Weekly Market Movements - Week Ended 31 March 2024

Overview

National hydro storage increased slightly this week and now sits at 88% of the historic mean. South Island inflows were average this week for the first time since mid February, with South Island storage picking up from 83% to 84% of the historic mean. Residual generation was very healthy last week with more than 1000 MW of residual the entire week.

In this week's insight we look at correlations between hydrology and average energy price.

Security of Supply

Energy

National hydro storage now sits at 88% of the historic mean, up from 87% a week ago. South Island storage is at 84% of the historic mean, which is roughly the 10th percentile, and North Island storage dropped from 145% to 139% of the historic mean. South Island inflows rose throughout the week to reach the historic average by Sunday.

Capacity

Capacity margins were healthy last week with consistently high wind generation for the first half of the week and low demand over the long weekend.

Forecast N-1-G margins are high until late April and early May when there are six days with low margins forecast. The lowest N-1-G margin during the forecast period is 132 MW on the 6th and 7th of May. The latest NZGB report is available on the NZGB website.

Electricity Market Commentary

Weekly Demand

Total demand was 742 GWh, no change from the week prior despite a public holiday on Friday. Demand peaked at 5,543 MW on the morning of Thursday 28th March.

Weekly Prices

The average wholesale price at Otahuhu last week was $242/MWh, down from $262/MWh the week prior. Energy prices were steady for most of the week, only dropping to near zero in the early hours of Thursday morning, where wind generation picked up and thermal generation dropped off.

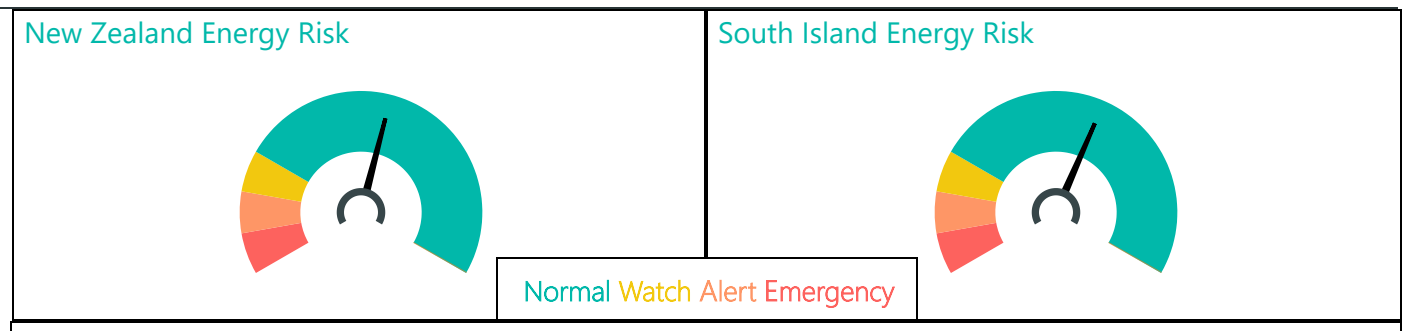
There were several periods of inter-island price separation at the start of the week. Whilst in round power mode the HVDC risk subtractor is set to 0MW, so DCCE can set the risk in the South Island at quite low levels of transfer. The price separates as a lack of offered South Island reserves (SIR in this case) prevents an increase of energy transfer in the south direction. We have covered this outcome in more detail in a previous insight linked here.

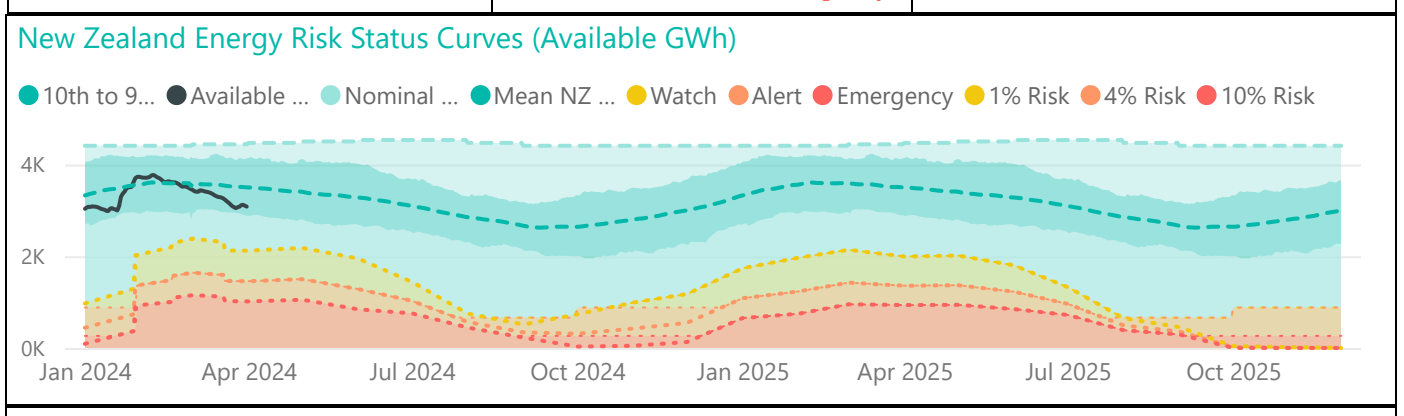
Generation Mix

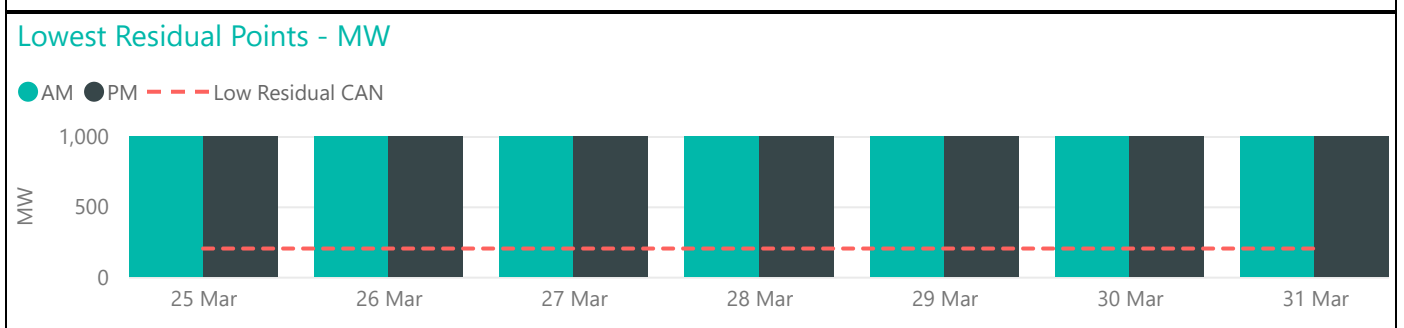
The renewable percentage of the generation mix last week was 80%. Wind generation increased significantly from the week prior, from 4% of the generation mix to 12%. Hydro generation decreased from 55% the week prior to just 48%, and thermal generation decreased from 19% of the mix to 18%.

