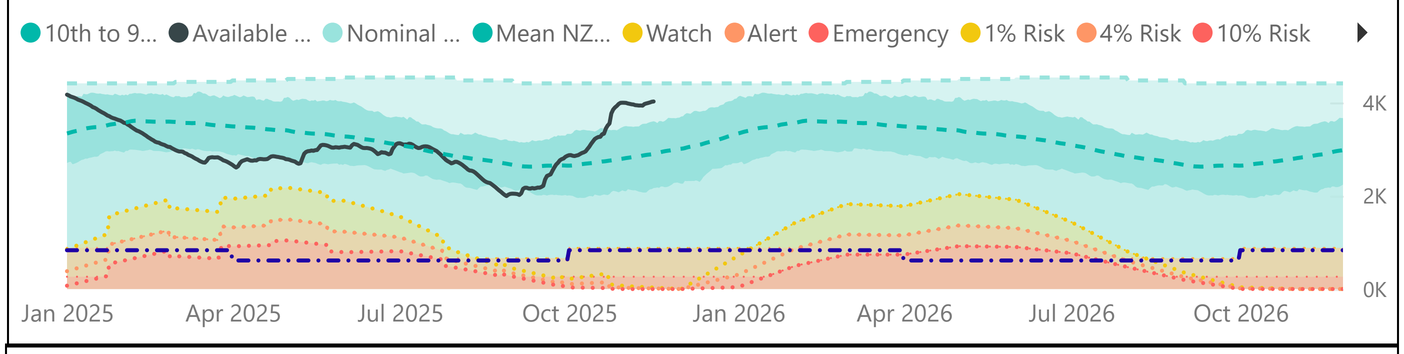


South Island Energy Risk

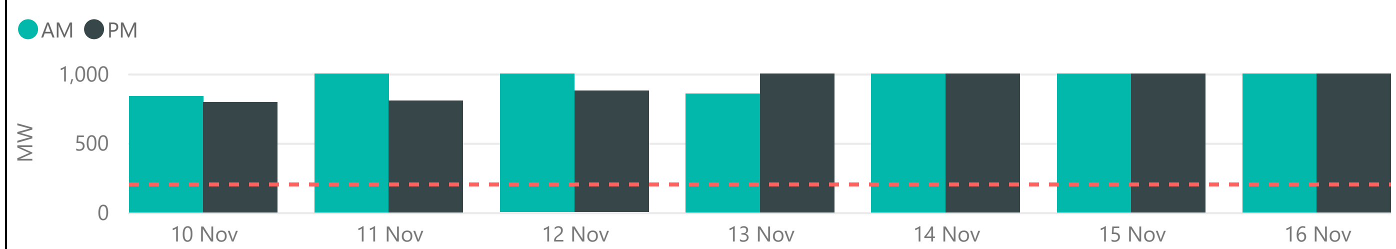


Normal Watch Alert Emergency

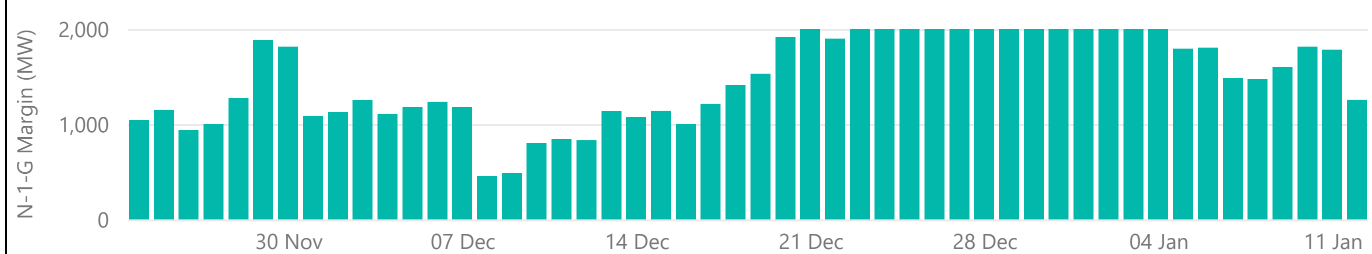
New Zealand Electricity Risk Status Curves (Available GWh)



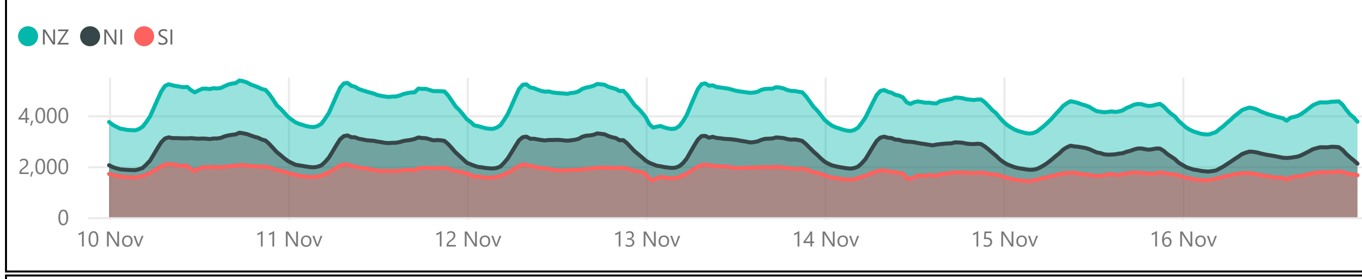
Lowest Residual Points - MW



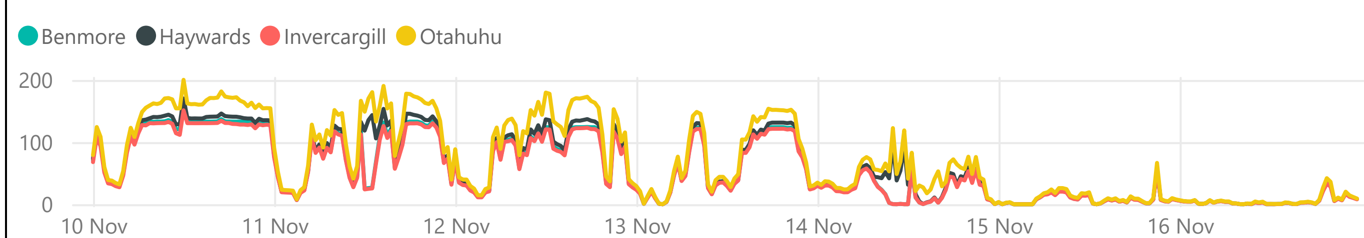
NZGB Look-Ahead (excluding next 7 days)



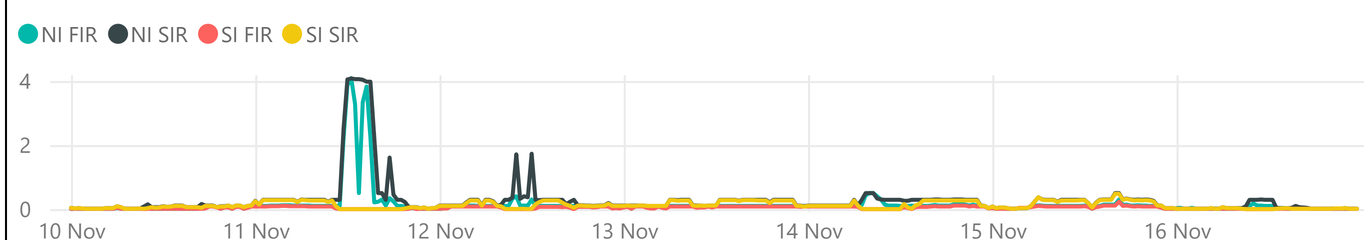
National Demand by Trading period - MW



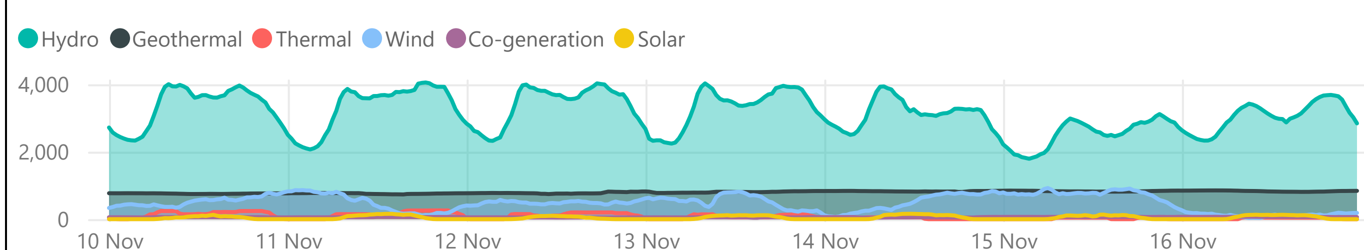
Energy Prices - $/MWh



Reserve Prices - $/MW



Generation - MW



Net HVDC Transfer - MW (Northward positive)

Weekly Insight — Sun protection; slip, slop, slap in an outage

As Aotearoa New Zealand heads toward summer the longer daylight hours and increasingly strong sunshine reminds of the need to "slip, slop, slap, and wrap" to avoid the dangers of over-exposure to the harmful effects of the sun. A less commonly known potential harmful effect of the sun is the potential impact on electrical assets from solar storm activity (see below). Recently, Transpower was reminded of the need for the power system's equivalent of "slip, slop, slap, and wrap" due to coronal mass ejections (CMEs) occurring on 12 November.

