Weekly Market Movements - Week Ended 25 February 2024

Overview

National hydro storage fell last week to below the average for the time of year, now sitting at 98% of the historic mean. Residual generation was healthy all week, however North Island prices spiked to over $1,400/MWh during the HVDC Pole 3 outage.

In this week's insight we look at the factors contributing to the publication of the Customer Advice Notice for potential South Island Reserve shortfalls last week.

Security of Supply

Energy

National hydro storage fell to below average this week, currently at 98% of the historic mean, from 101% the previous week. South Island storage fell from 96% to 93% of the historic mean while North Island storage dropped from 153% to 149% of the historic mean.

Capacity

Capacity margins were healthy last week with higher thermal commitment coinciding with the HVDC outage. The lowest residual point of 621MW occurred on Thursday evening. Forecast N-1-G margins are healthy throughout the forecast horizon to late April. The HVDC outages running from 21 February - 14 March are considered in the margin calculation. The lowest N-1-G margin during the forecast period is 356 MW on 21 March. The latest NZGB report is available on the NZGB website.

Electricity Market Commentary

Weekly Demand

Demand remained low last week with continued summer conditions. Demand peaked at 5,462 MW on Monday 19 February during the evening peak. Demand increased from 747 GWh the week prior to 759 GWh.

Weekly Prices

Prices spiked last week on Thursday 22 February during the HVDC pole 3 outage over a period of low wind generation. With pole 3 on outage, there was no HVDC risk subtractor which increased the amount of reserves required to cover the HVDC contingent event - in this case the loss of the pole - leading to a North Island price spike for fast instantaneous reserve.

The Otahuhu price peaked at $1,421/MWh on Wednesday 22 February at 15:30. The average wholesale price at Otahuhu last week was $204/MWh, up from $177/MWh the week prior.

Generation Mix

The renewable percentage of the generation mix dropped further last week to below the annual average, from 88% to 84%. Hydro decreased from 60.4% of the mix to 56.4% of the mix. This was offset by increases in wind and thermal generation; wind increased from 8.5% to 9.5% of the mix and thermal from 10.6% of the mix to 13.5%, as noted earlier.

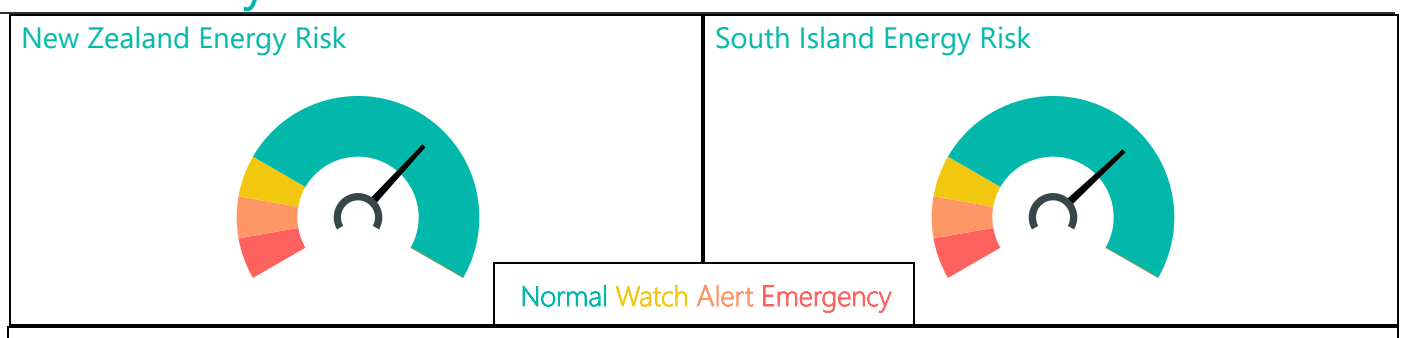
HVDC

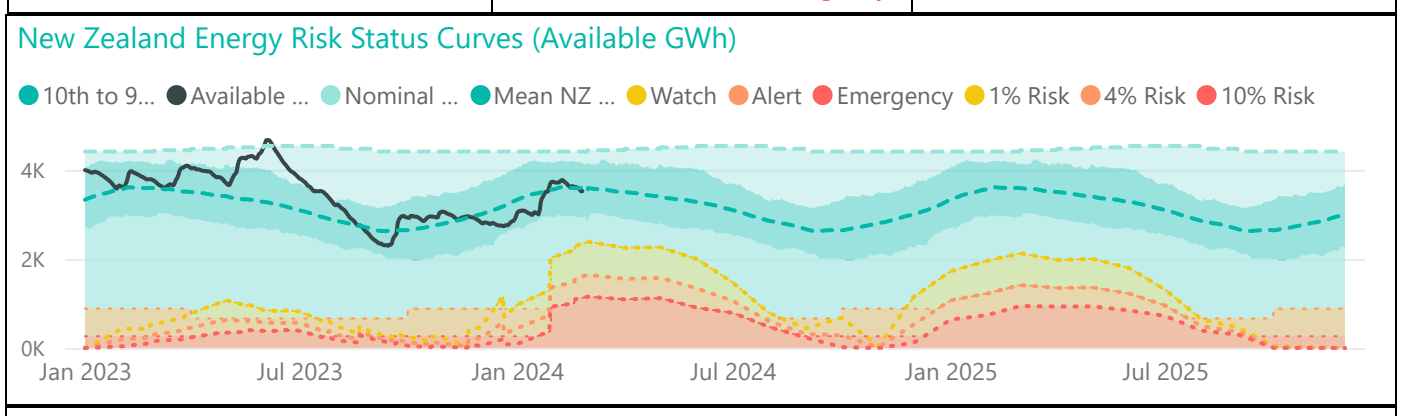
HVDC flows remained northward during the day last week. However, on all but one night, overnight flows were southward coinciding with overnight periods of low demand and high North Island generation (from both wind and thermal sources).

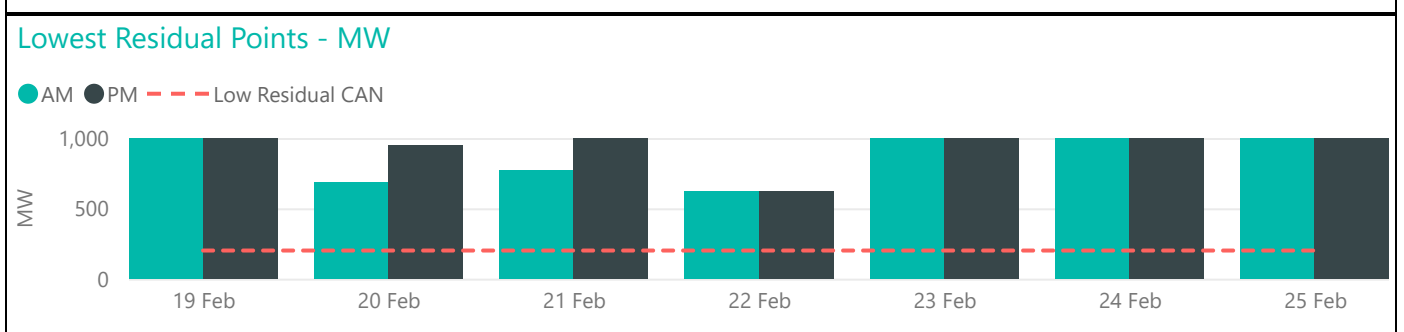
HVDC Pole 3 and Bi-Pole outages have both concluded. Pole 2 went on outage on 25 February and will remain on outage until 14 March. For further details see the Customer Advice Notice.