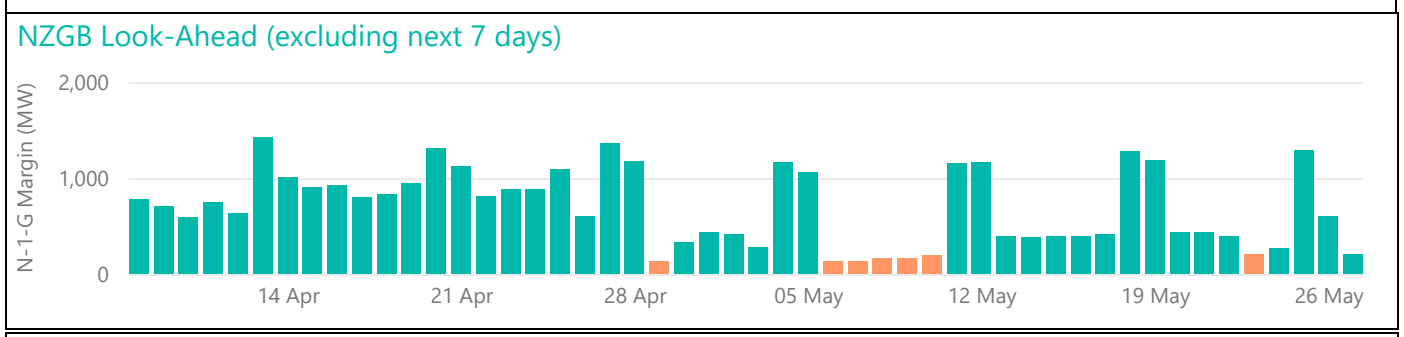
HVDC

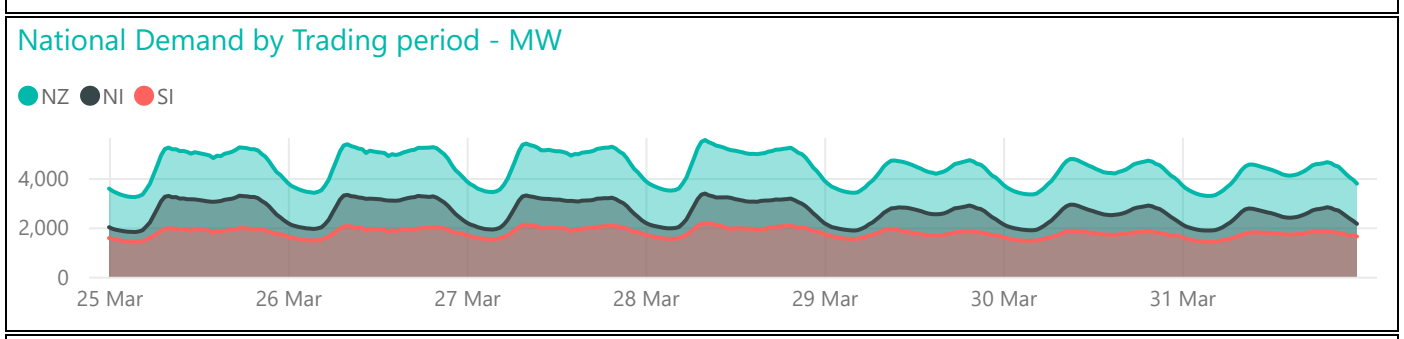
HVDC flows returned to predominately southward last week, in line with the consistently high North Island wind and thermal generation.