At 13:45 on 12 November Transpower was alerted via our subscription to solar storm notifications from the National Oceanic and Atmospheric Administration (NOAA) that a G3 (Strong) event had occurred. Within 10 minutes Transpower's monitoring of NER (neutral earthing resistor)[1] currents triggered alarms for excessive currents across multiple sites in the South Island. However, the threshold at which assets are removed from service to protect them from potential damage had not yet been reached. Substantial planning activities were undertaken across both the system operator and grid owner control rooms to prepare in case the situation worsened.

Grid Emergency

At 14:25 an updated warning from NOAA was received which increased the severity of the observed event to a G4 (Severe). Coupled with ongoing elevated NERs and associated alarms, the decision was made at 14:40 to declare a grid emergency. The associated Grid Emergency Notice (GEN) was issued at 14:55 for the South Island, originally for 14:45 – 23:59 on 12 November but extended at 20:51 on 12 November to end at 07:00 on 13 November. Finally, at 03:52 on 13 November the end time of the grid emergency was amended to 04:00.

In line with our procedure to manage solar storms as a precautionary measure, to prevent damage to equipment, the national power grid was put into a resilient state by reconfiguring and removing some circuits from service across the South Island. These were restored back to service following the conclusion of the grid emergency at 04:00 on 13 November, and there was no impact on consumers' electricity supply.

Three circuits (Roxburgh – Three Mile Hill 1, North Makarewa – Gore – Three Mile Hill 1, and Benmore – Twizel 1) along with the Roxburgh T10 transformer were removed from service to reduce total grid induced currents (GIC — see Solar Storm below) in the system. Doing so got assets at Halfway Bush and South Dunedin back under their NER alarm limits providing headroom in case the 3rd CME (see features of this event) arrived before the other two had dissipated.

A brief industry meeting to explain the situation, what was happening and why and discuss the expected severity of the event was held at 16:30 on 12 November.

Features of this event

While this event was smaller in magnitude (about ½ to ⅓ the size) than the G5 Gannon solar storm experienced on 11 May 2024, this event had some notable characteristics:

- Three earth-directed CMEs launched in succession. (see Figure 1)
- The first two were travelling slower (400 – 500km/s) and bunched up on each other.
- The third was travelling much faster >900km/s and arrived around 08:00 on Thursday after we had removed mitigations and restored the grid configuration to normal.
- The first two smaller and slower CMEs were more geoeffective and produced larger GICs than expected is they were both strongly southward in polarity — the opposite of the earth's polarity. The 3rd CME was mostly northward in polarity and mostly bounced off earth's magnetic field like a deflector screen so a much smaller effect was observed.

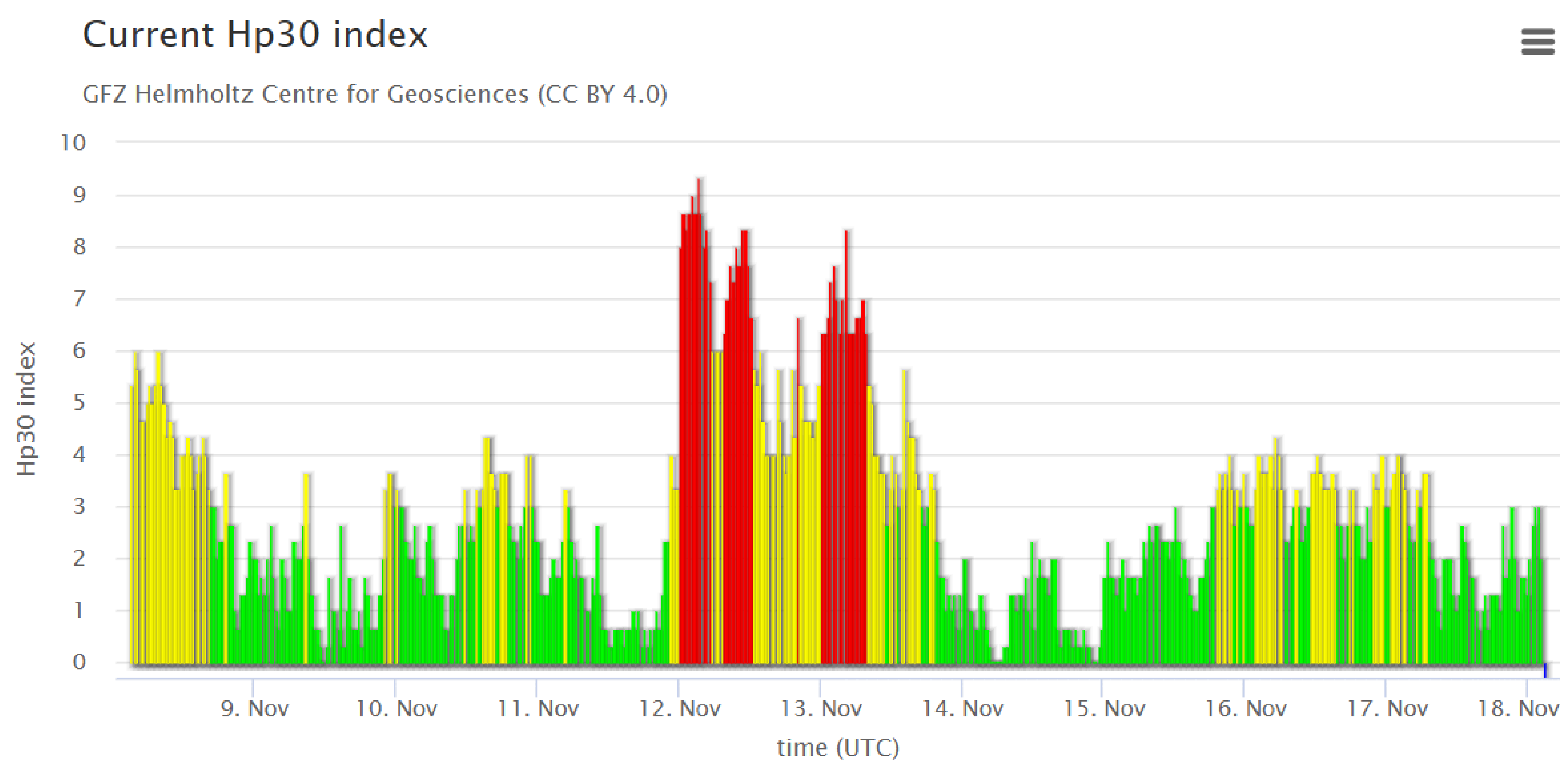
Solar Storms

The sun experiences an 11-year cycle during which its magnetic field flips. The middle of this cycle is the solar maximum. This is when the sun has the most sunspots resulting in an increased number of solar flares and coronal mass ejections (CMEs). If the Earth is in the path of this ejected matter, the high-velocity impact of protons can cause significant changes in the Earth's magnetic field which induce quasi-DC currents (Geomagnetically Induced Current or GIC)[2] to flow in transmission circuits. These currents can flow to ground through transformers' grounded neutrals[1] (completing the circuit) and could saturate and damage transformer cores because of several factors including:

- excessive heat leading to thermal failure,
- extra harmonics leading to protection malfunctions and trips of power lines,
- voltage control difficulties because of increasing Var (Volt-Amperes reactive) consumption, and
- compensators switching out of service.

An extreme solar event could therefore cause widespread (global) damage to power networks. The impact of GIC is most pronounced in power systems with significant lengths of east-west transmission lines, as these are perpendicular to magnetic field lines, and in the higher latitudes where the magnetic field is strongest.

Figure 1: The three CMEs are clearly observable on this chart from Helmholtz Centre for Geosciences. The chart measures the Hpo index, another measure of solar storm strength, and shows this in 30m intervals.



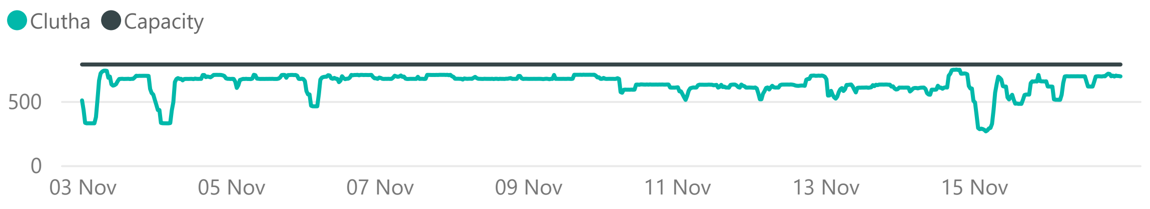
Footnotes:

1. NERs are used in AC networks to limit transient overvoltage that flows through the neutral point of a transformer or generator to a safe value during a fault. Generally connected between ground and neutral of transformers, NERs reduce the fault currents to a maximum pre-determined value that avoids a network shutdown and damage to equipment yet allows sufficient flow of fault current to activate protection devices to locate and clear the fault.
2. Transformers with star connections and grounded neutrals linked by long transmission lines are most susceptible to GIC.