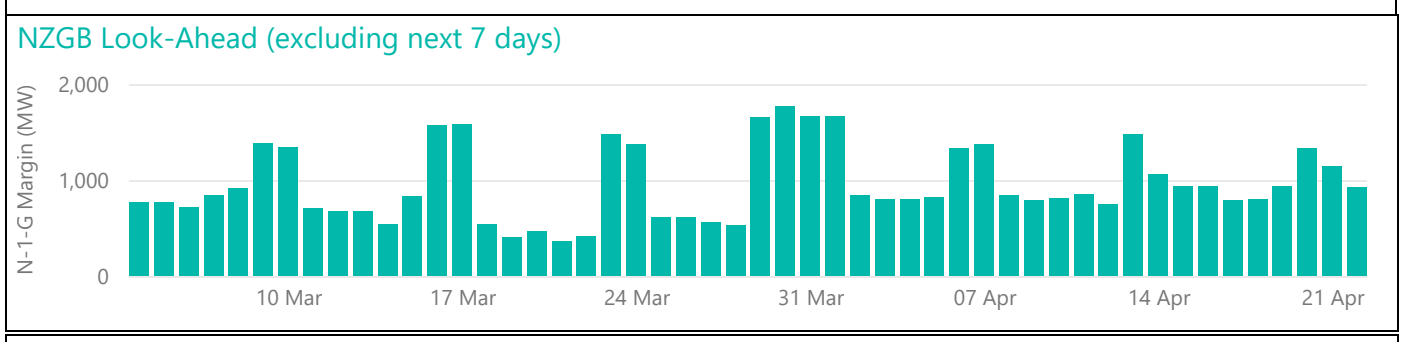
SOROP Consultation

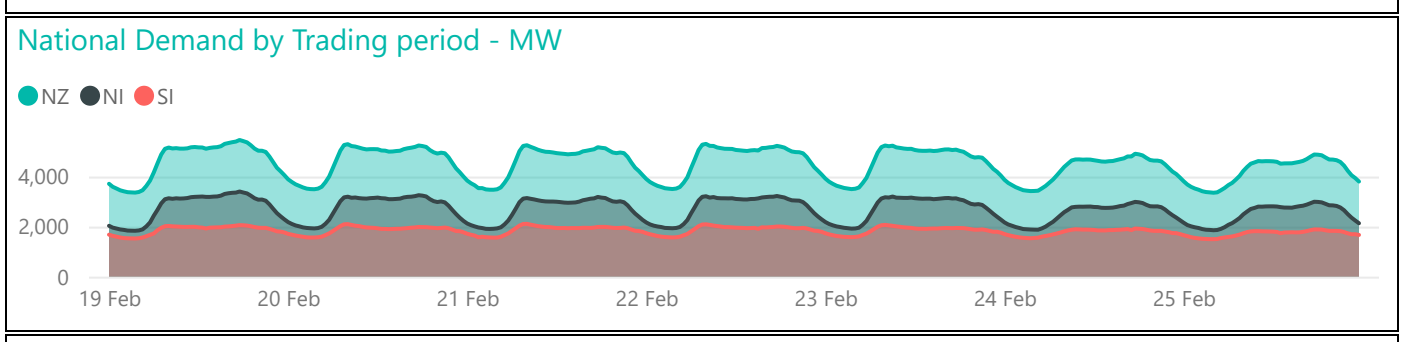
Transpower is seeking views from the electricity industry on proposed changes to the System Operator Rolling Outage Plan (SOROP). The consultation started on 7 February and runs until 6 March. There is then a two-week period for cross submissions until 20 March. Please see our website for further details.

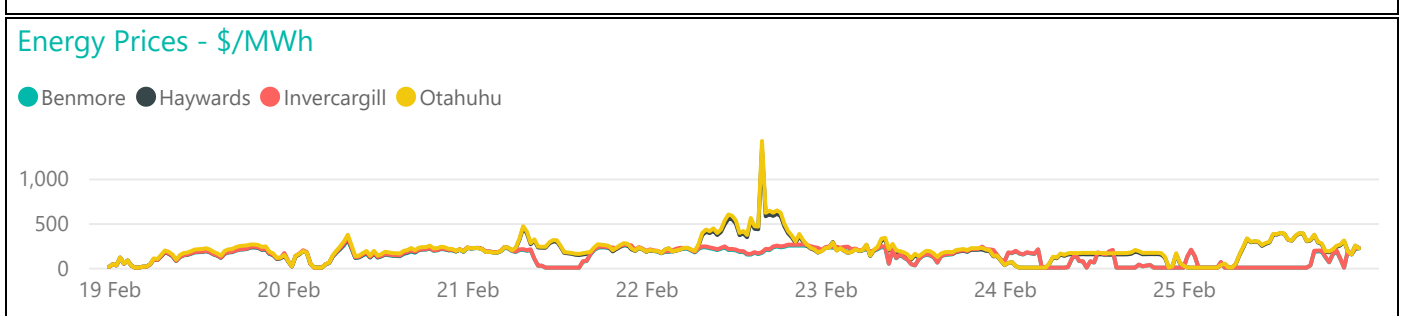


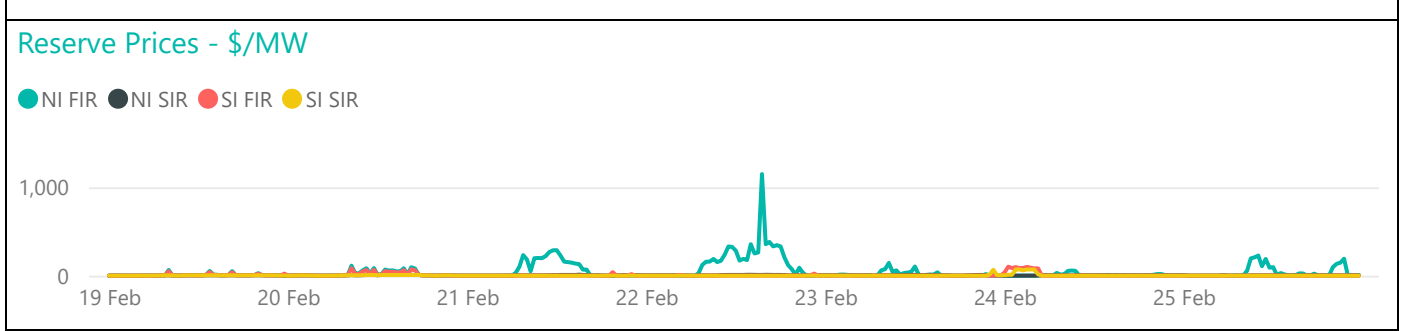


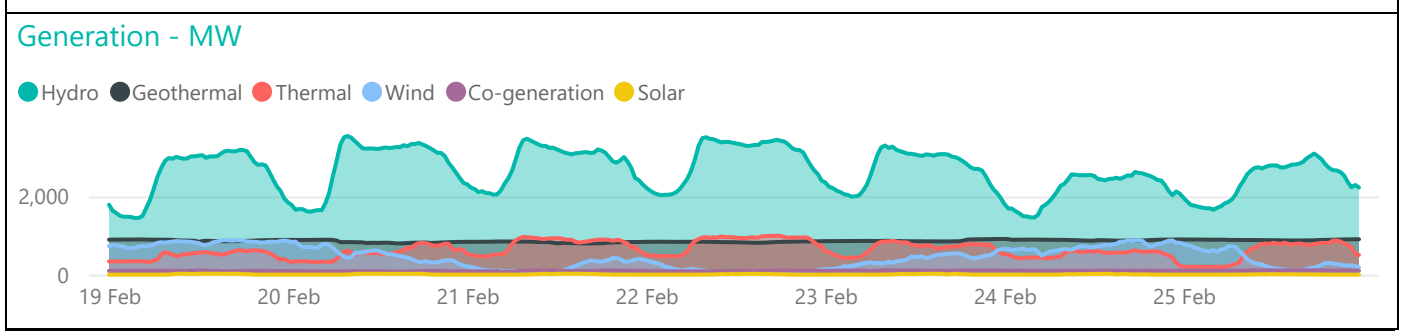


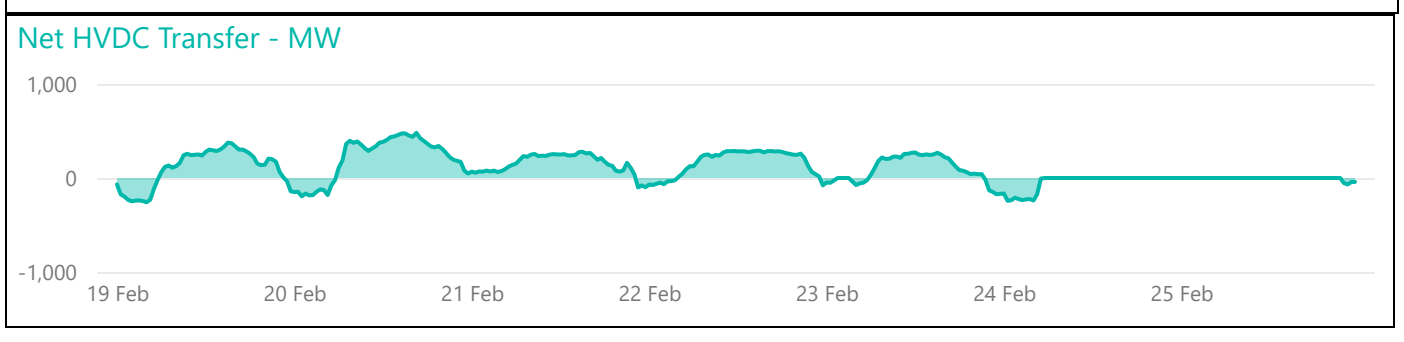












Weekly Summary Insight - Last week's potential South Island Reserves Shortfall CAN

In this week's insight we look at the factors contributing to the publication of a Customer Advice Notice (CAN) last week asking participants to offer more reserves in the South Island. The request was to mitigate the risk of potential South Island Reserve shortfall.

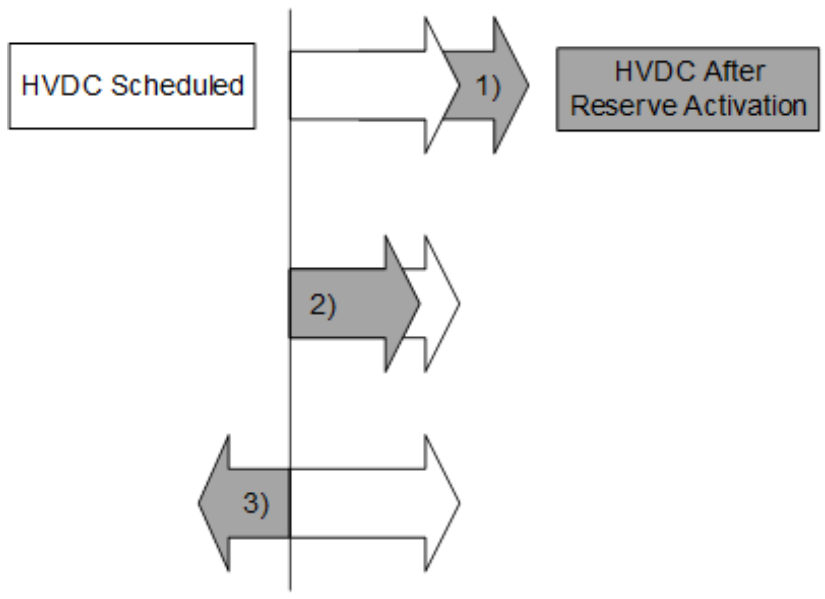
In our system operator role, we procure enough reserves (6s and 60s) to cover the loss of the largest risk in each island. This could be a large generating unit, group of generators or one of the HVDC poles.