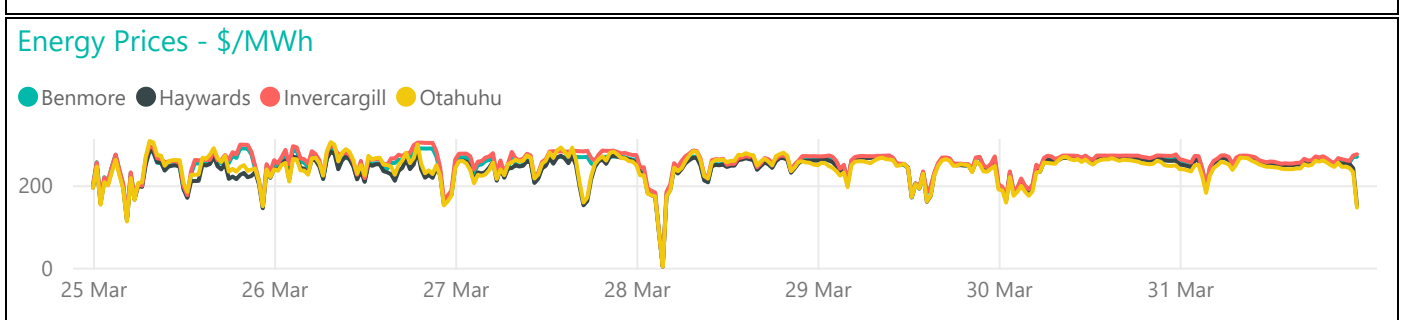


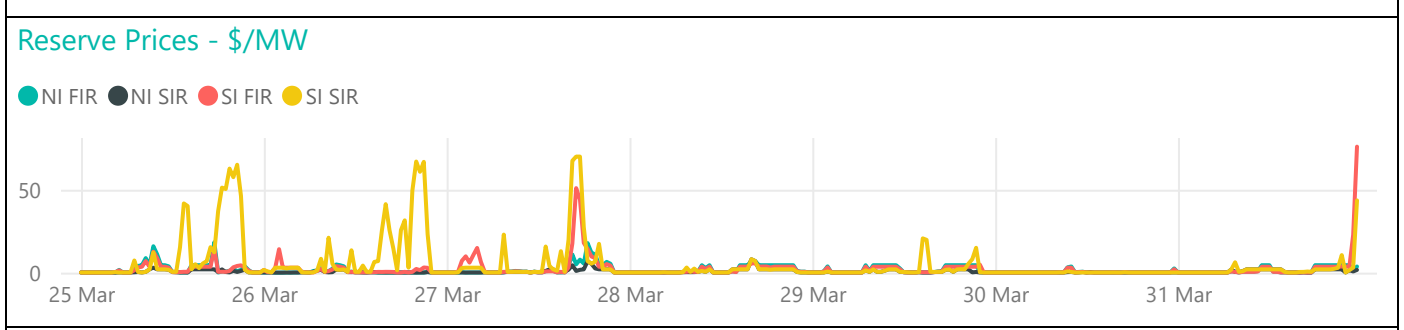


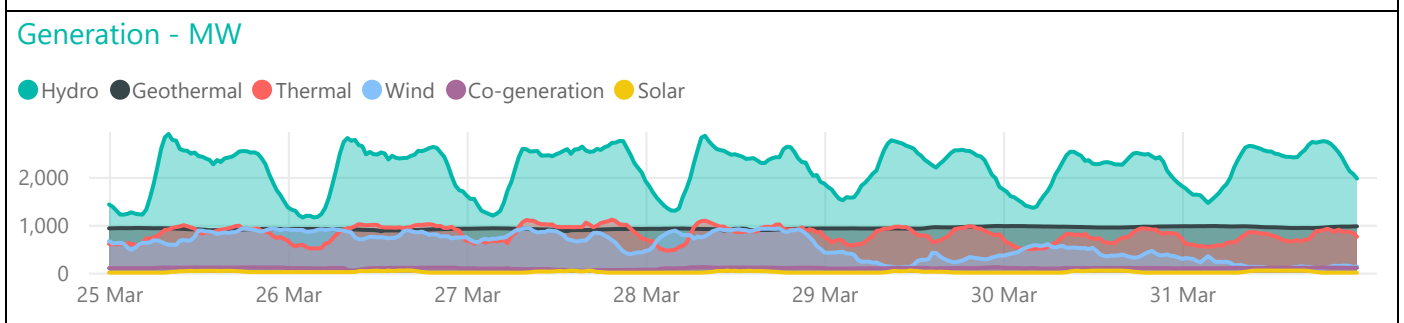


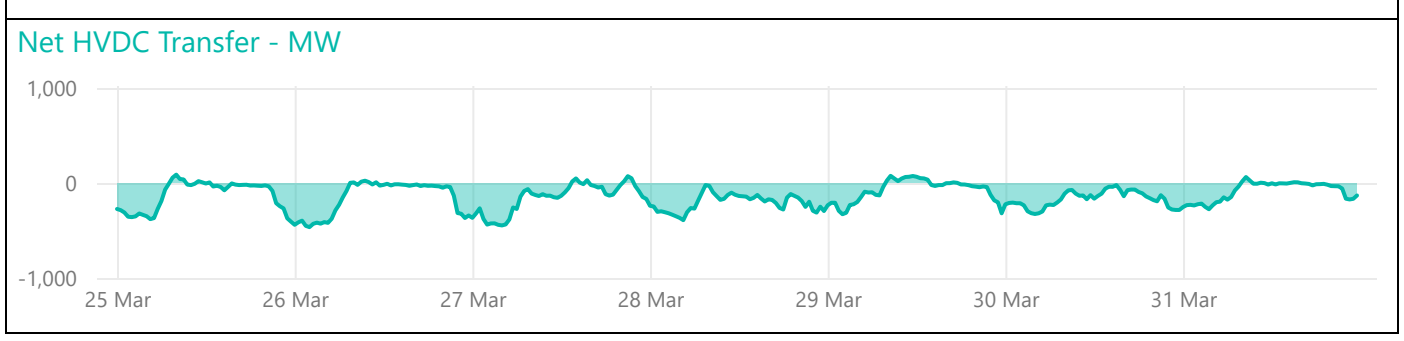










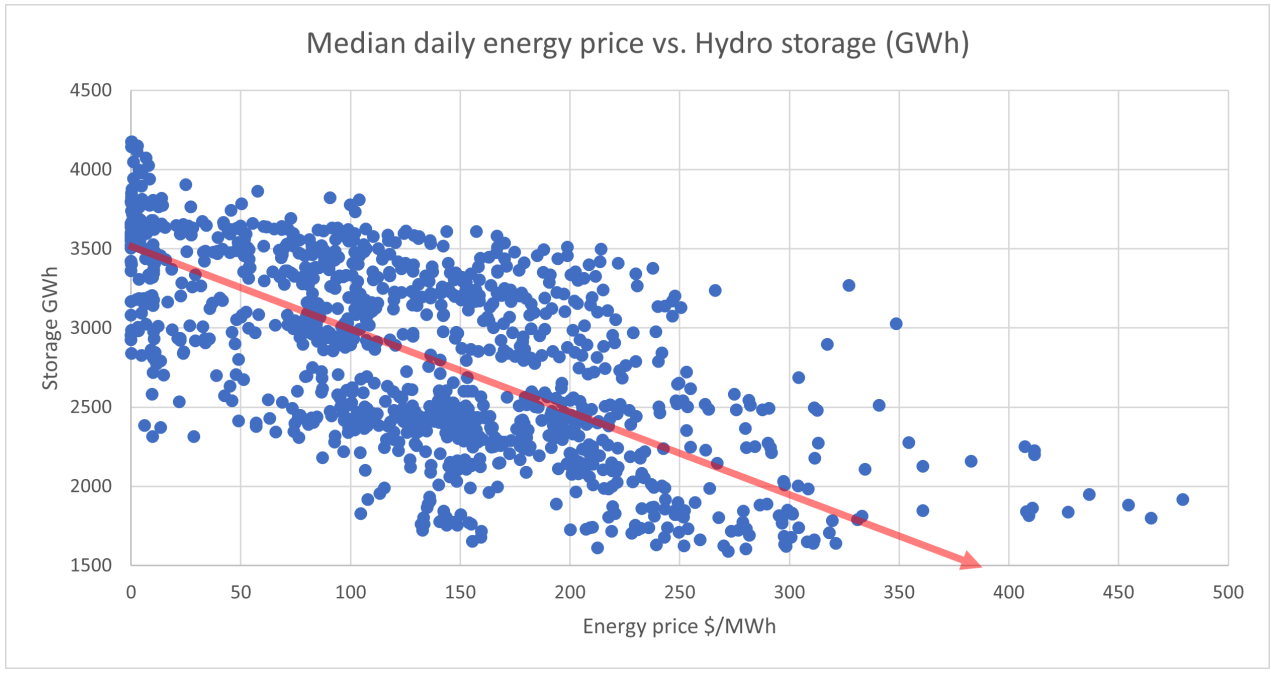


Weekly Summary Insight - How Does Price Correlate with Hydrology?

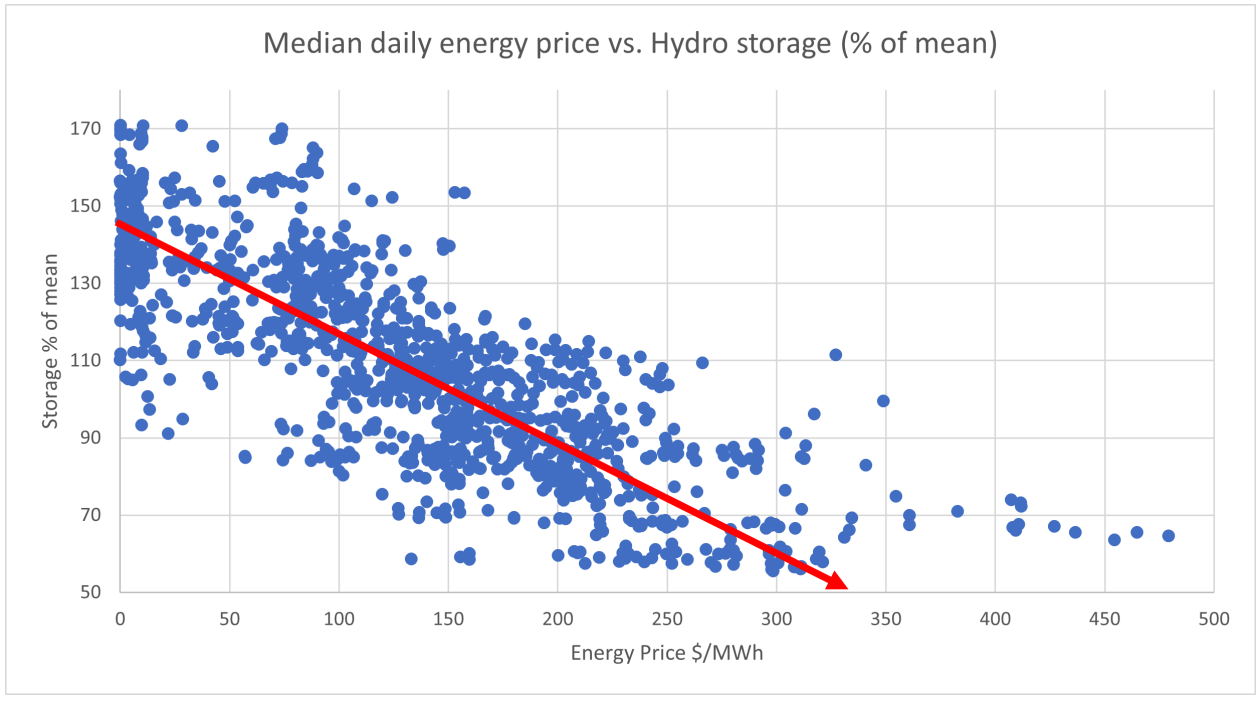
Energy prices in the wholesale market are influenced by a lot of factors. Last week we looked at the correlation between prices and demand throughout a typical day. Given our hydro dominated generation supply with relatively limited hydro storage, in this insight we look at a correlation between price and hydrology over the last few years.

The charts below show the daily median price for the two island reference nodes, plotted against the national hydro storage level for the respective day. The data spans from the beginning of 2021 until end of March 2024, and median values for price are used to lessen the impact of extreme outliers. From these charts it is possible to see a correlation between price and hydrology, with higher prices occurring more frequently during periods of low hydro storage, and vice versa.

The top chart compares energy price with the national hydro storage in GWh. Because inflows are always fluctuating and storage shows seasonal trends over time, the raw GWh stored can be somewhat arbitrary in terms of what it means to the market. Hydro stations may offer generation based on a 'water value' metric which takes into account not just current stored GWh but also inflow forecasts and other factors in the market. For example, if a large inflow event is expected soon, the 'water value' for hydro generators may decrease relative to a different time of year where the stored GWh is the same but no inflows are forecast. The R-squared value for this data is 0.425, meaning ~43% of the variation in price can be attributed to the national storage in GWh. While some correlation can be observed, it is not as strong as in the chart further down.