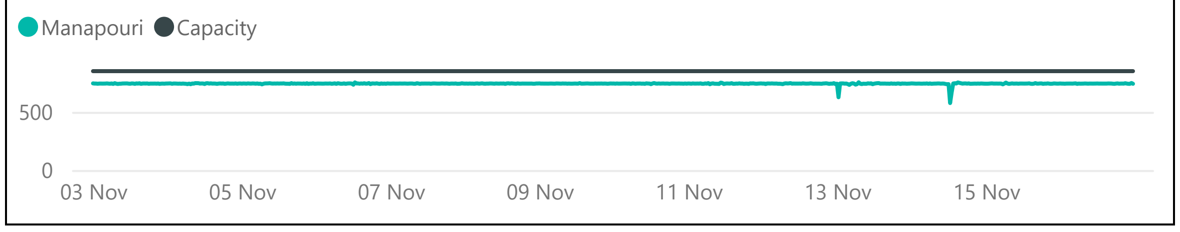
Generation Breakdown - Last Two Weeks

Measured in MW and displayed at trading period level for last 14 days

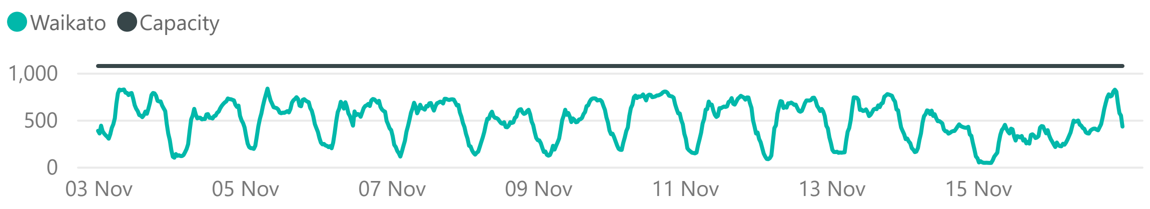
Clutha



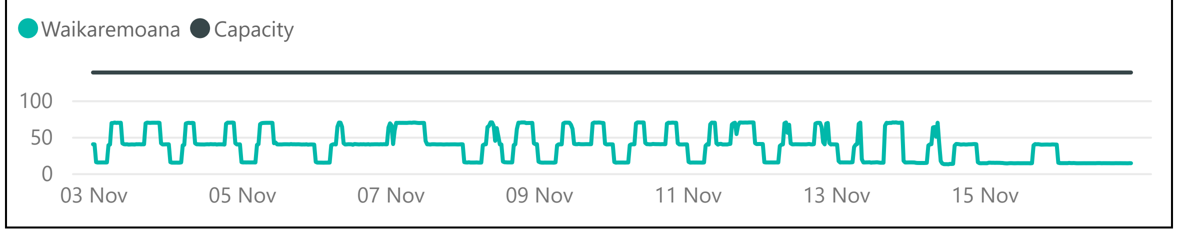
Manapouri



Waikato

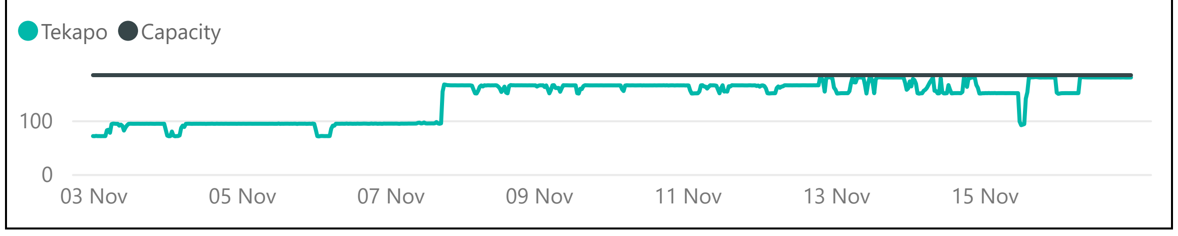


Waikaremoana

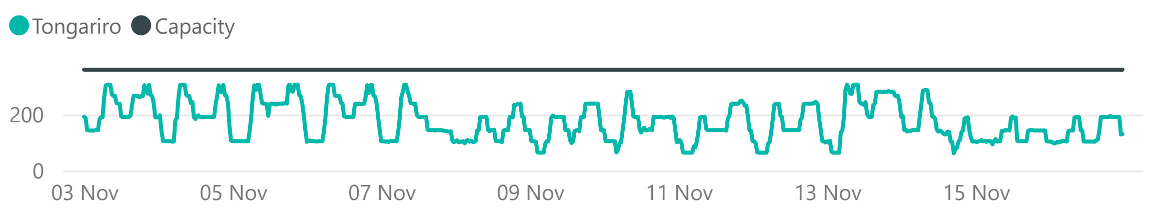


Waitaki

Tekapo

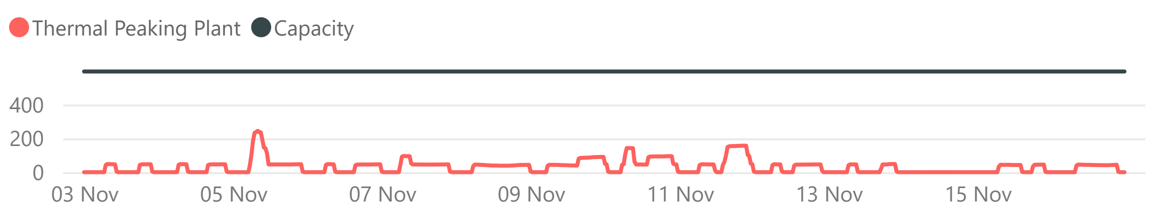


Tongariro

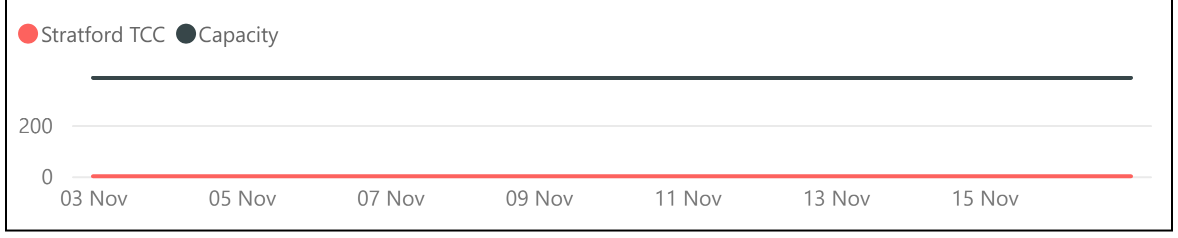


Other SI Hydro

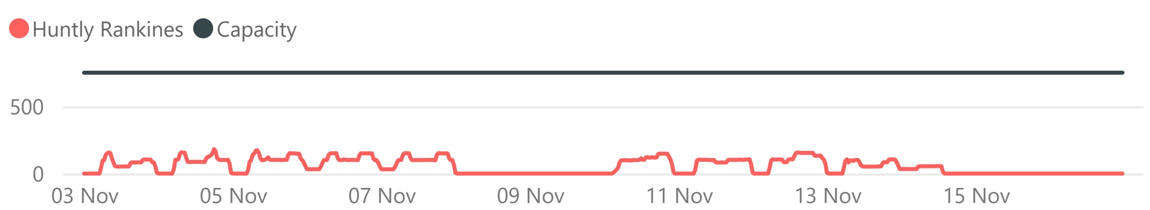
Thermal Peaking Plant



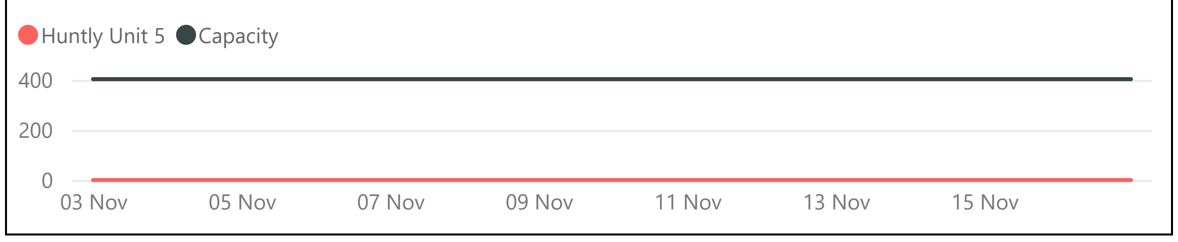
Stratford TCC



Huntly Rankines