The HVDC allows reserves to be shared between the islands to cover generation risks in each island by automatically adjusting the HVDC transfer level in response to a frequency excursion. This capability was expanded as part of the National Market for Instantaneous Reserves (NMIR) project in 2016.

Reserve sharing across the HVDC can be classified as *forward* or *reverse* sharing as shown in Figure 1. Forward sharing refers to the ability of the HVDC transfer to increase (1), thus providing reserves to the receiving island if a generator in that island were to trip.

Reverse sharing refers to the ability of the HVDC transfer to decrease (2,3), thus providing reserves to the sending island if a generator in that island were to trip. Reverse sharing is more complicated than forward sharing because reverse sharing may involve the HVDC reducing to the point where it reverses direction.

The ability to reverse direction within the 6s and 60s reserve timeframes requires the availability of round power. Round power is the ability for the HVDC bipole transfer to seamlessly move from importing to exporting power whilst transitioning through 0MW. Round power operation needs both poles to be available for service, with the poles operating in opposite directions to achieve a net 0 MW transfer.



During an HVDC pole outage, round power is not possible and is therefore disabled, which means there is no ability for the HVDC to share reserves in the reverse direction when it is operating near or at the minimum operating level of each pole (which is modelled as 35 MW). When Frequency Keeping Control (FKC) is enabled, the HVDC contributes to normal band frequency control and a 30MW allowance is made for variation in the HVDC transfer from its dispatch level.

In addition, when transitioning between north and south transfer on the same pole, a minimum cable discharge time of five minutes is required. This means if a 30-minute schedule when in monopole operation shows the optimal dispatch for future trading periods has the HVDC power flow in the opposite direction, the HVDC must be stopped to be restarted in the opposite direction.

Within a trading period where a reversal of the HVDC direction is required, any 5-minute dispatch below the pole minimum operating level +30MW will have no reserve sharing in the reverse direction. This results in a risk of a temporary instantaneous reserve shortfall condition in one island in the Real Time Dispatch (RTD) schedules.

For example, if the HVDC transfer is scheduled to go from 100 MW North to 100MW South in consecutive trading periods, then in real time there will be a dispatch which requires shutting the pole down. In this case, there will be no reserve sharing to the South Island for HVDC dispatches below the pole minimum operating level +30MW, until the cable discharge period has expired and a South flow dispatch occurs. With no reserve sharing to the South Island, there will be a reserve shortfall in the 5-minute dispatch if the offered reserves in the South Island are inadequate. In this instance increasing the quantity of reserves offered in the South Island would reduce this risk.

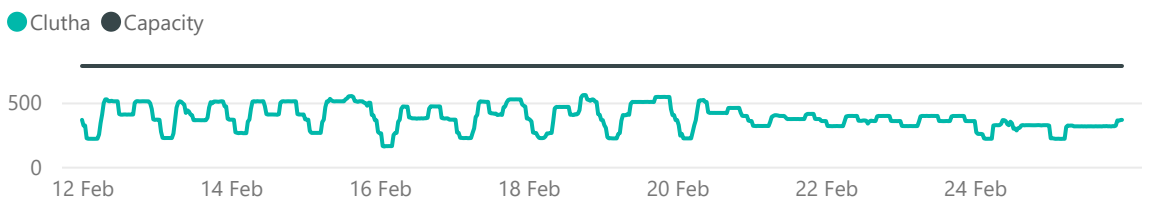
These were the contributing factors behind the System Operator CAN issued last week.

The issue could also occur at any time when there an outage of the HVDC (planned or unplanned) and insufficient island reserves are offered. This could occur in the North Island under different conditions.