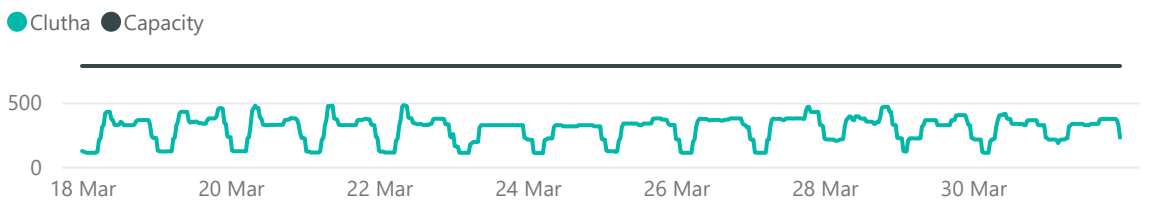
The chart below uses essentially the same data, but compares price with hydro storage as a percentage of the historic mean. This sets a benchmark, or 'normalises' the hydro storage value. The same trend can be seen here but the correlation is more obvious. The R-squared value for this data is also higher at 0.613, meaning 61% of the variance in daily price can be attributed to hydro storage as a percentage of mean at the time.



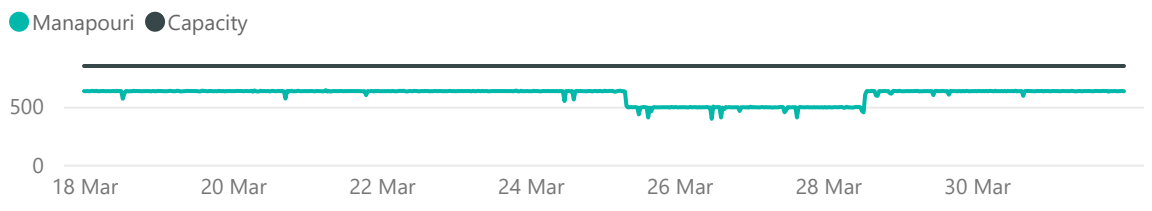
Generation Breakdown - Last Two Weeks

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

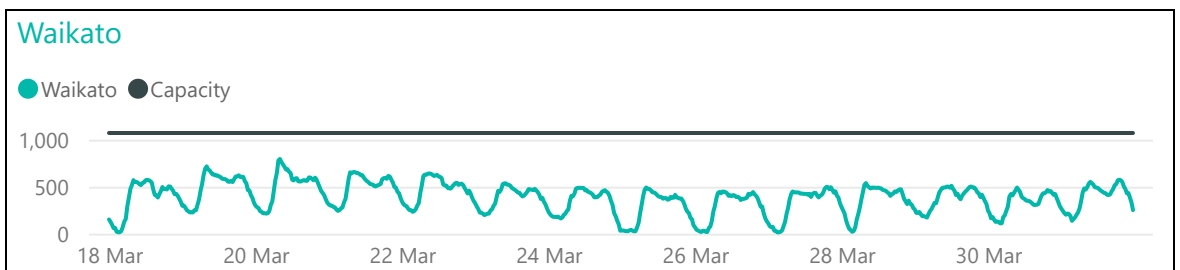
Clutha



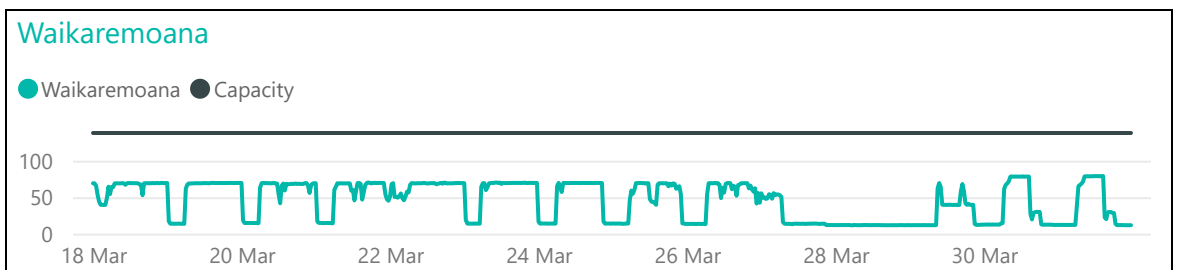
Manapouri



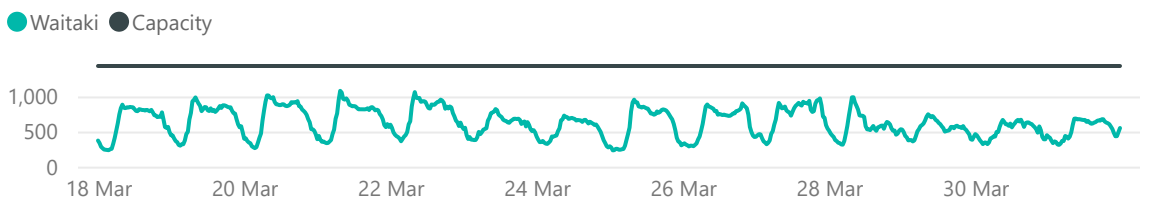
Waikato



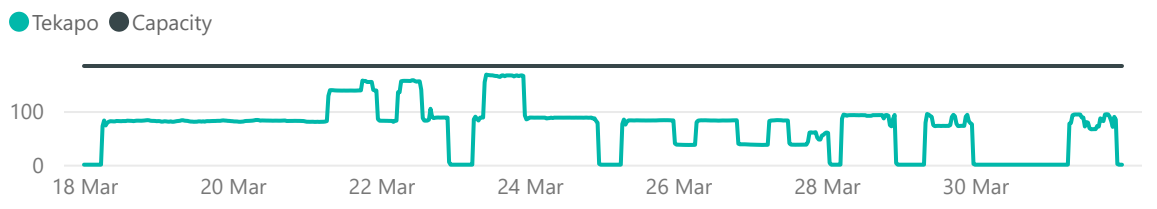