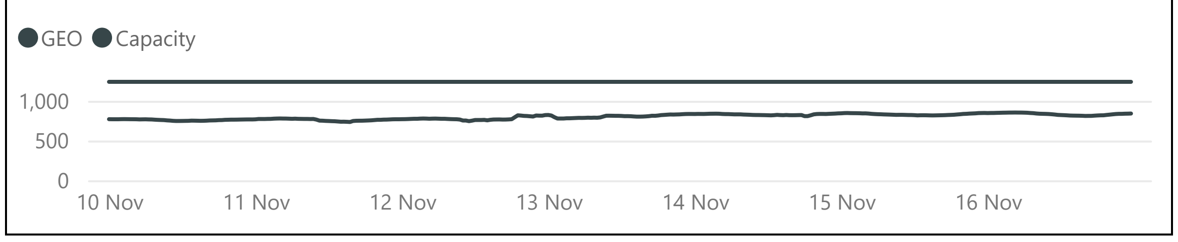


Huntly U5

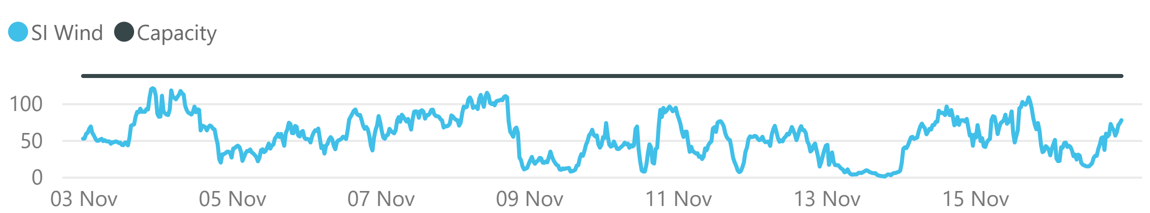


North Island Wind

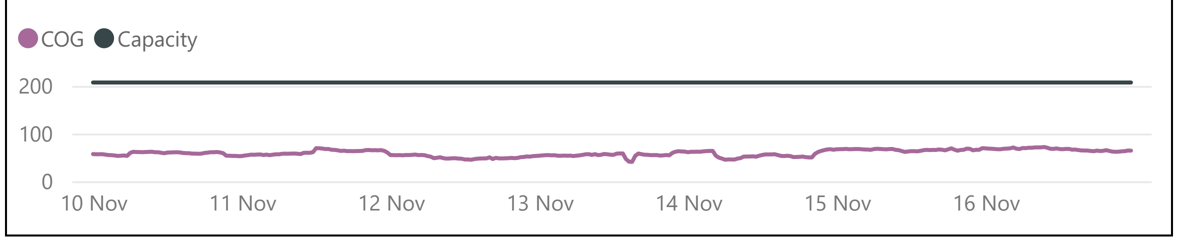
Geothermal



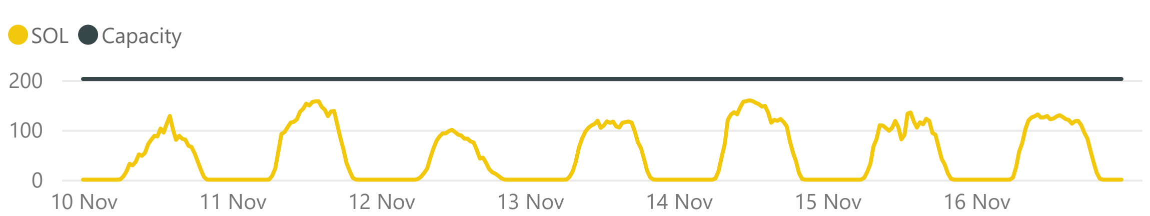
South Island Wind



Co-Generation

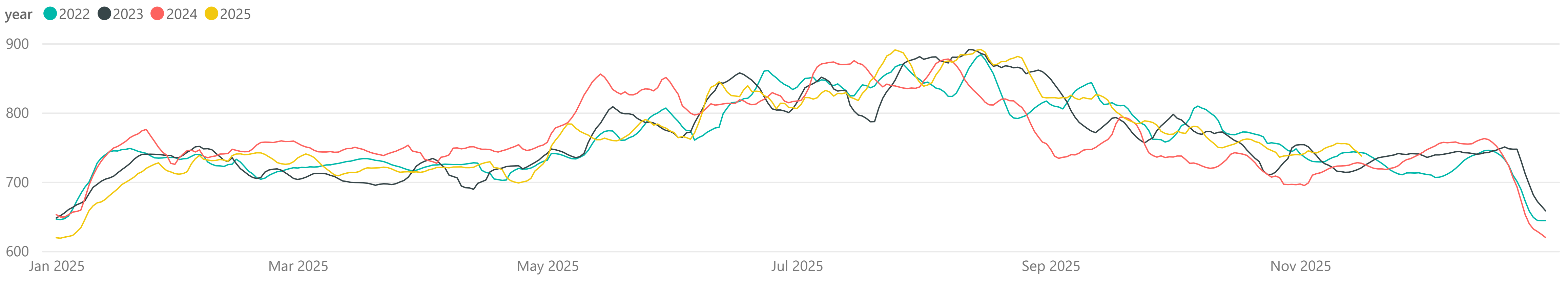


Solar

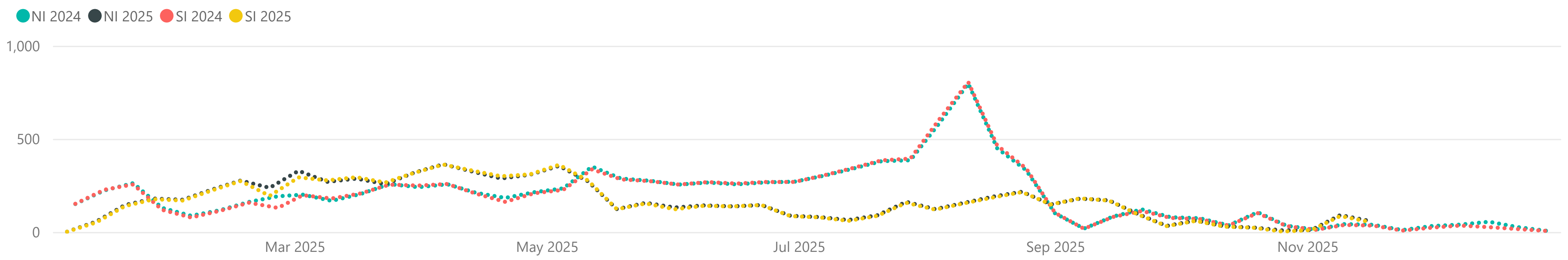


Weekly Profiles

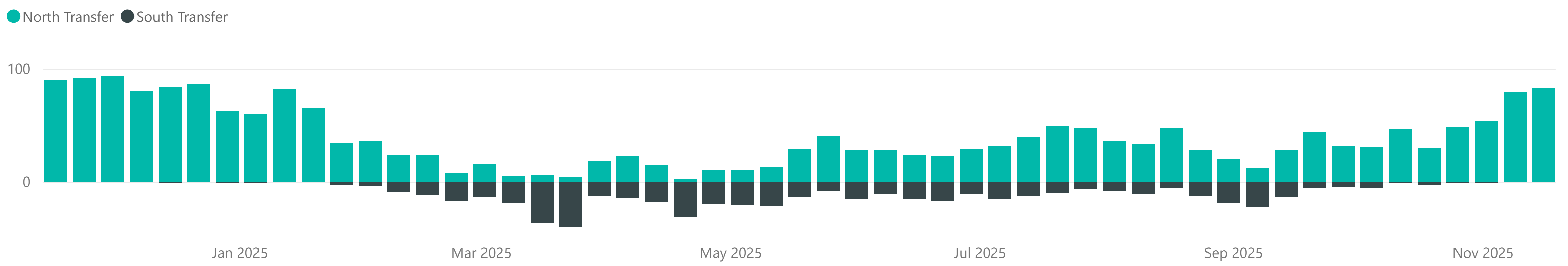
National Weekly Demand - GWh - 7 Day Rolling



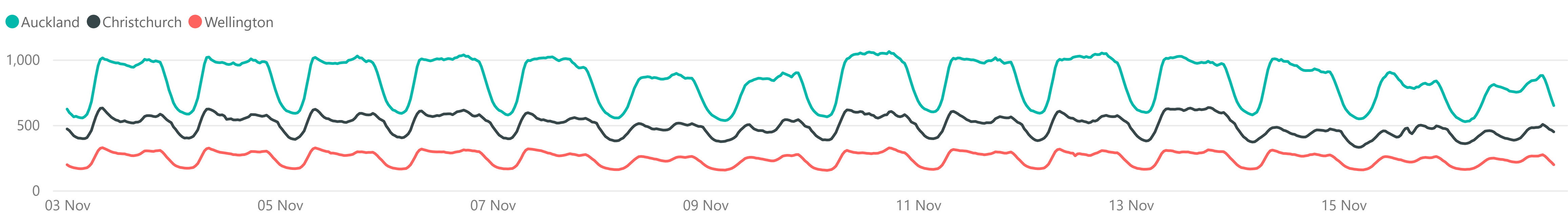
Weekly Spot Price - $/MWh



HVDC Transfer - Weekly GWh



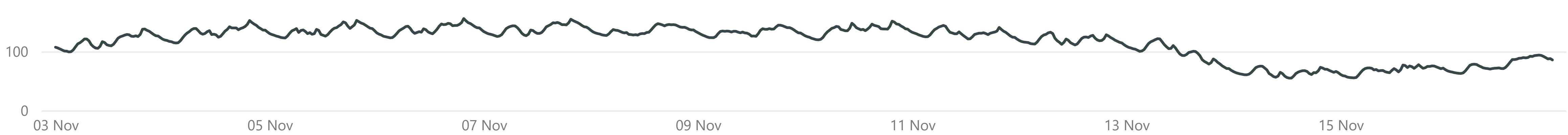
Conforming Load Profiles - Last Two Weeks *Measured in MW shown by region*