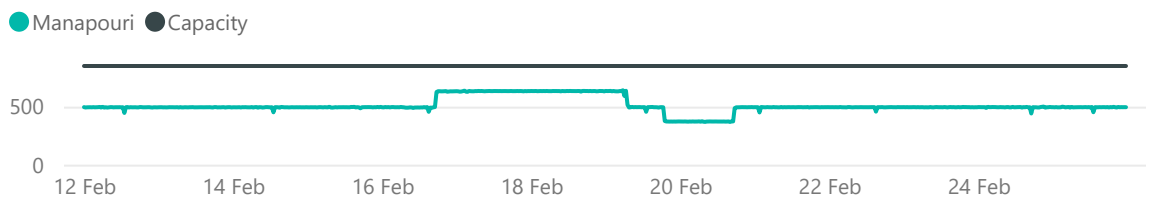
Generation Breakdown - Last Two Weeks

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

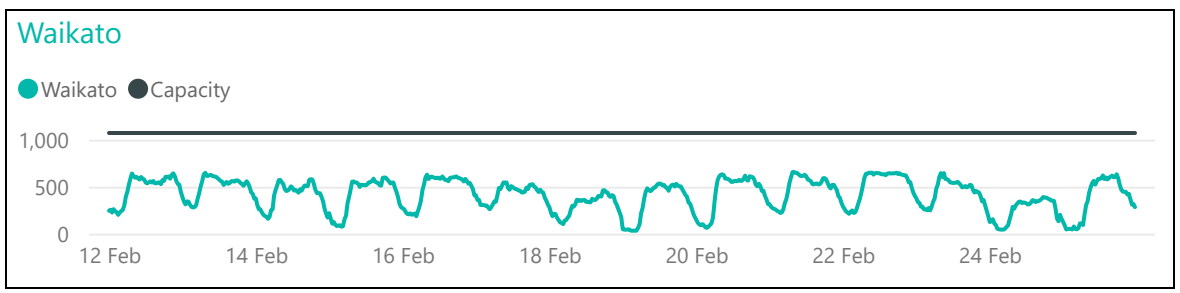
Clutha



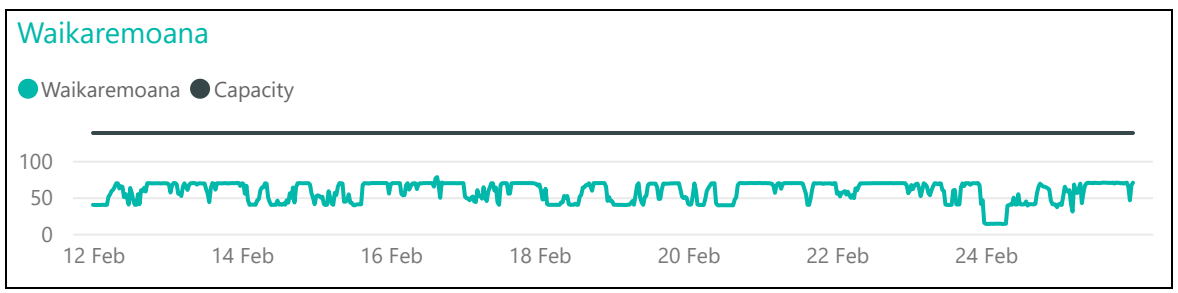
Manapouri



Waikato

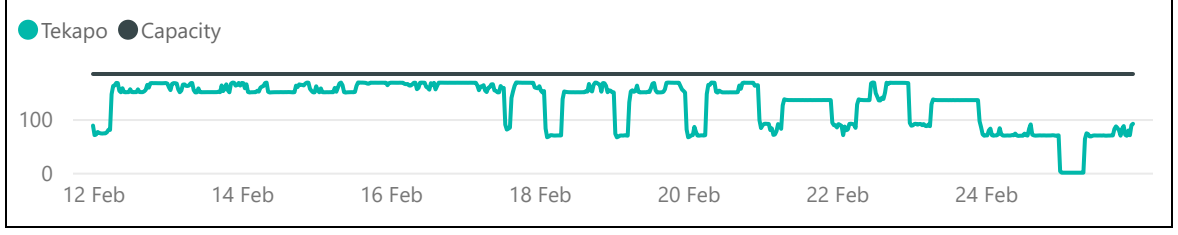


Waikaremoana

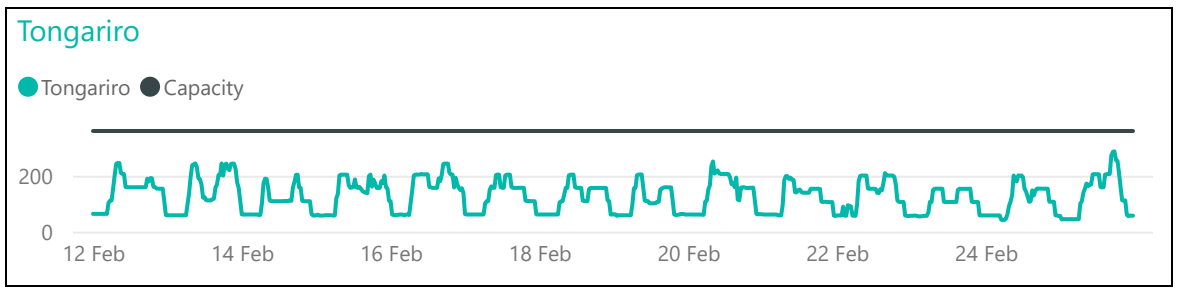


Waitaki

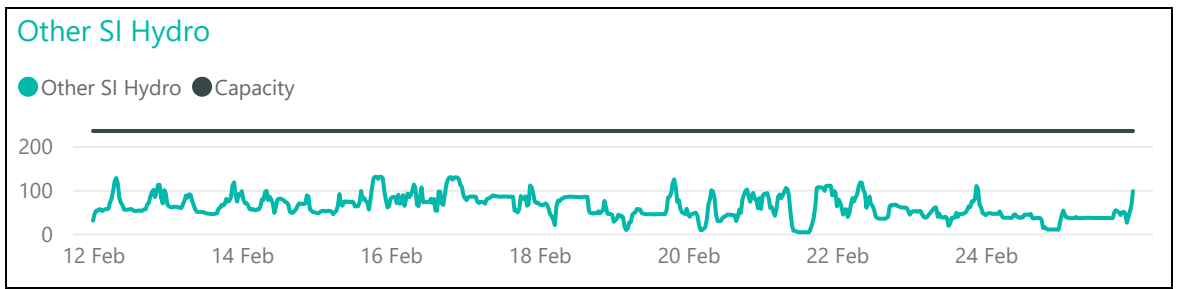
Tekapo



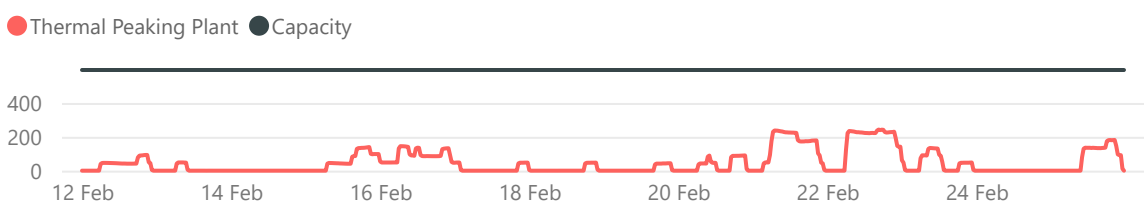
Tongariro



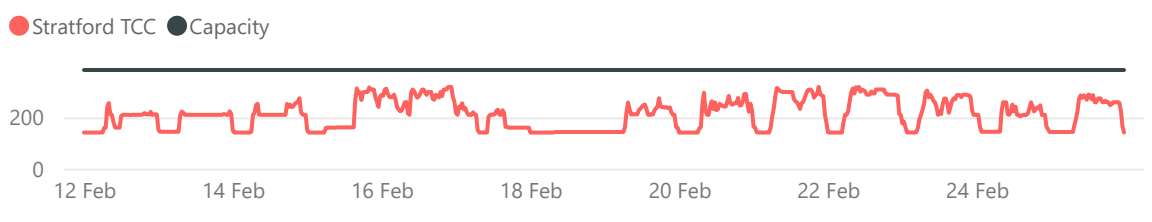
Other SI Hydro



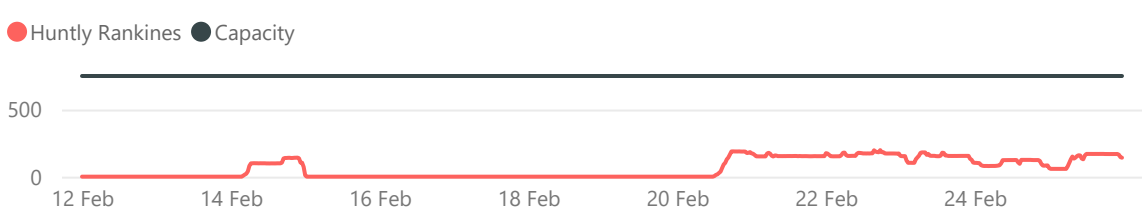
Thermal Peaking Plant



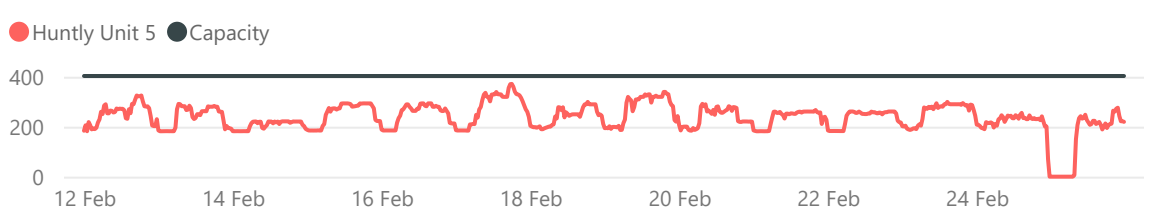
Stratford TCC



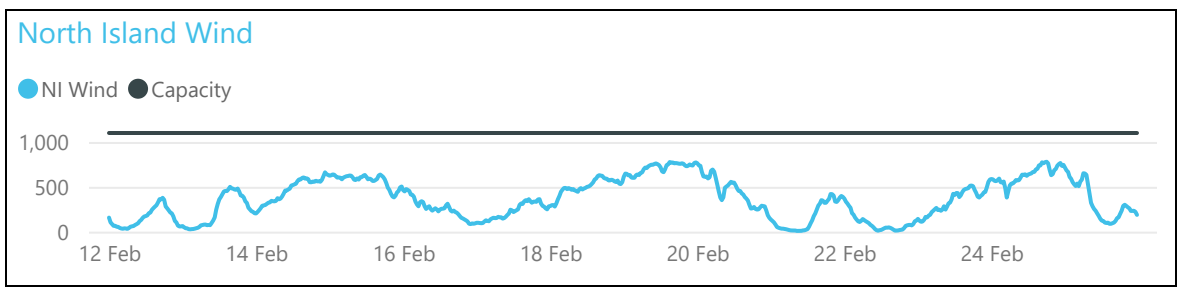
Huntly Rankines



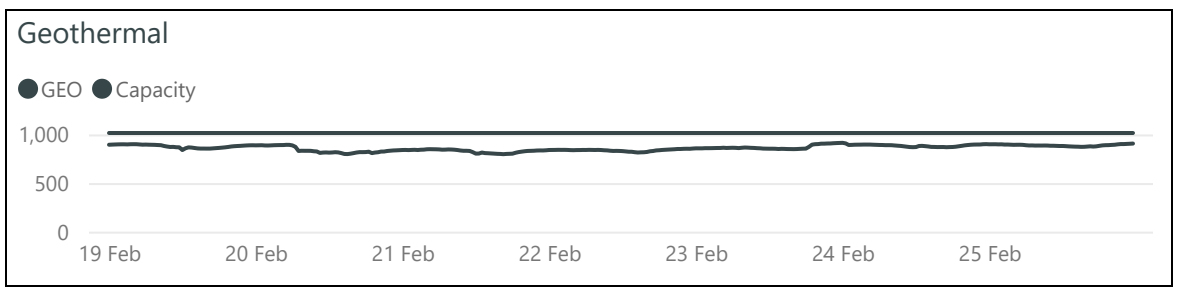
Huntly U5