Waikaremoana



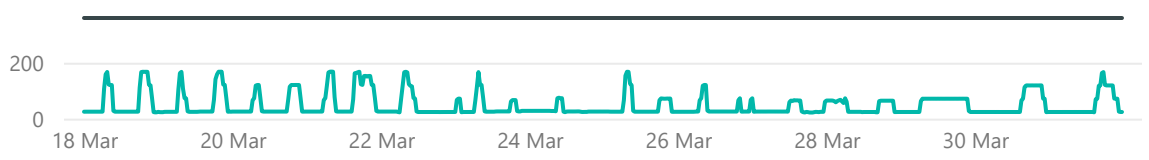
Waitaki



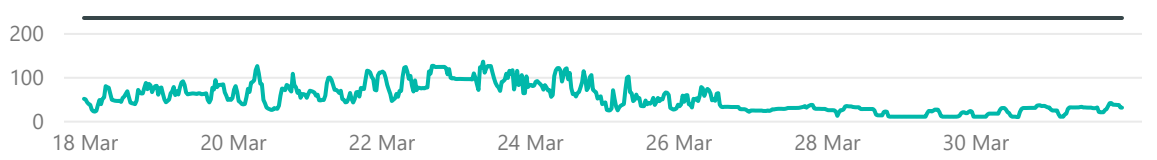
Tekapo



Tongariro



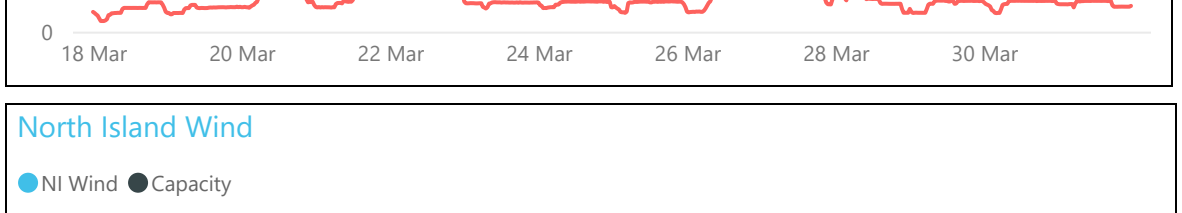
Other SI Hydro



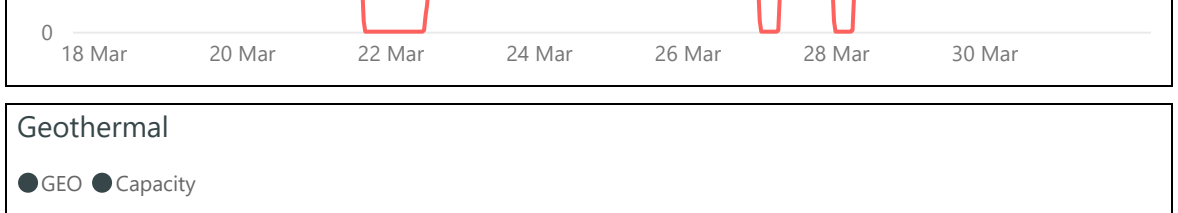
Thermal Peaking Plant

Stratford TCC

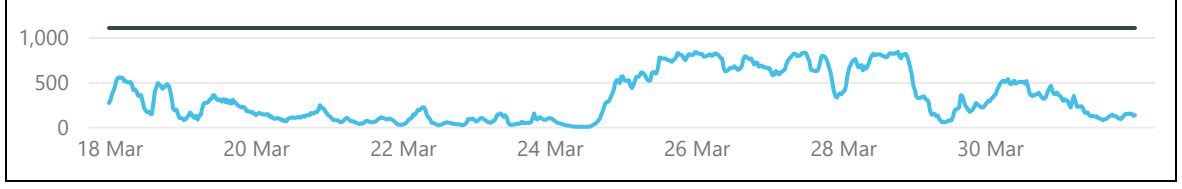
Huntly Rankines



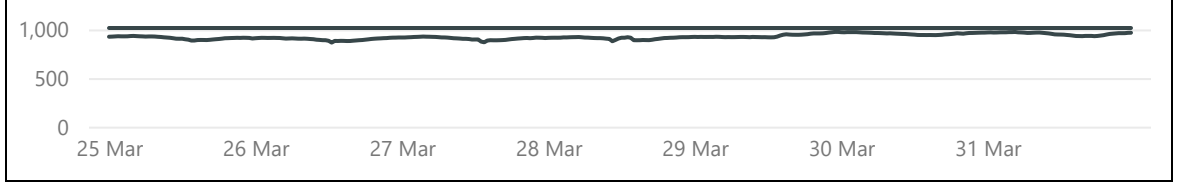
Huntly U5



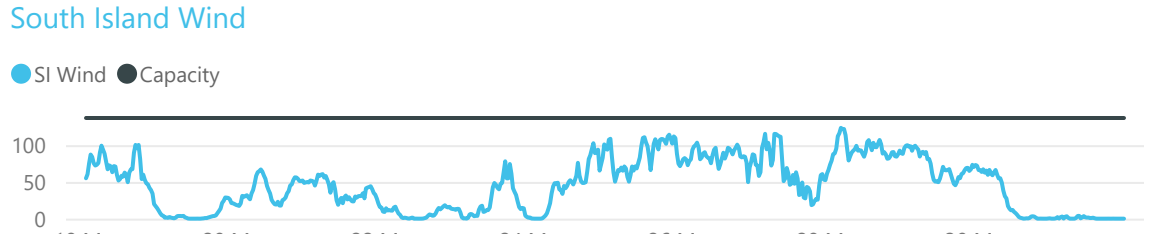
North Island Wind



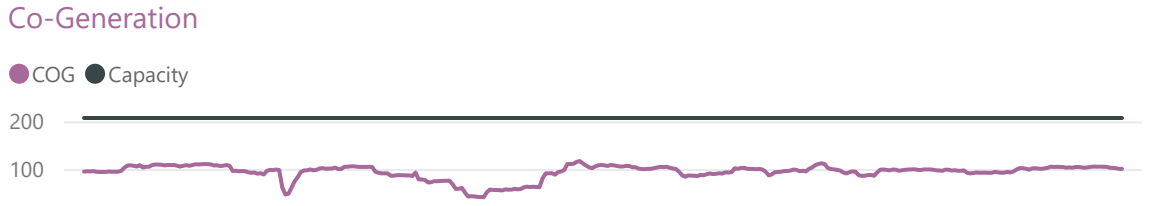
Geothermal



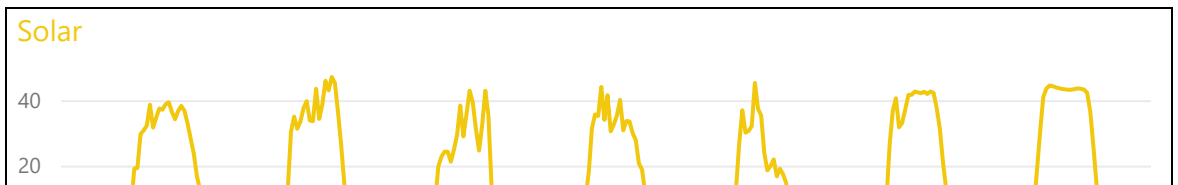
South Island Wind



Co-Generation

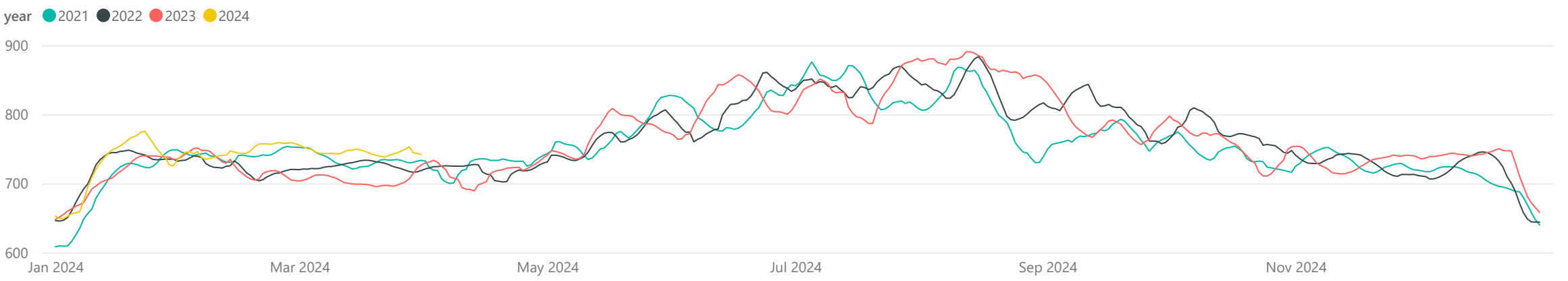


Solar

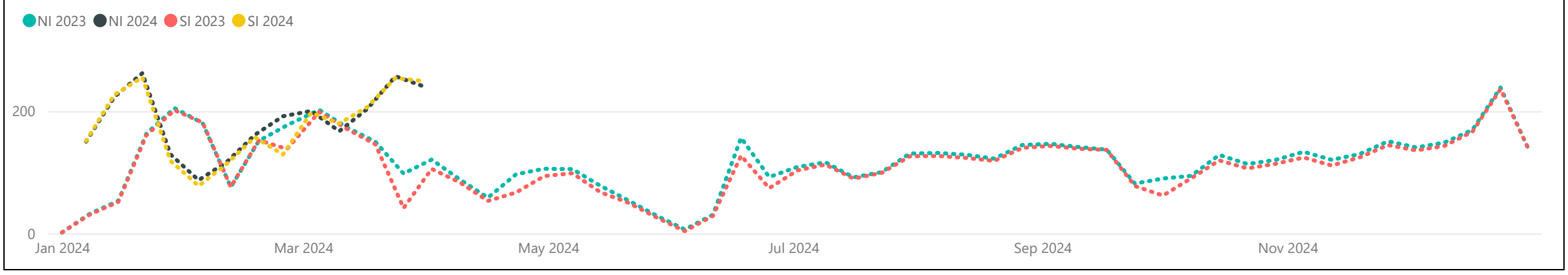


Weekly Profiles

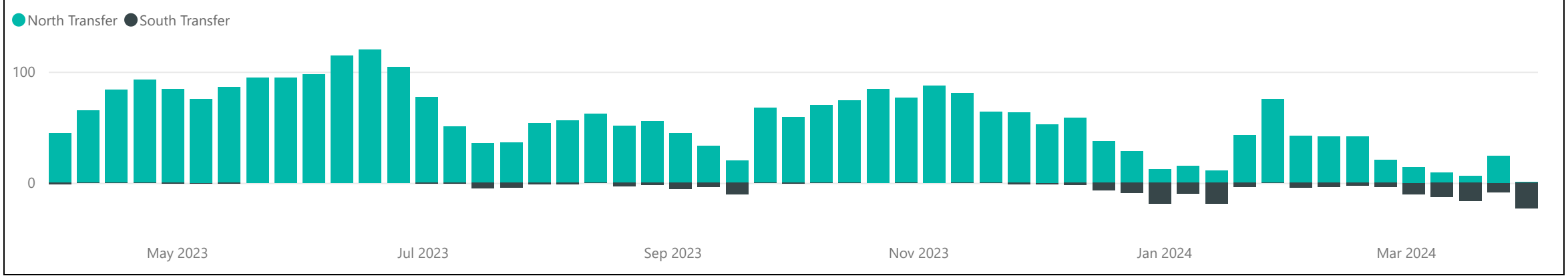
National Weekly Demand - GWh - 7 Day Rolling