Non-Conforming Load Profiles - Last Two Weeks *Measured in MW shown by GXP*

GLN0331

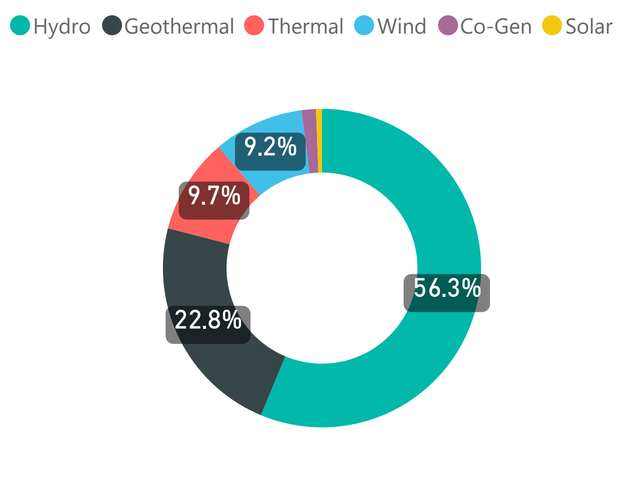
ASB0661



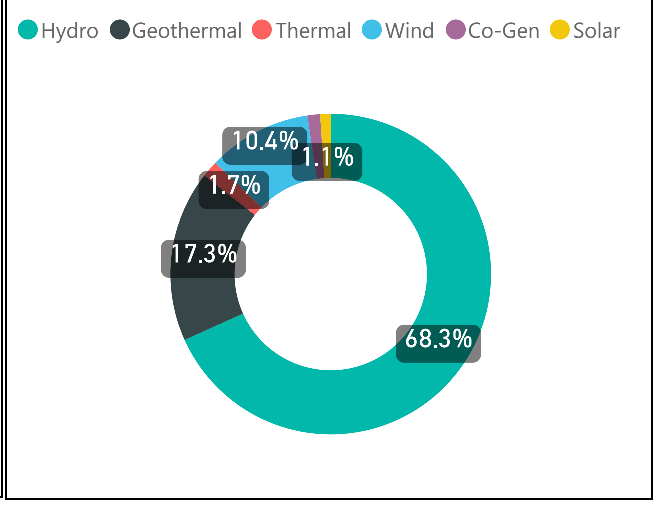
TWI2201

Generation Mix

Last 52 Weeks Generation Mix - Weekly GWh



Last 7 Days Generation Mix - Weekly GWh



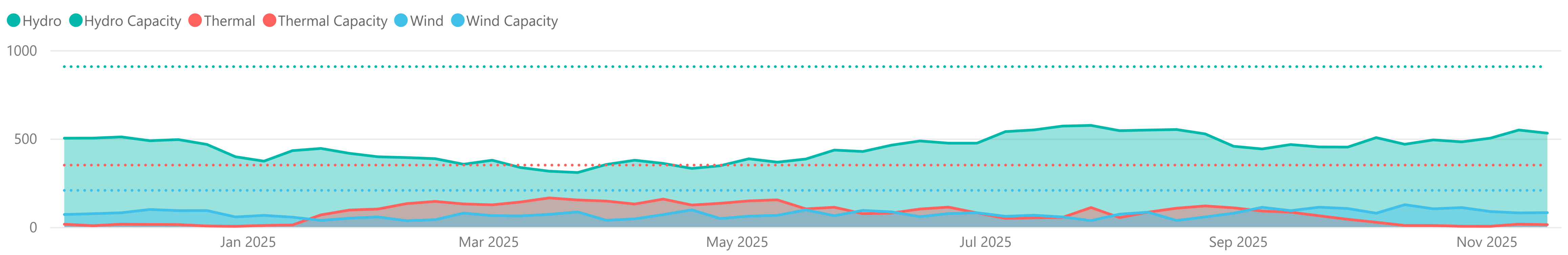
Average Metrics Last 7 Days

Renewable Percentage	CO2e Tonnes/Week	CO2e g/kWh
97%	16,793	20.9

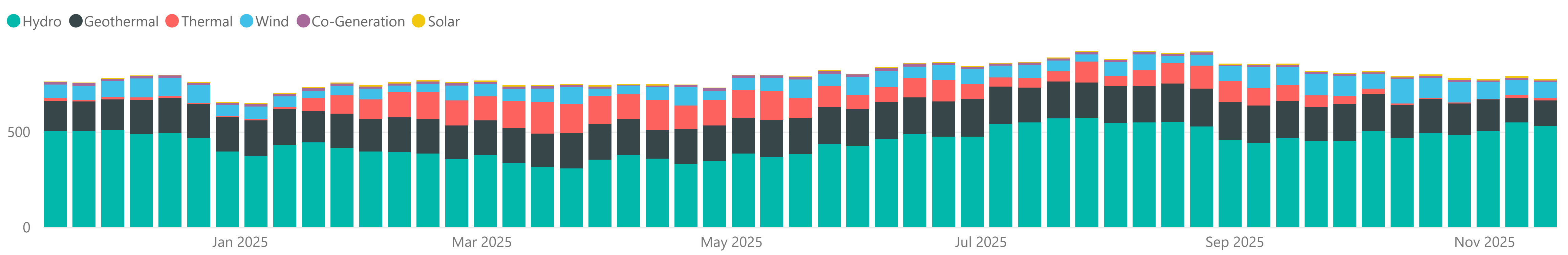
Average Metrics Last 52 Weeks