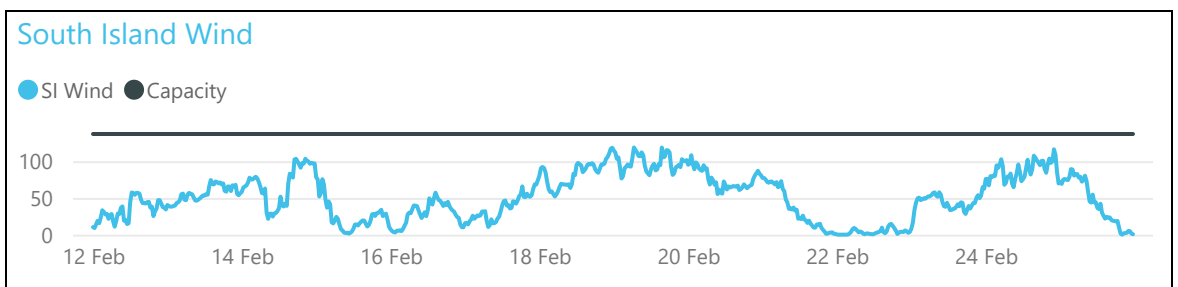
North Island Wind



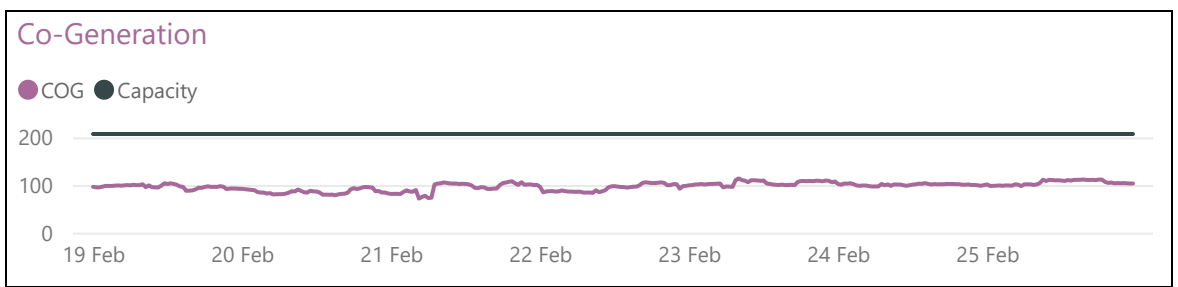
Geothermal



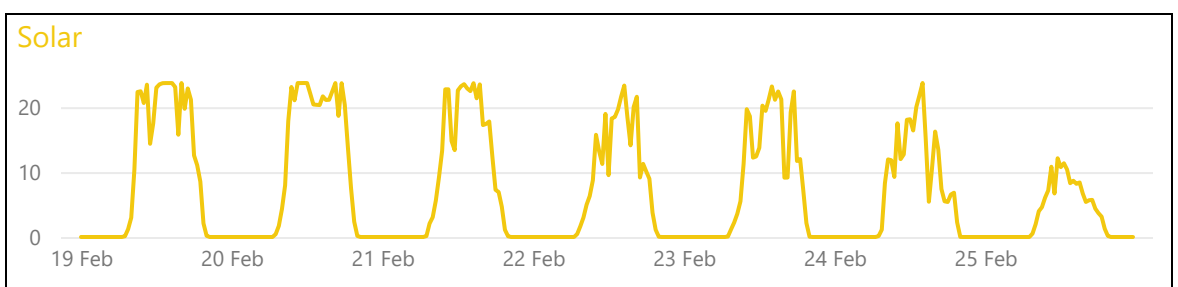
South Island Wind



Co-Generation

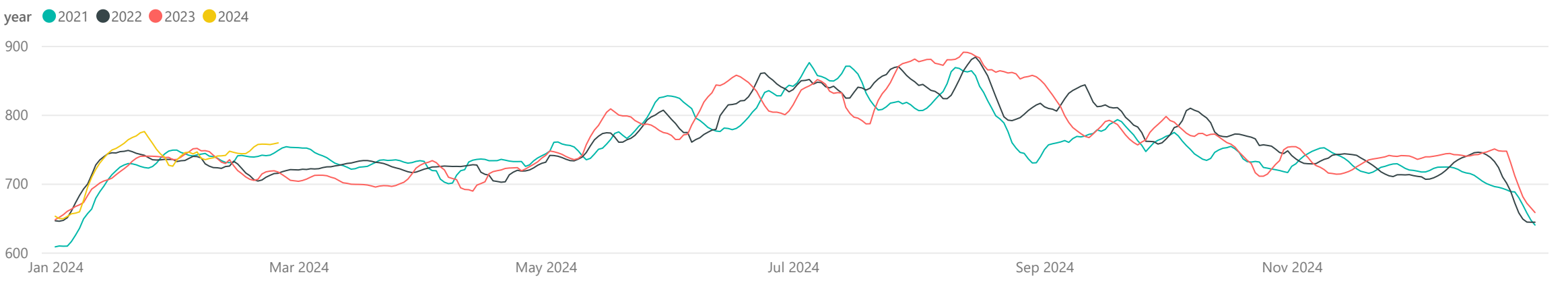


Solar

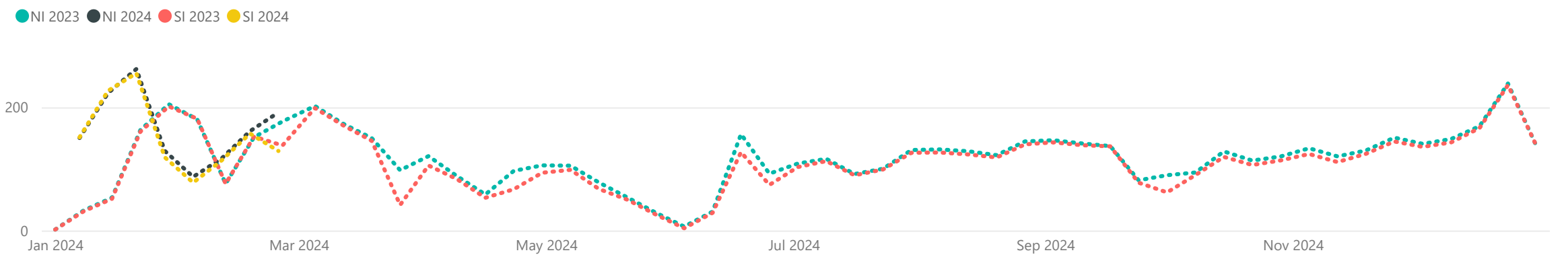


Weekly Profiles

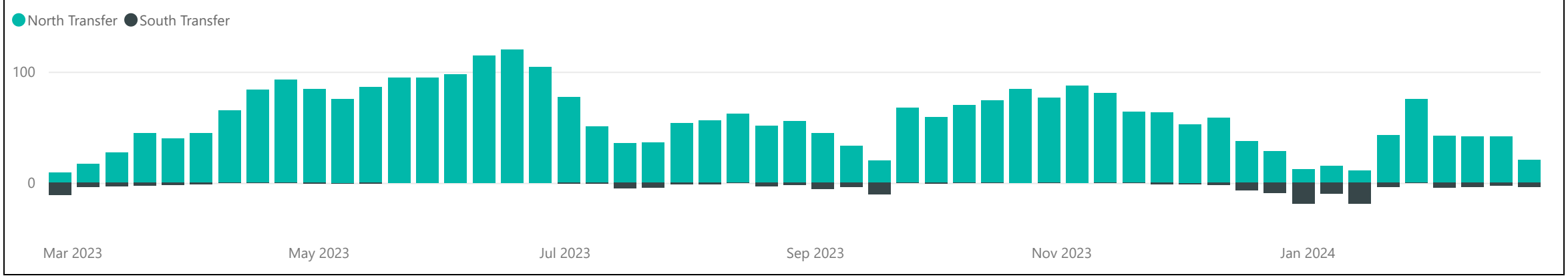
National Weekly Demand - GWh - 7 Day Rolling



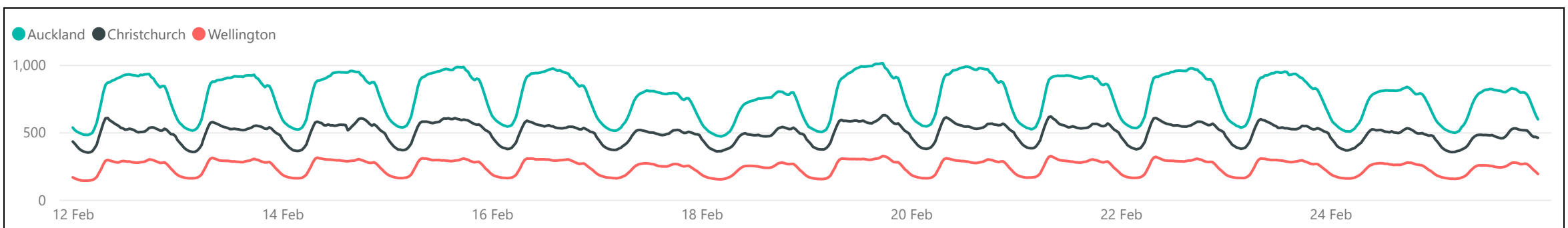
Weekly Spot Price - $/MWh



HVDC Transfer - Weekly GWh

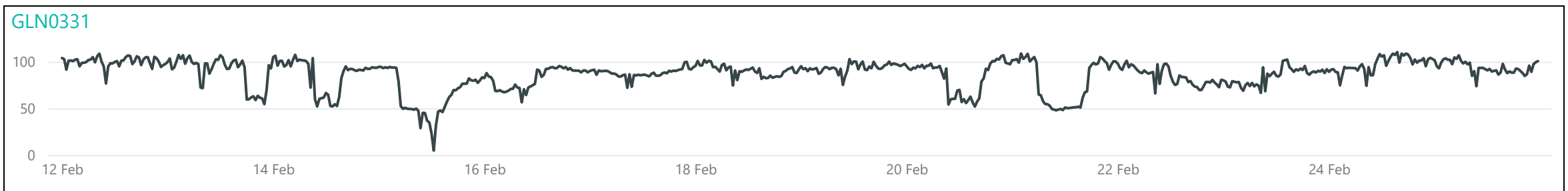


Conforming Load Profiles - Last Two Weeks *Measured in MW shown by region*



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

GLN0331



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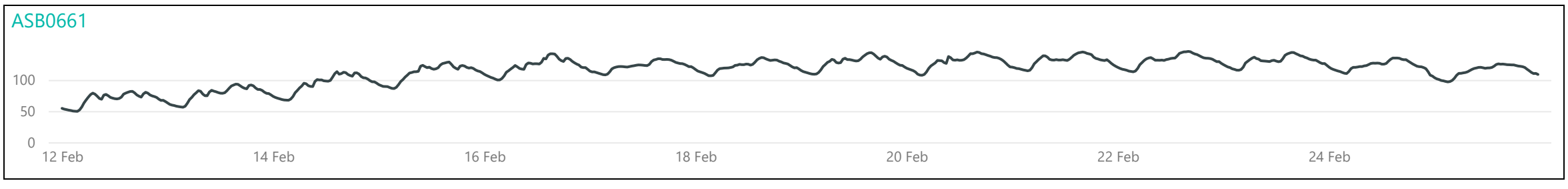