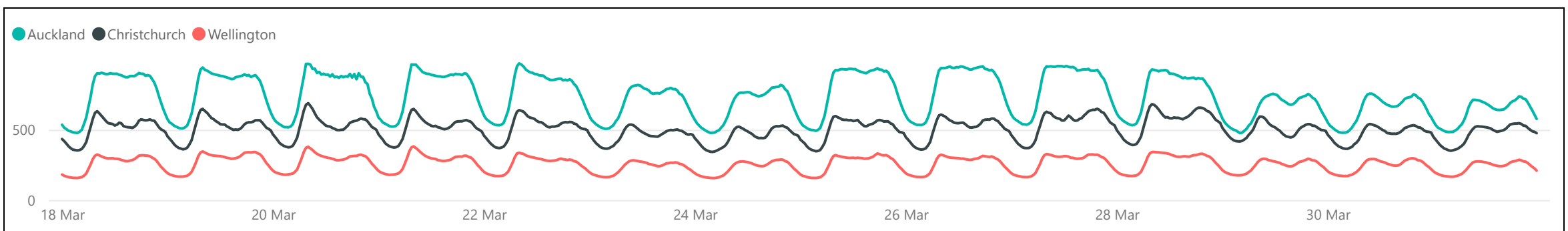
Weekly Spot Price - $/MWh



HVDC Transfer - Weekly GWh



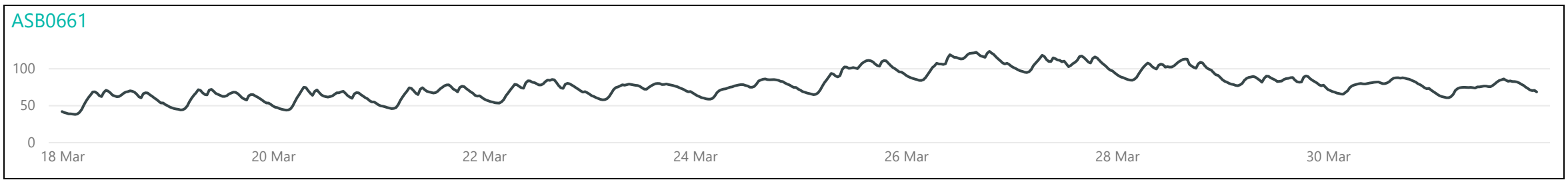
Conforming Load Profiles - Last Two Weeks *Measured in MW shown by region*



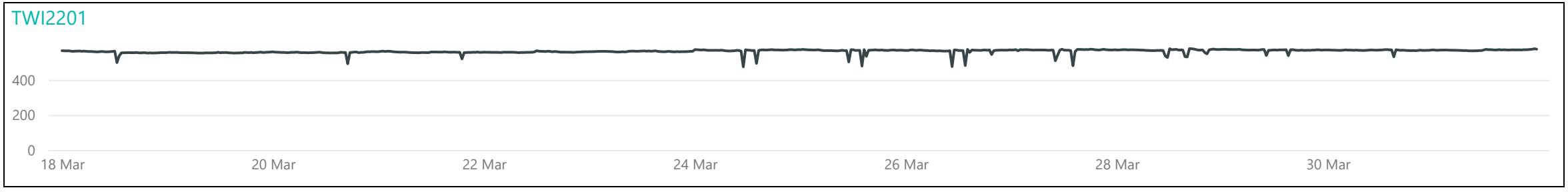
Non-Conforming Load Profiles - Last Two Weeks *Measured in MW shown by GXP*