Renewable Percentage	CO2e Tonnes/Week	CO2e g/kWh
89%	65,175	82.0

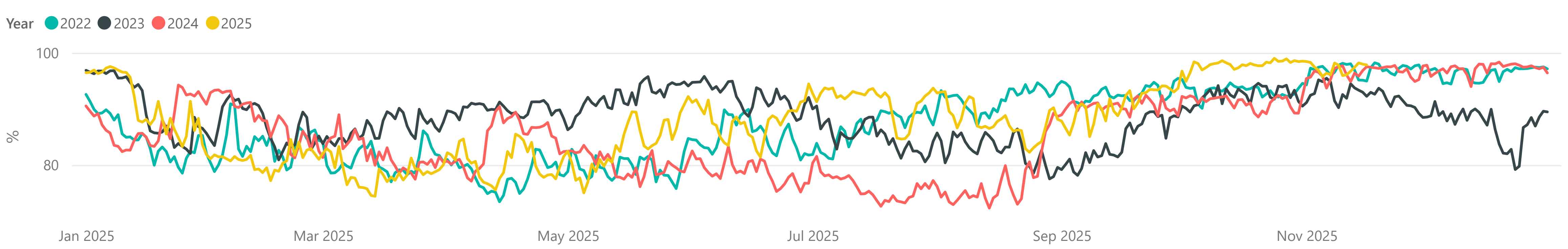
Weekly Generation Mix vs Capacity - GWh



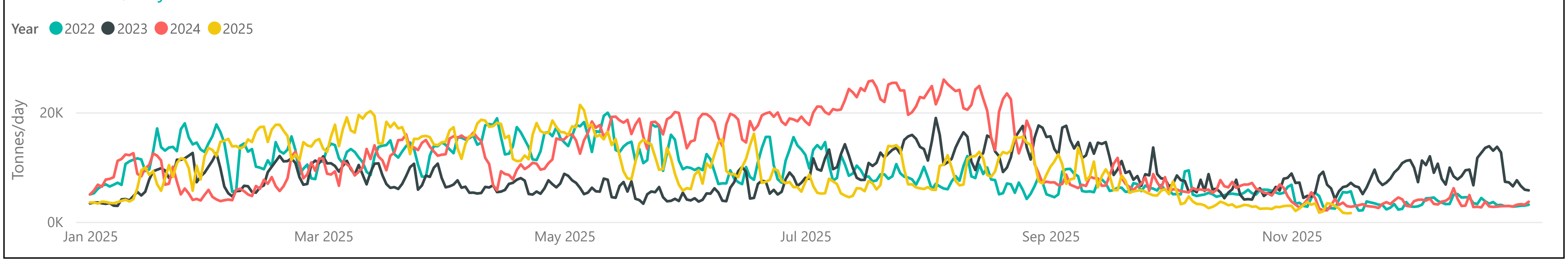
Weekly Generation Mix - GWh



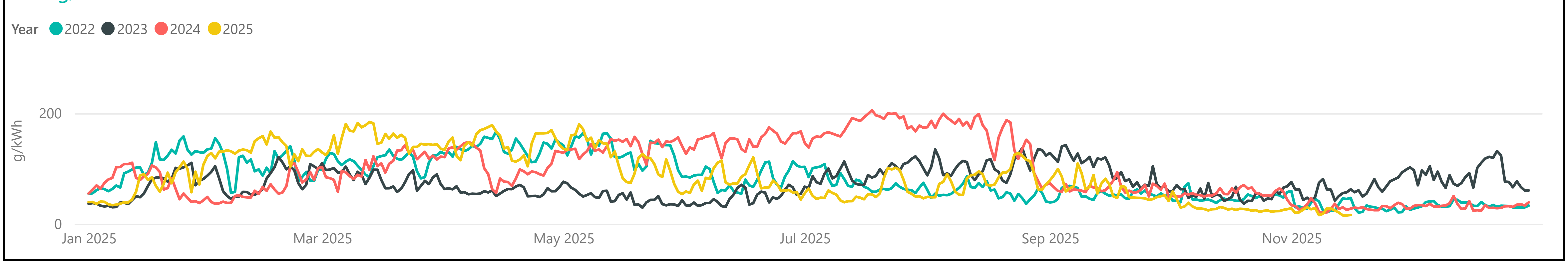
NZ Renewable Percentage



CO2 Tonnes/Day

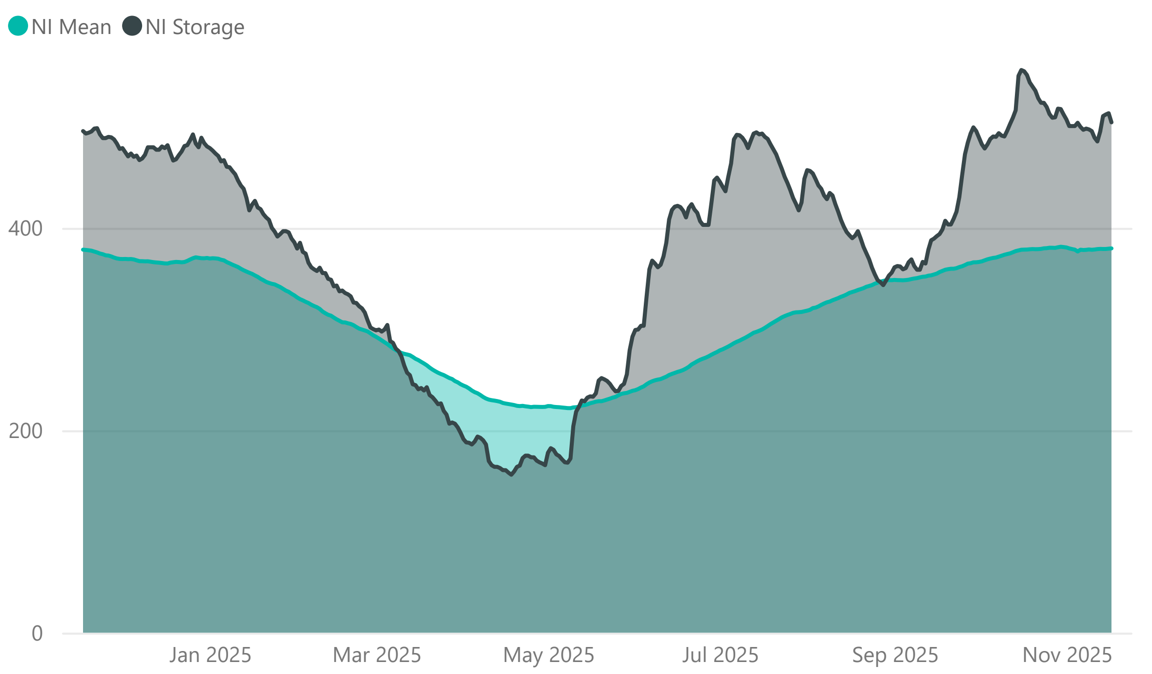


CO2 g/kWh



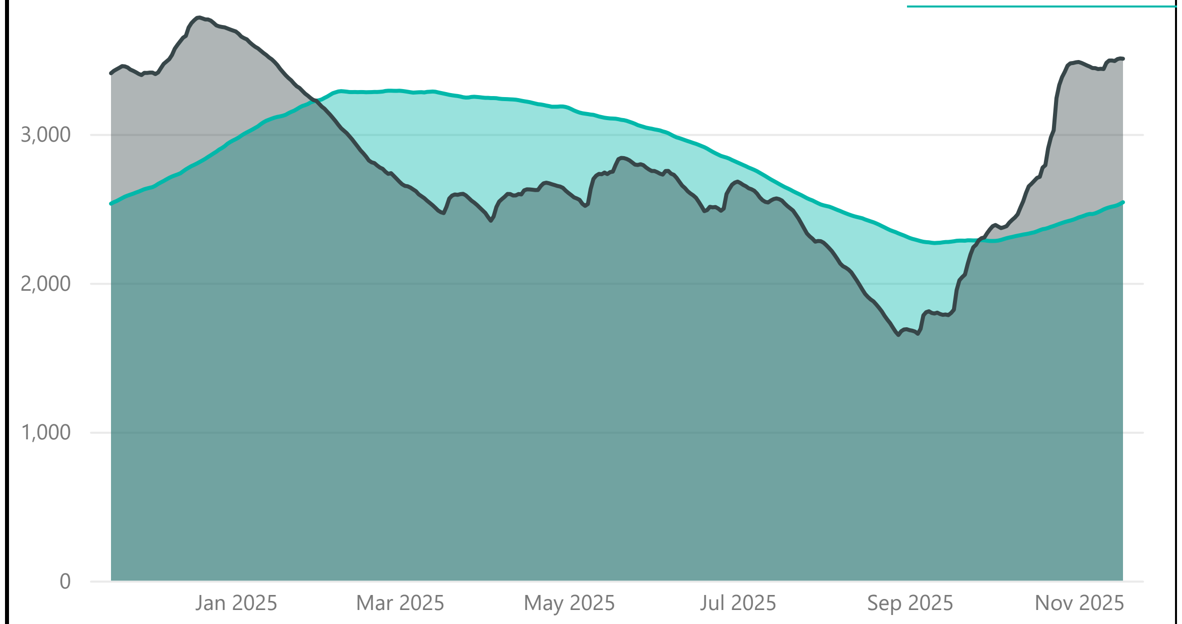
Hydro Storage

North Island Hydro Storage (Available GWh)

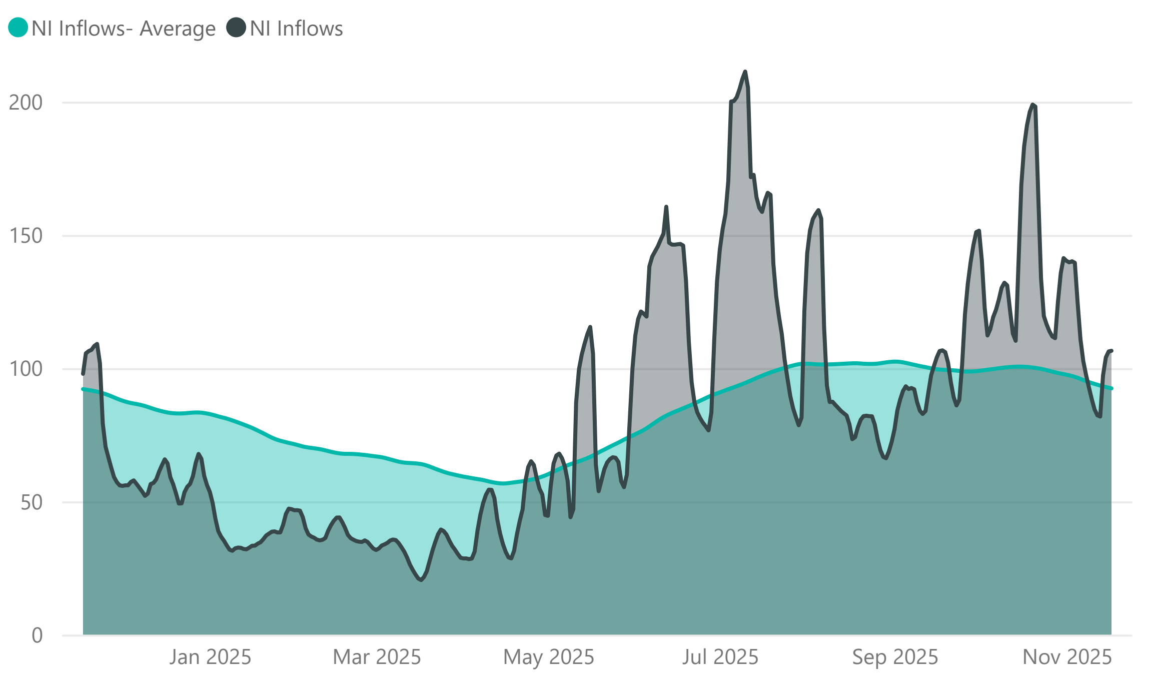


South Island Hydro Storage (Available GWh)