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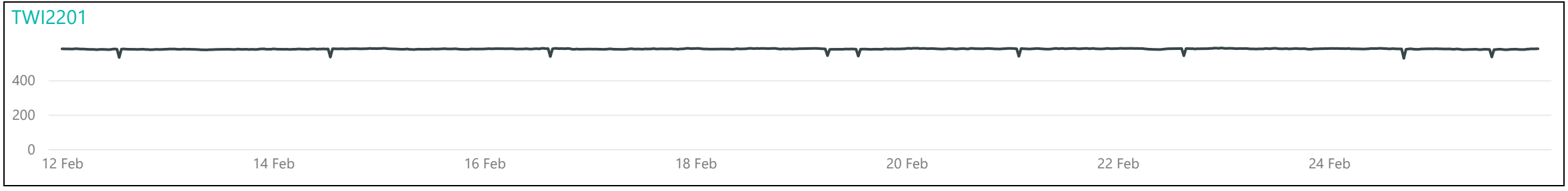
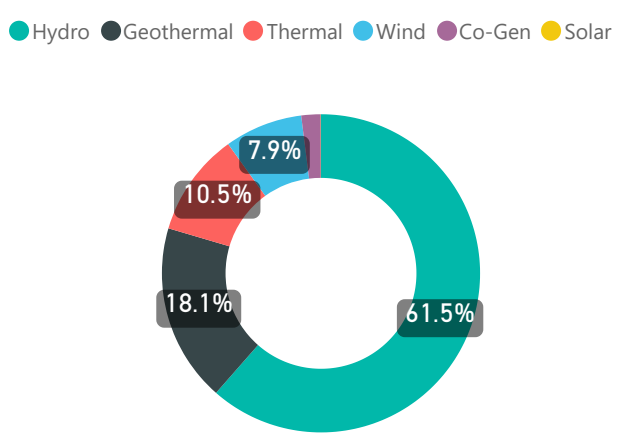