GLN0331

ASB0661



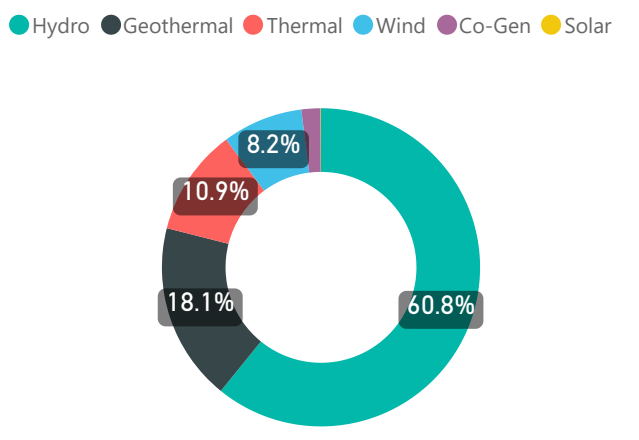
TWI2201



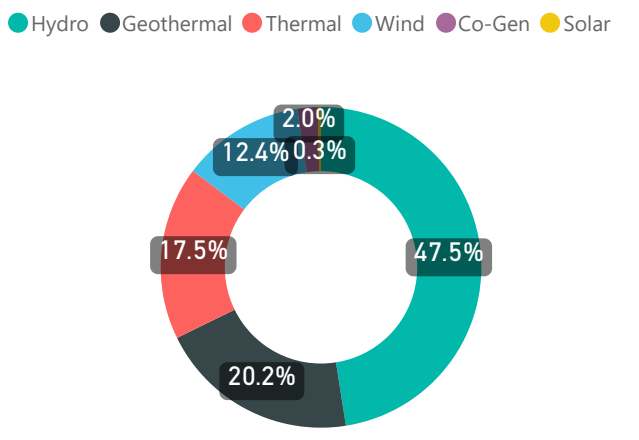
TRANSPOWER

Generation Mix

Last 52 Weeks Generation Mix - Weekly GWh



Last 7 Days Generation Mix - Weekly GWh



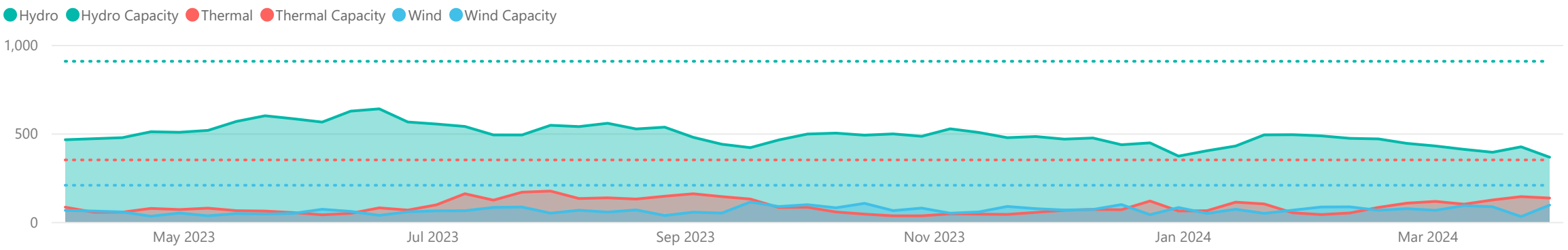
Average Metrics Last 7 Days

Renewable Percentage	CO2e Tonnes/Week	CO2e g/kWh
80%	93,408	121.5

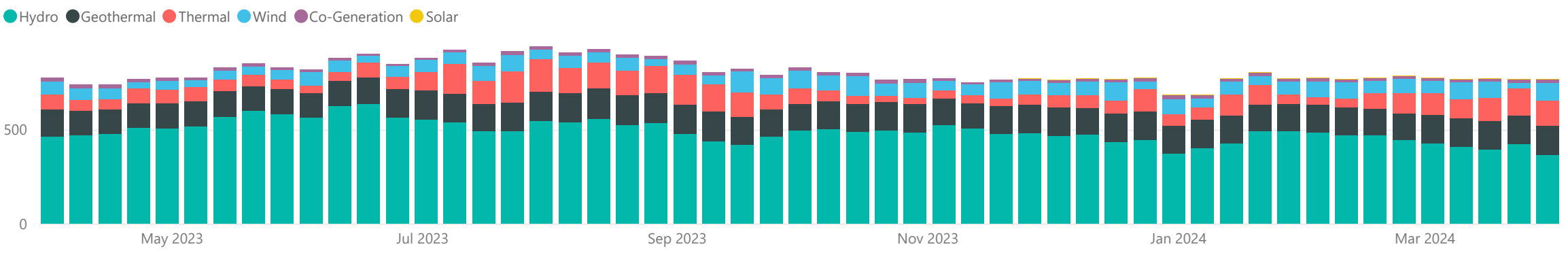
Average Metrics Last 52 Weeks

Renewable Percentage	CO2e Tonnes/Week	CO2e g/kWh
87%	61,482	75.2