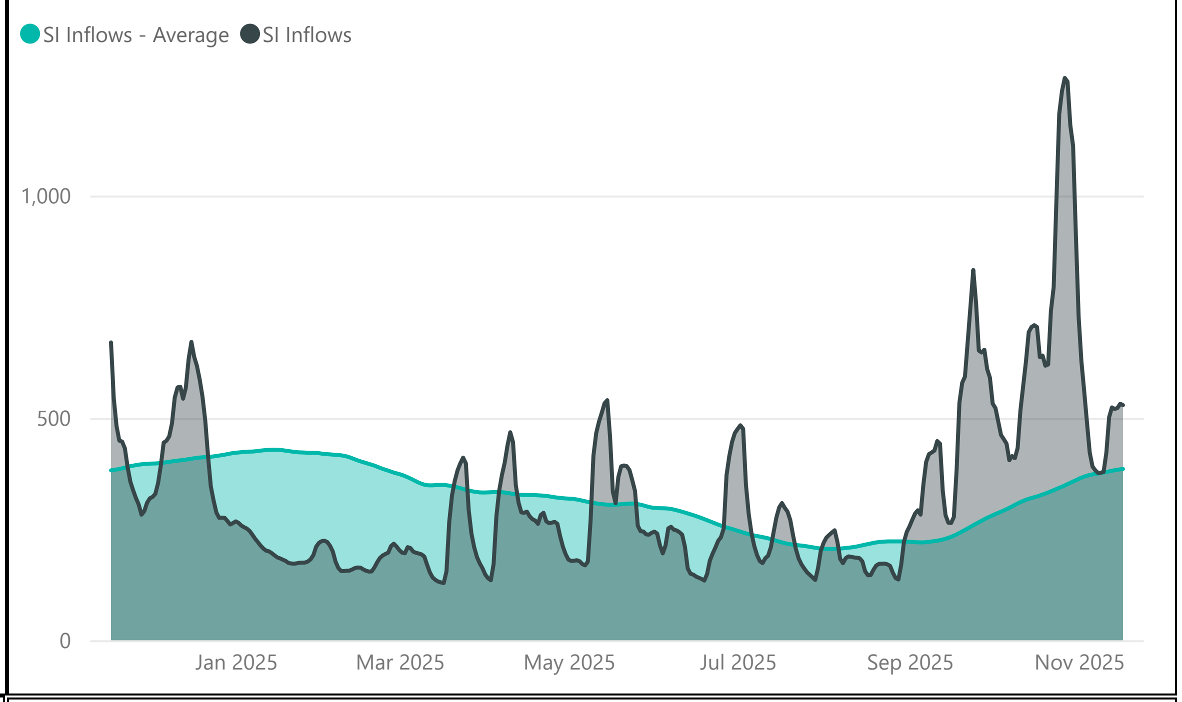
16 November 2025



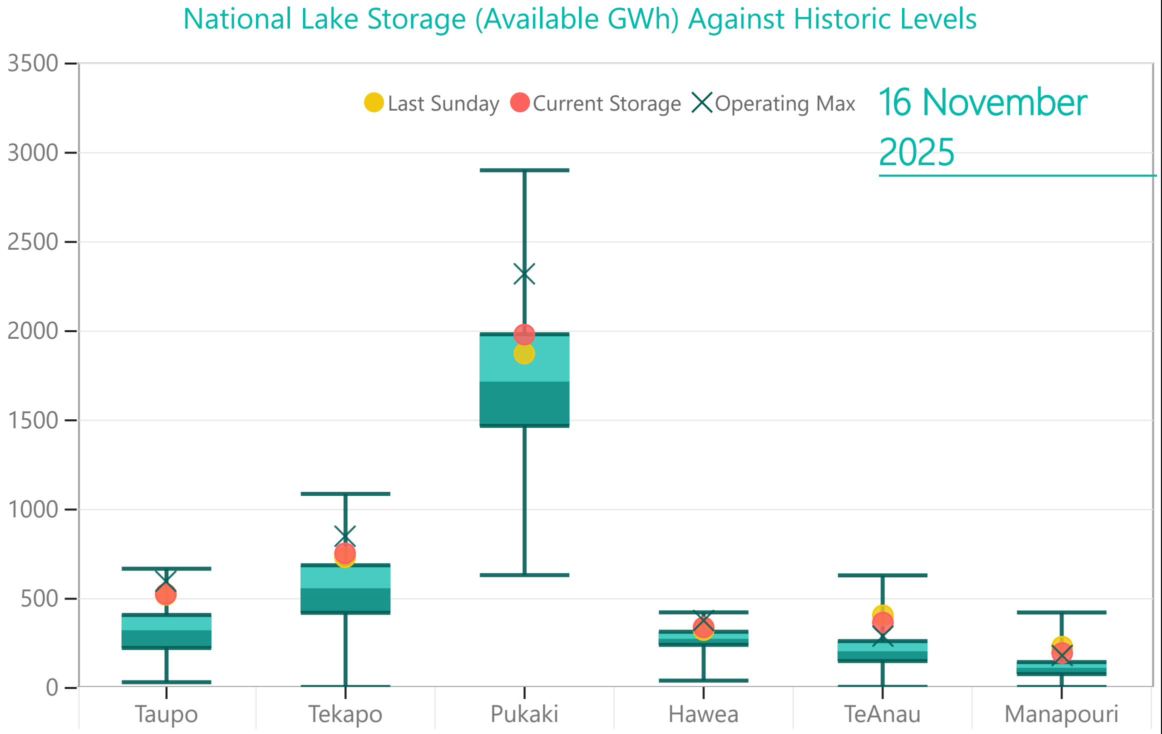
North Island Mean 7 Day Inflows (Available GWh)



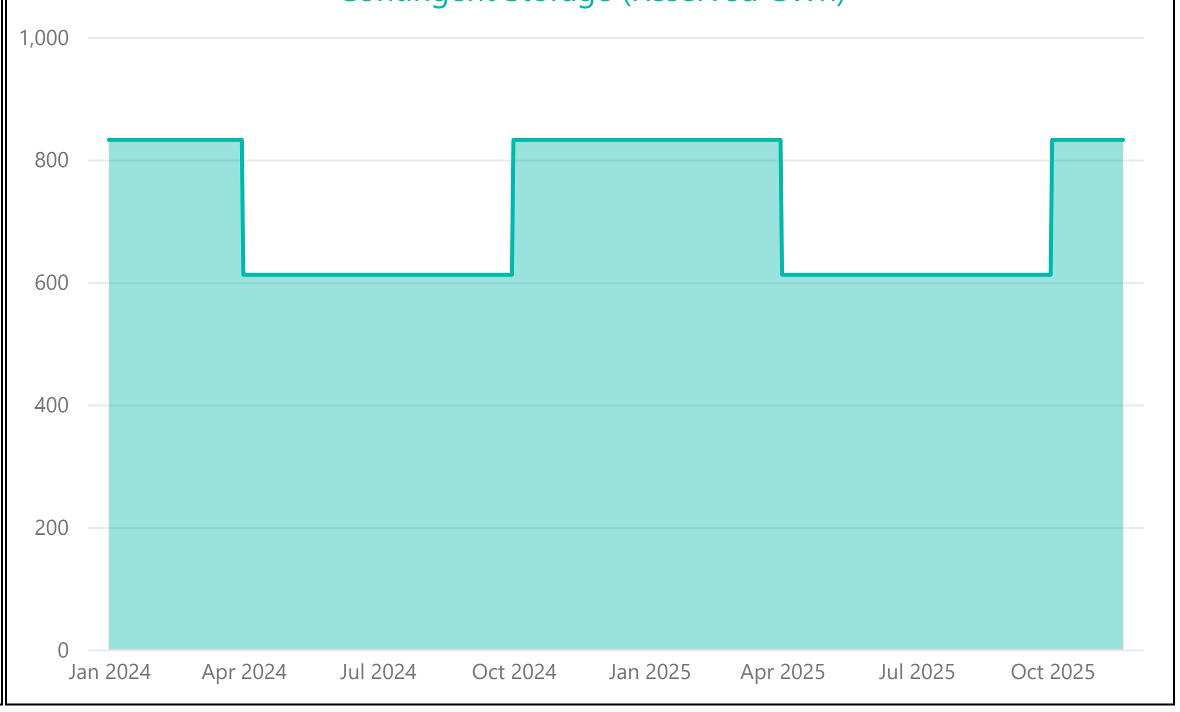
South Island Mean 7 Day Inflows (Available GWh)