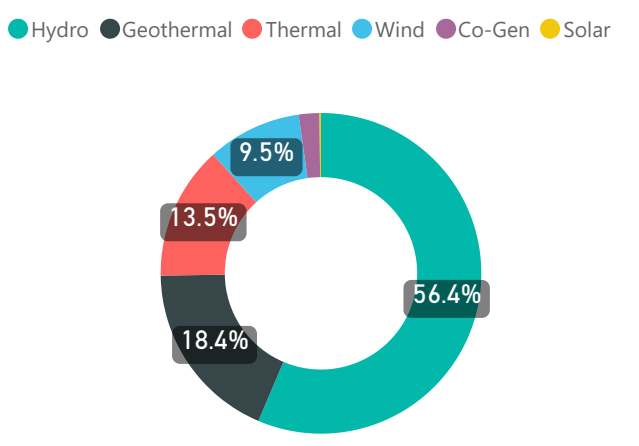
TRANSPOWER

Generation Mix

Last 52 Weeks Generation Mix - Weekly GWh



Last 7 Days Generation Mix - Weekly GWh



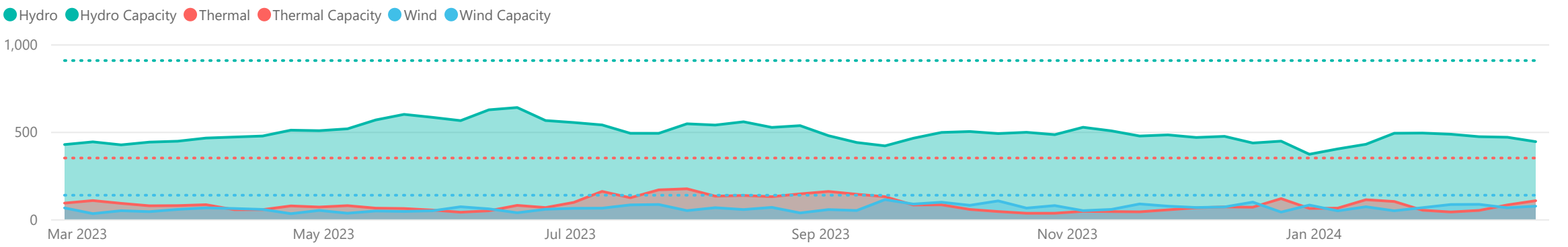
Average Metrics Last 7 Days

Renewable Percentage	CO2e Tonnes/Week	CO2e g/kWh
85%	66,610	83.9

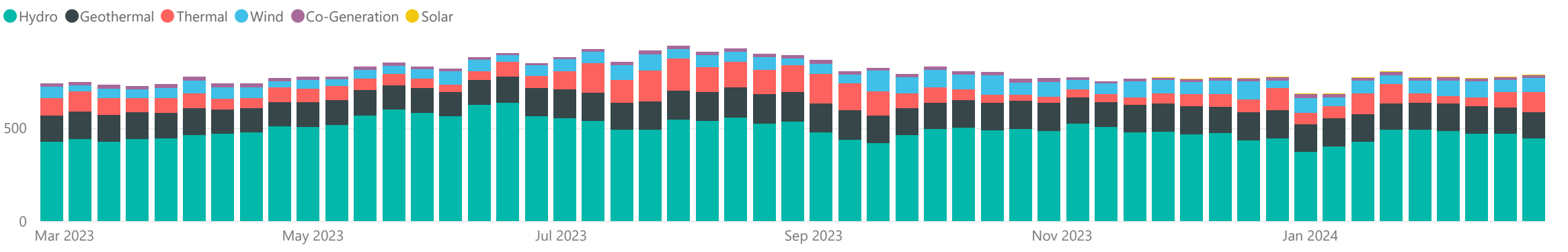
Average Metrics Last 52 Weeks

Renewable Percentage	CO2e Tonnes/Week	CO2e g/kWh
88%	59,662	73.2

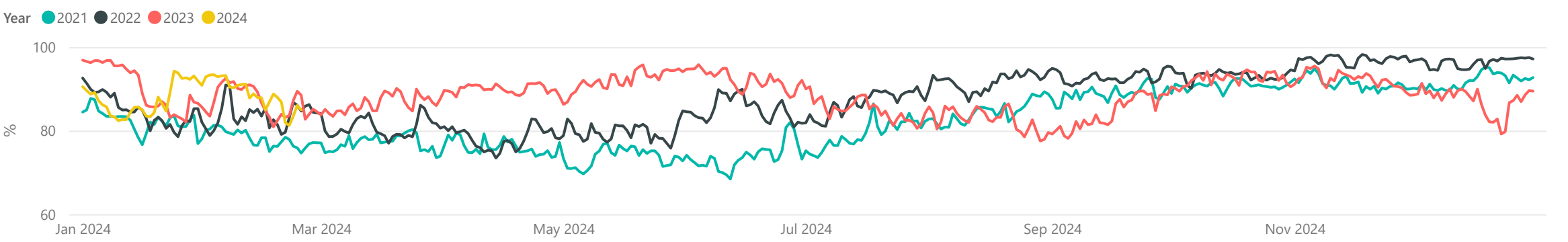
Weekly Generation Mix vs Capacity - GWh



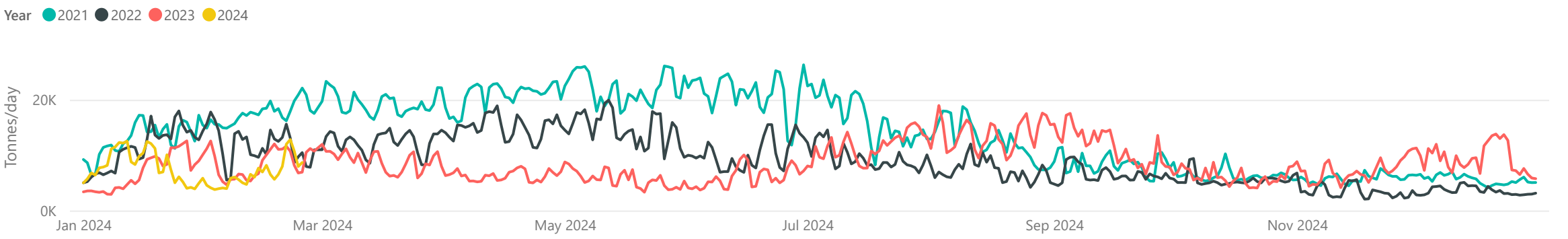
Weekly Generation Mix - GWh



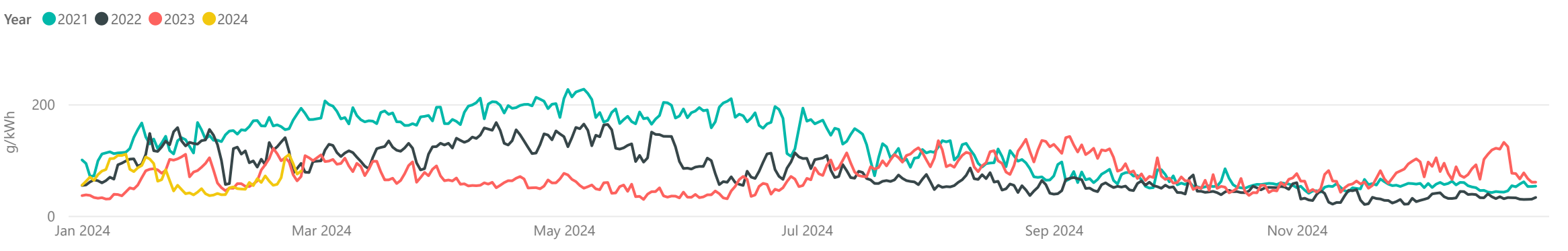
NZ Renewable Percentage



CO2 Tonnes/Day

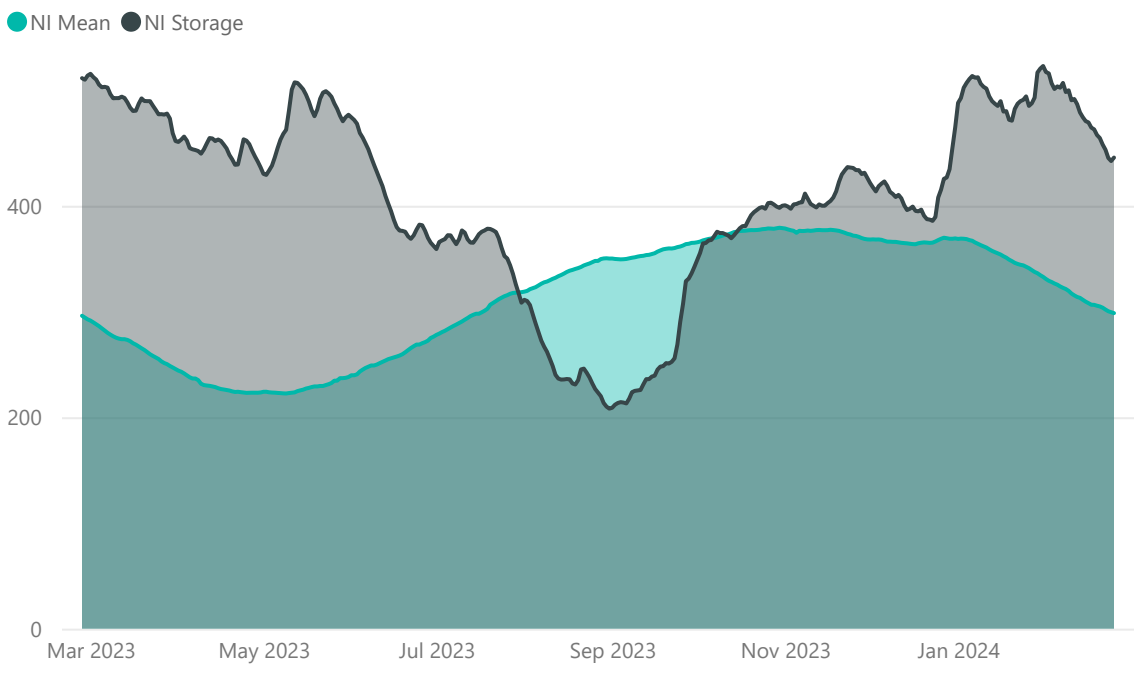


CO2 g/kWh

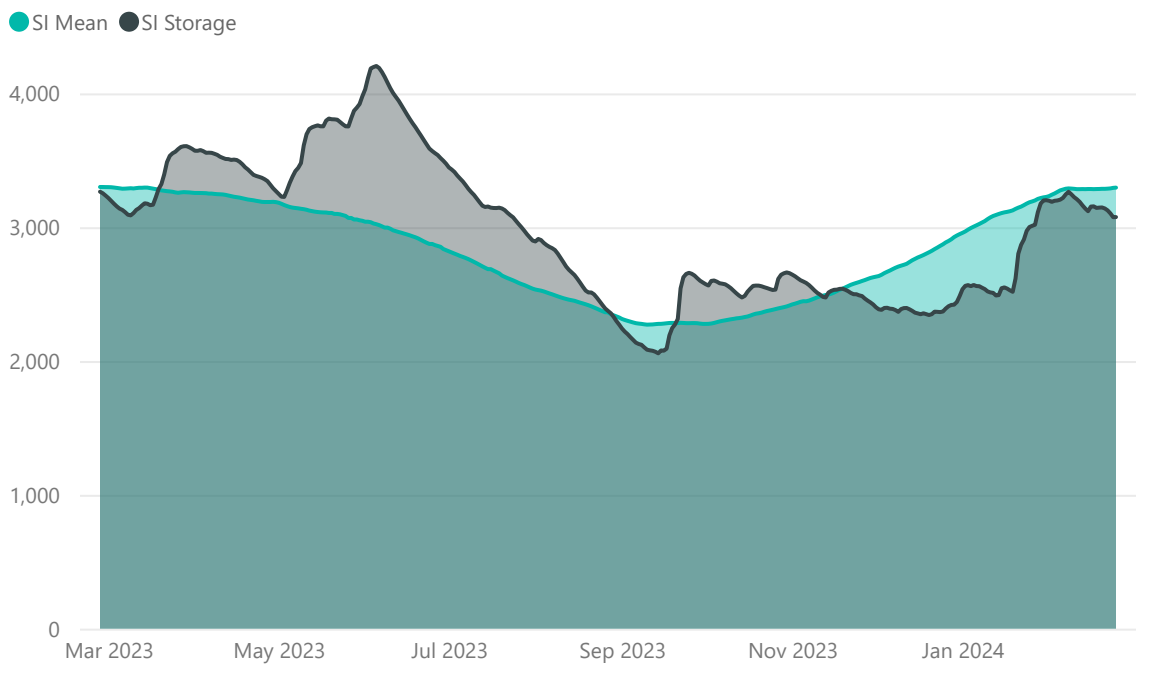


Hydro Storage

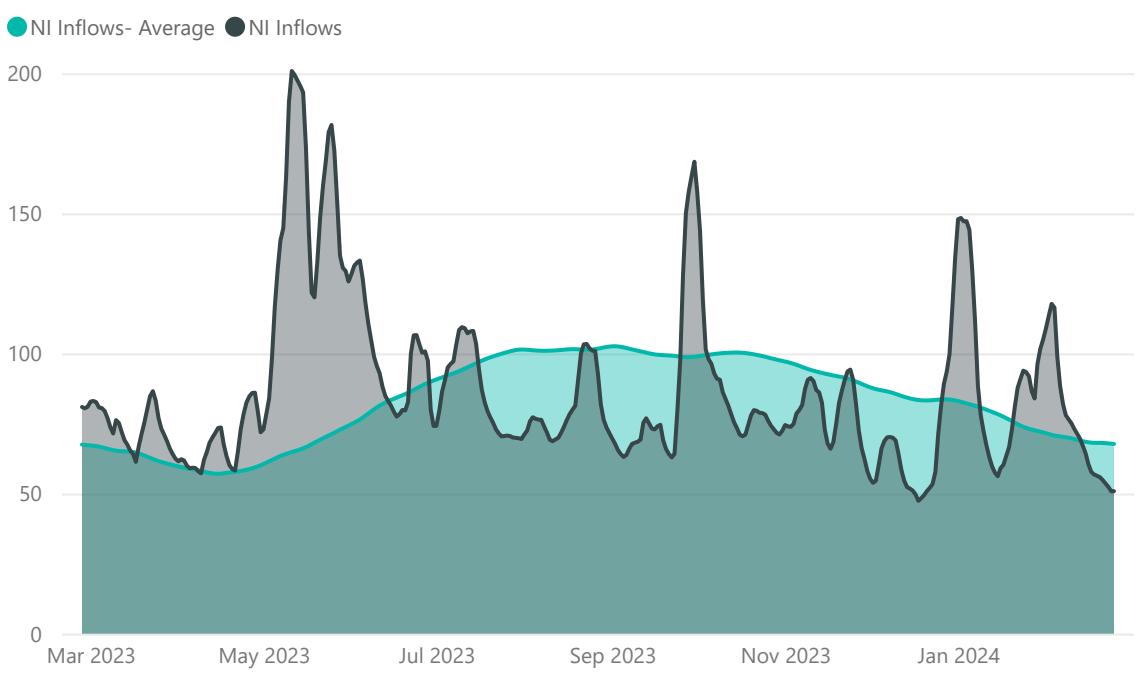
North Island Hydro Storage (Available GWh)



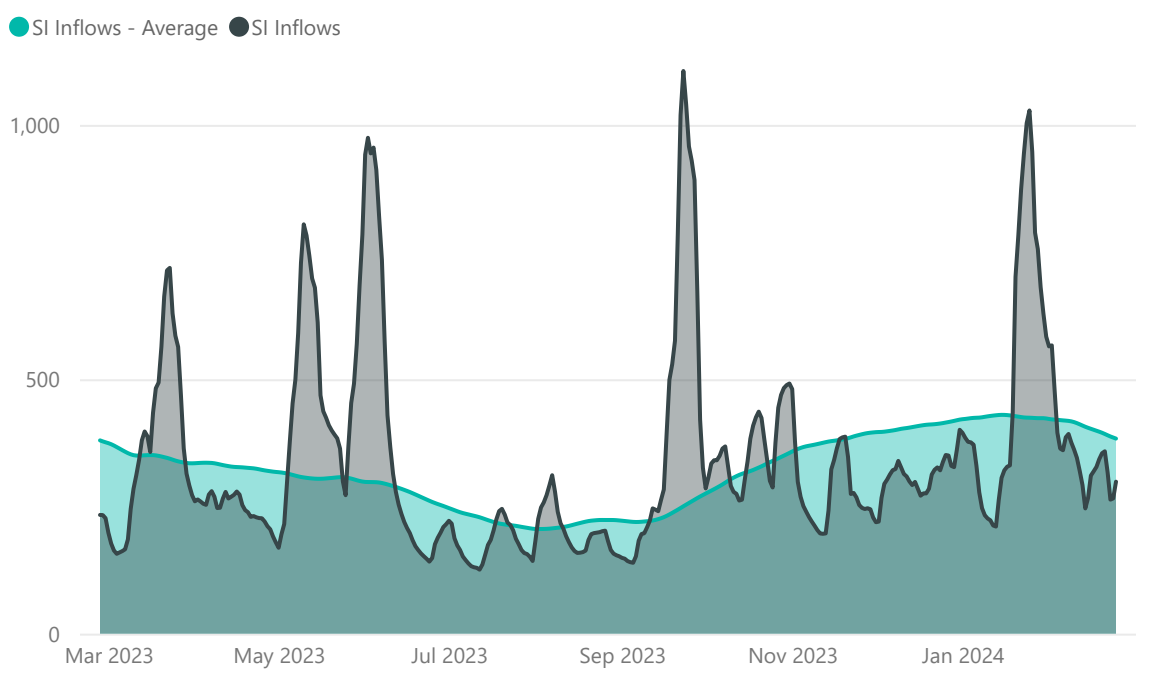
South Island Hydro Storage (Available GWh)



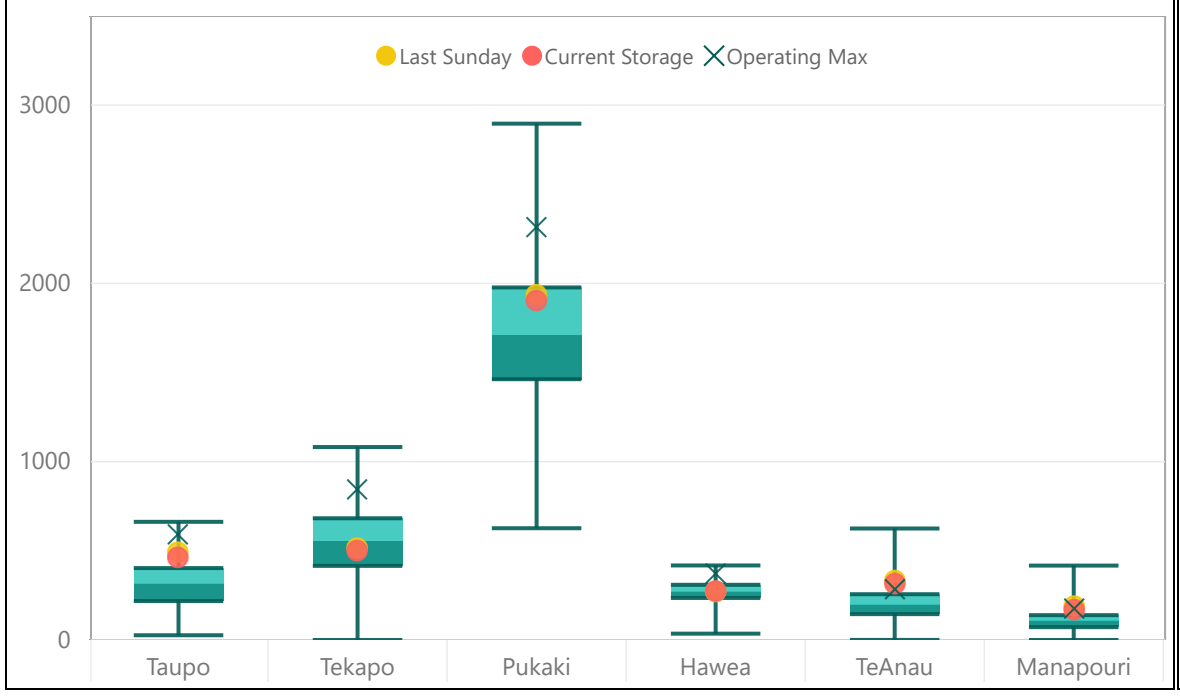
North Island Mean 7 Day Inflows (Available GWh)



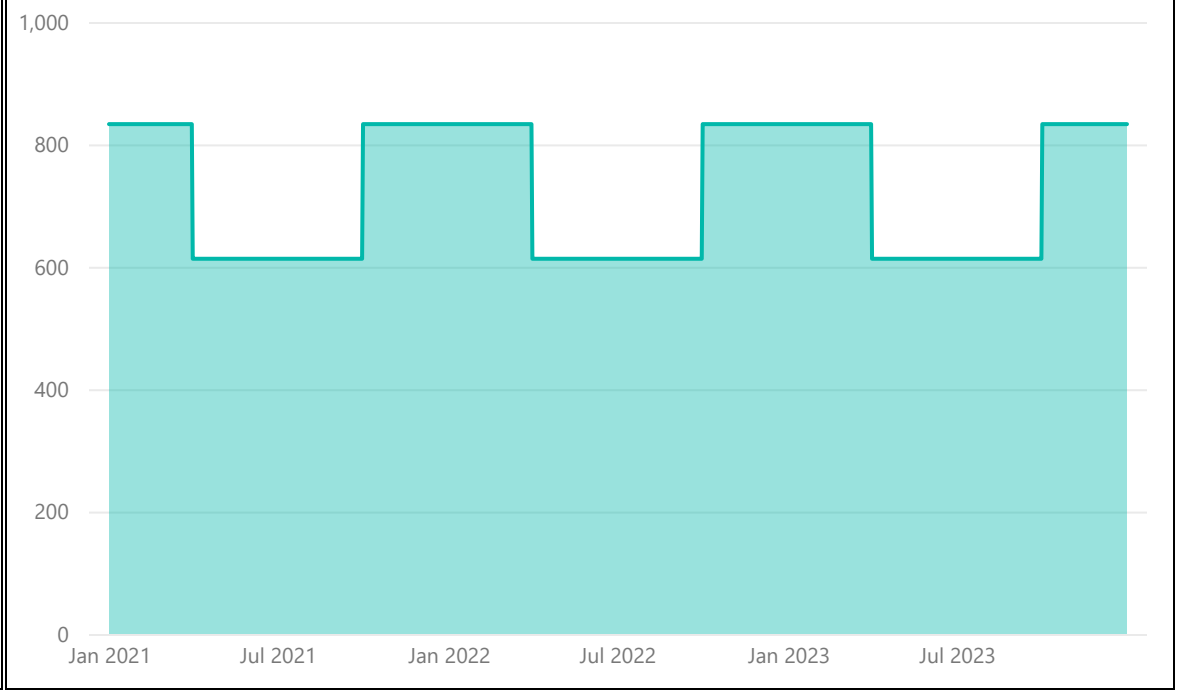
South Island Mean 7 Day Inflows (Available GWh)



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

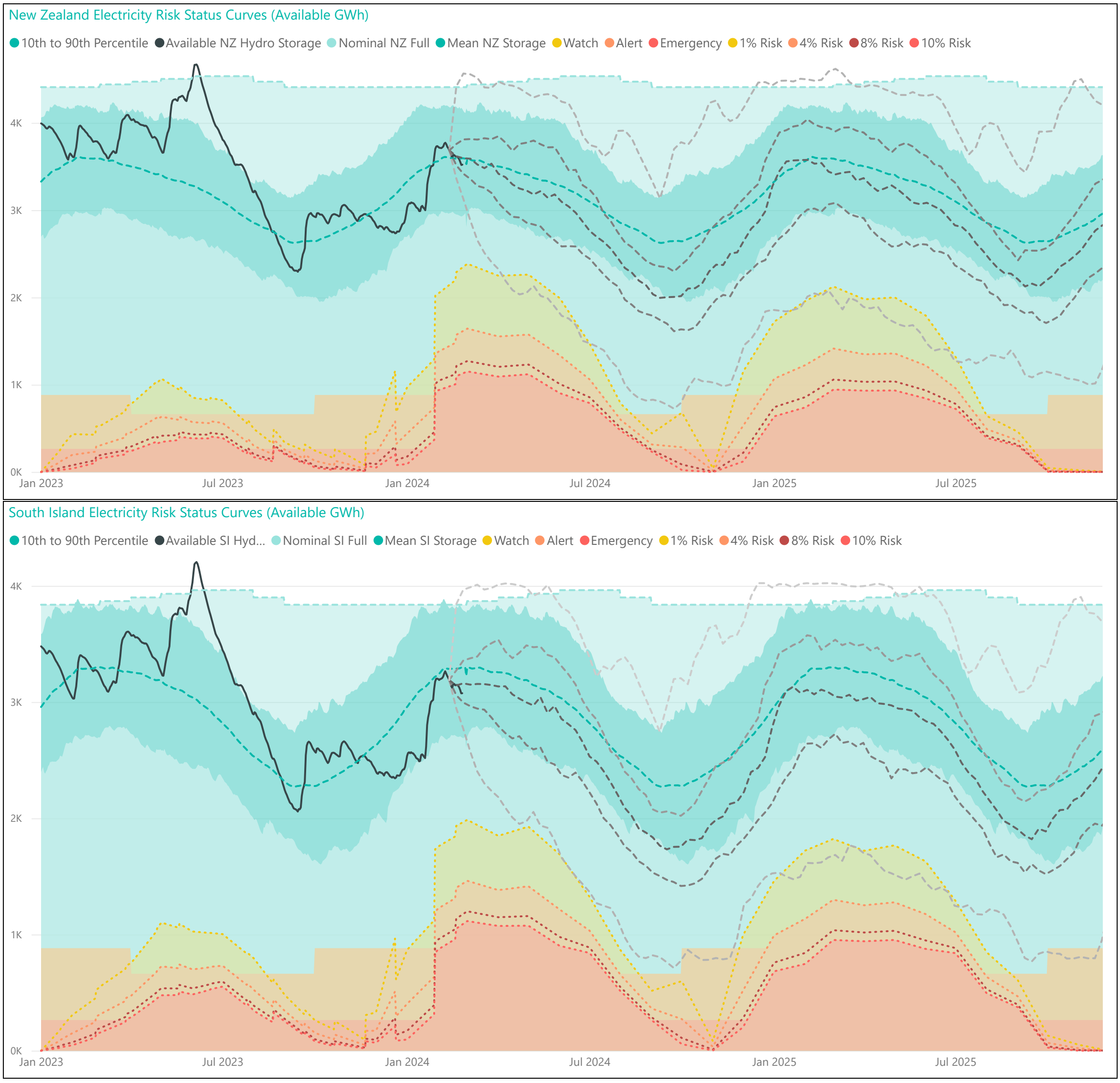
For any inquiries related to security of supply contact market.operations@transpower.co.nz

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).