National Lake Storage (Available GWh) Against Historic Levels



Contingent Storage (Reserved GWh)



For further information on security of supply and Transpower's responsibilities as the System Operator, refer to our webpage here: https://www.transpower.co.nz/system-operator/security-supply

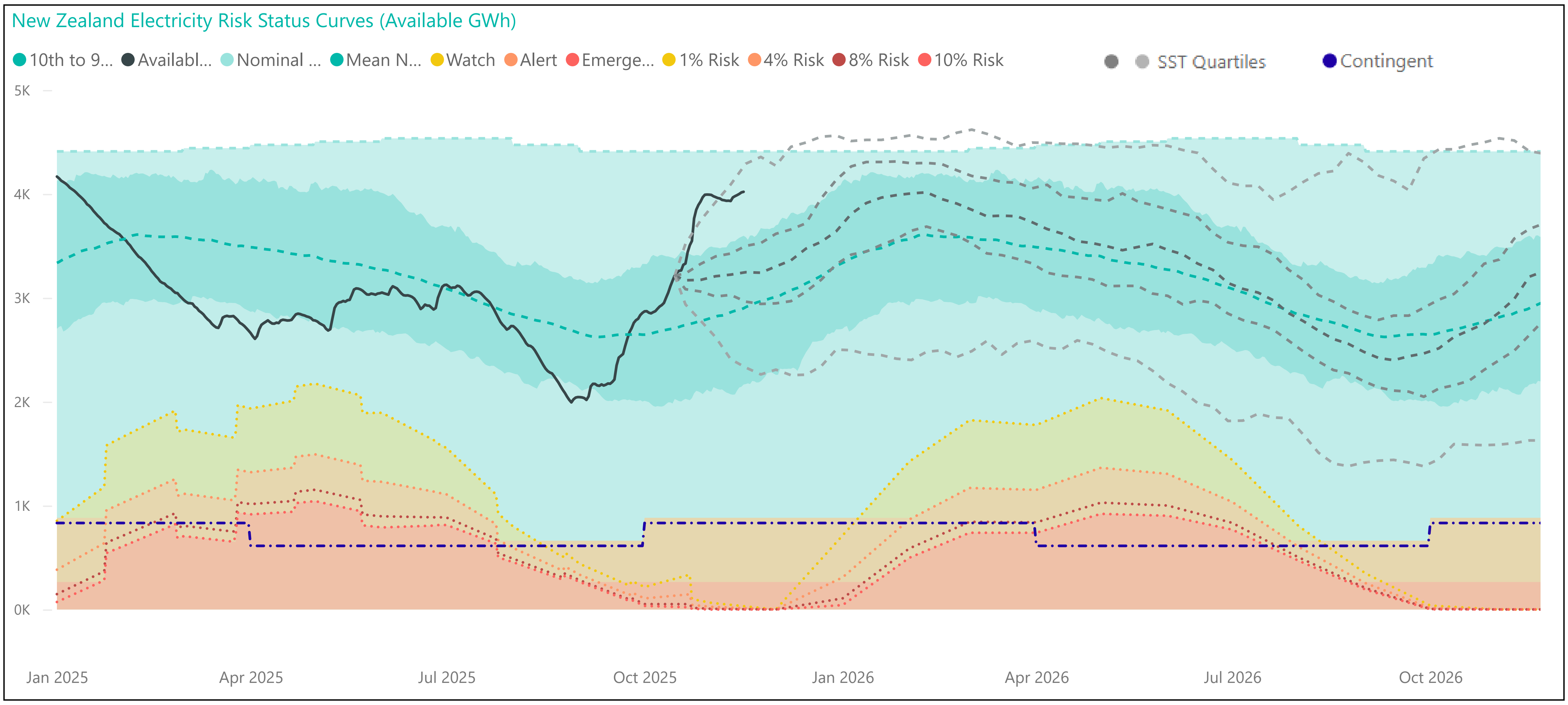
For any inquiries related to security of supply contact market.operations@transpower.co.nz

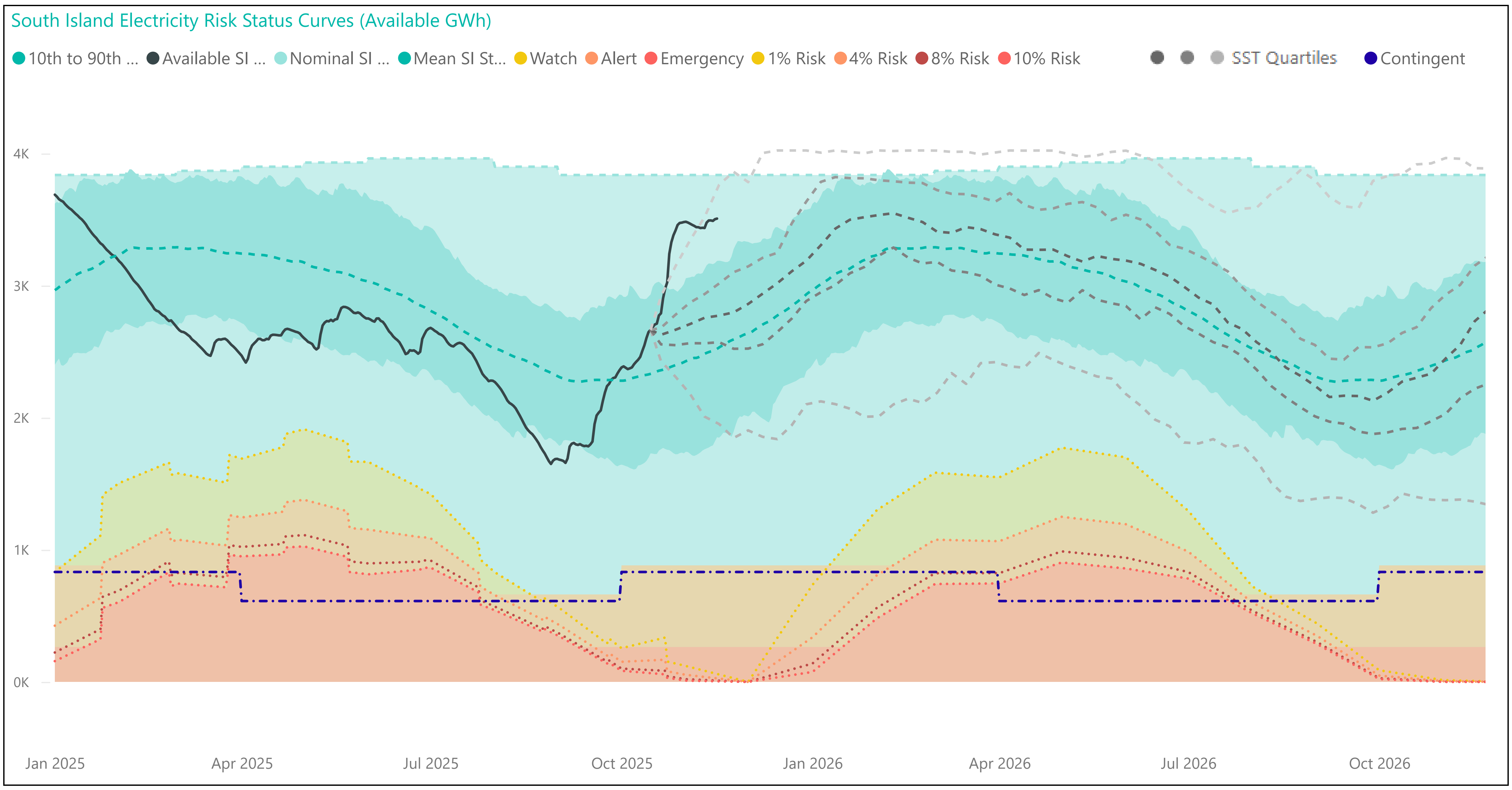
Hydro data used in this report is sourced from *NZX Hydro*.

Electricity risk curves have been developed for the purposes of reflecting the risk of extended energy shortages in a straightforward way, using a standardised set of assumptions.

Further information on the methodology of modelling electricity risk curves may be found here: https://www.transpower.co.nz/system-operator/security-supply/hydro-risk-curves-explanation

Electricity Risk Curves





Electricity Risk Curve Explanation:

Watch Curve - The maximum of the one percent risk curve and the floor and buffer
Alert Curve - The maximum of the four percent risk curve and the floor and buffer
Emergency Curve - The maximum of the 10 percent risk curve and the floor and buffer
Official Conservation Campaign Start - The Emergency Curve
Official Conservation Campaign Stop - The maximum of the eight percent risk curve and the floor and buffer

Note: The floor is equal to the amount of contingent hydro storage that is linked to the specific electricity risk curve, plus the amount of contingent hydro storage linked to electricity risk curves representing higher levels of risk of future shortage, if any. The buffer is 50 GWh.

The dashed grey lines represent the minimum, lower quartile, median, upper quartile and the maximum range of the simulated storage trajectories (SSTs). These will be updated with each Electricity Risk Curve update (monthly).