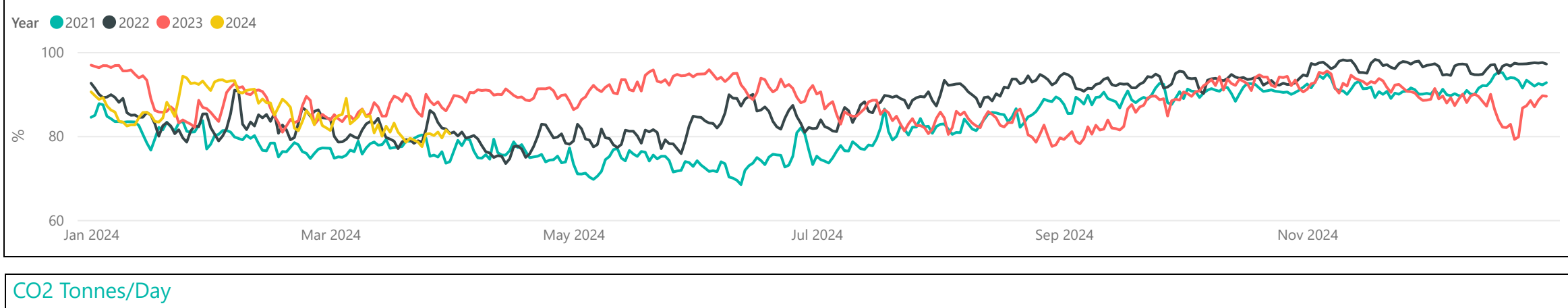
Weekly Generation Mix vs Capacity - GWh



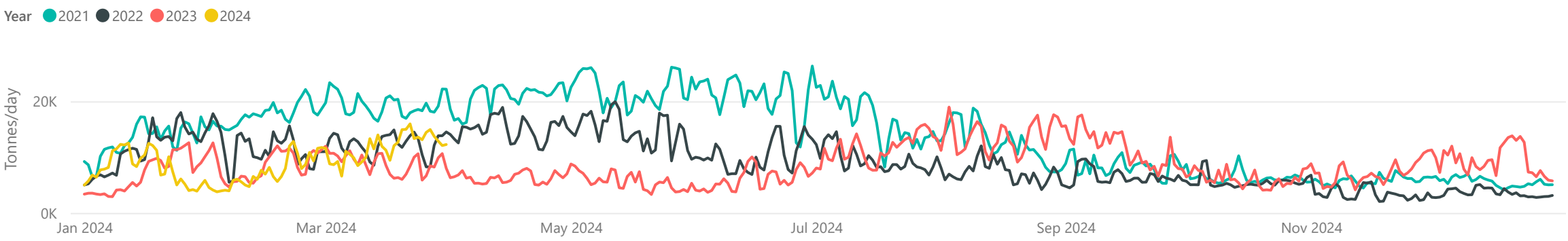
Weekly Generation Mix - GWh



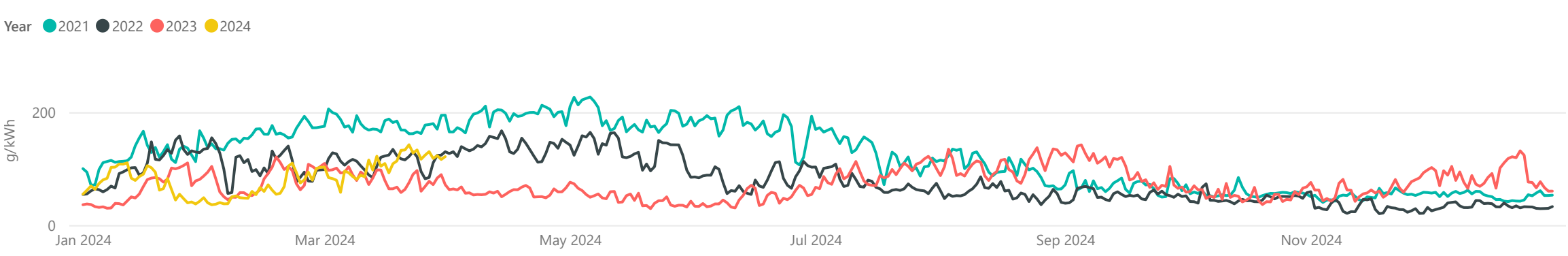
NZ Renewable Percentage



CO2 Tonnes/Day

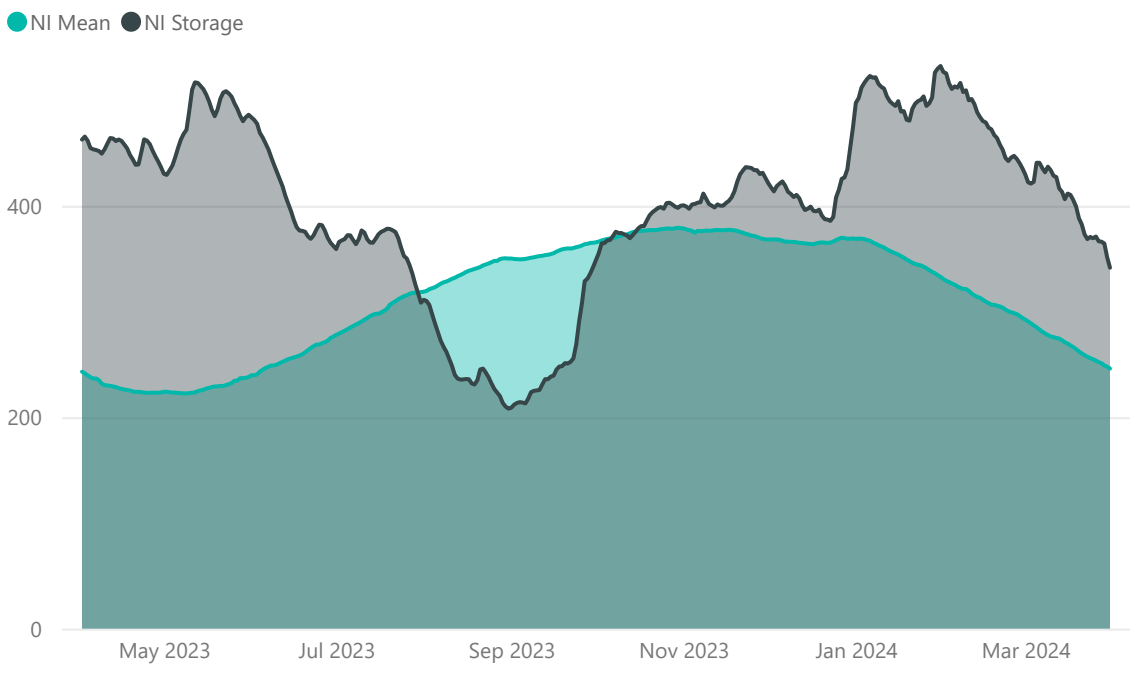


CO2 g/kWh

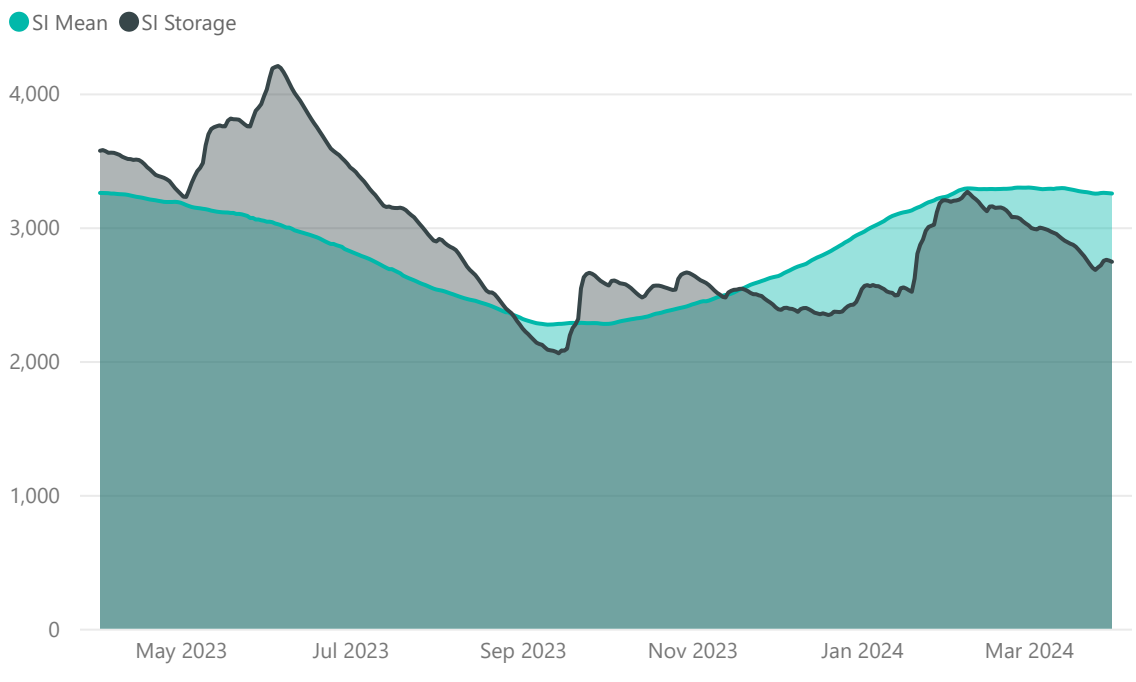


Hydro Storage

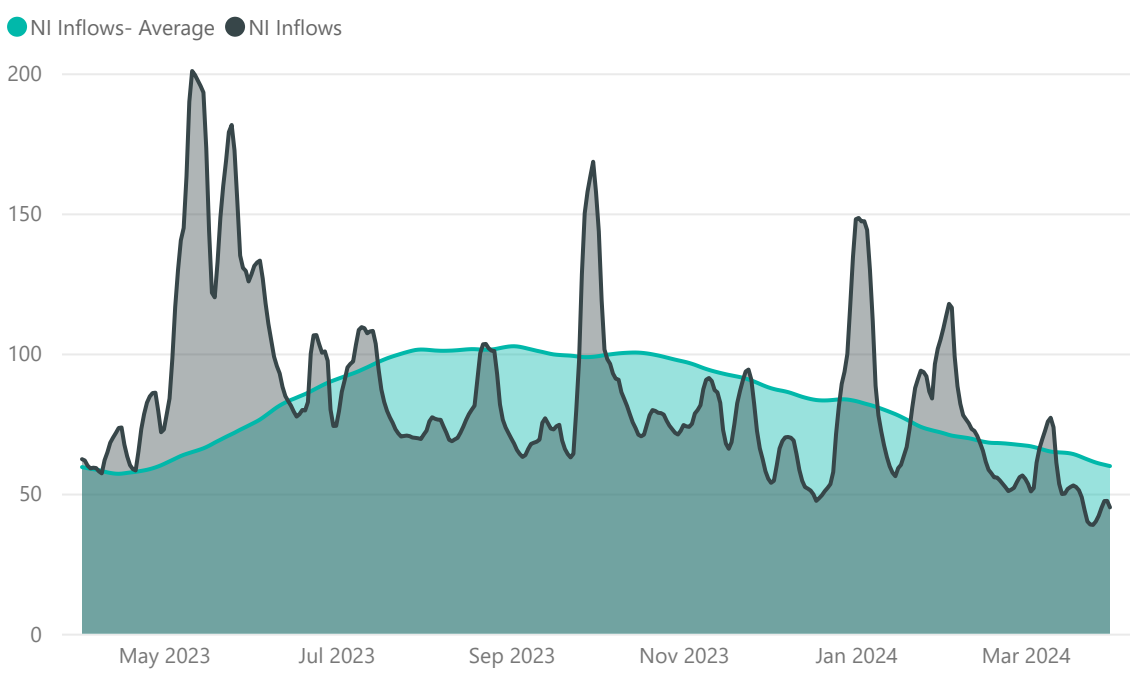
North Island Hydro Storage (Available GWh)



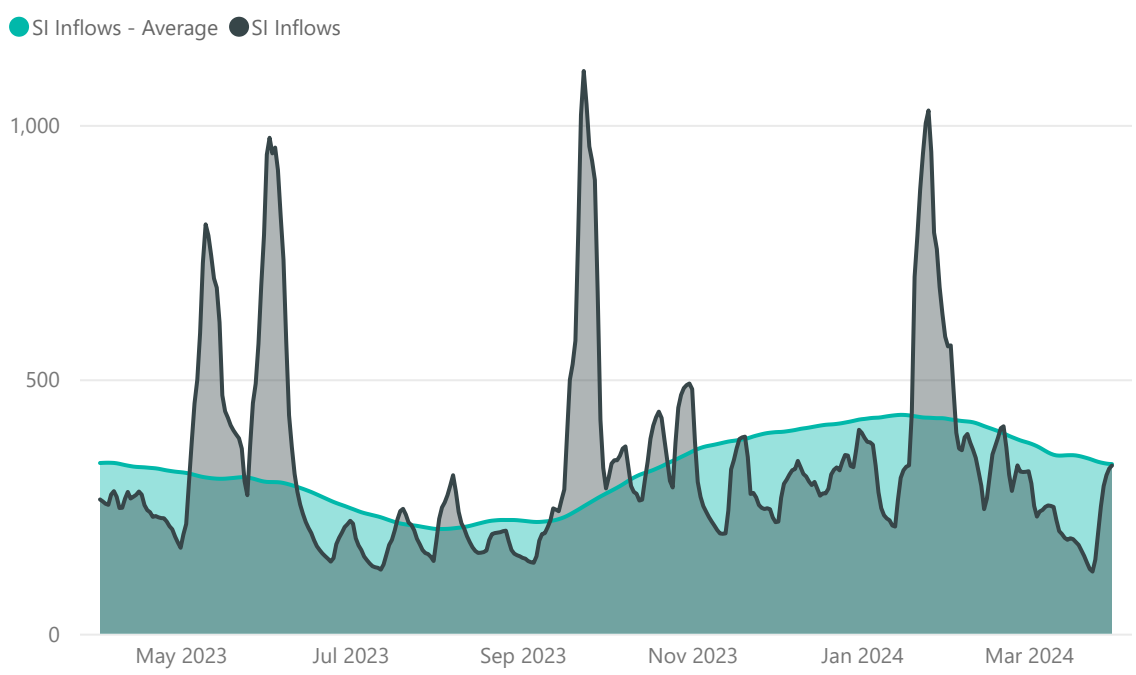
South Island Hydro Storage (Available GWh)



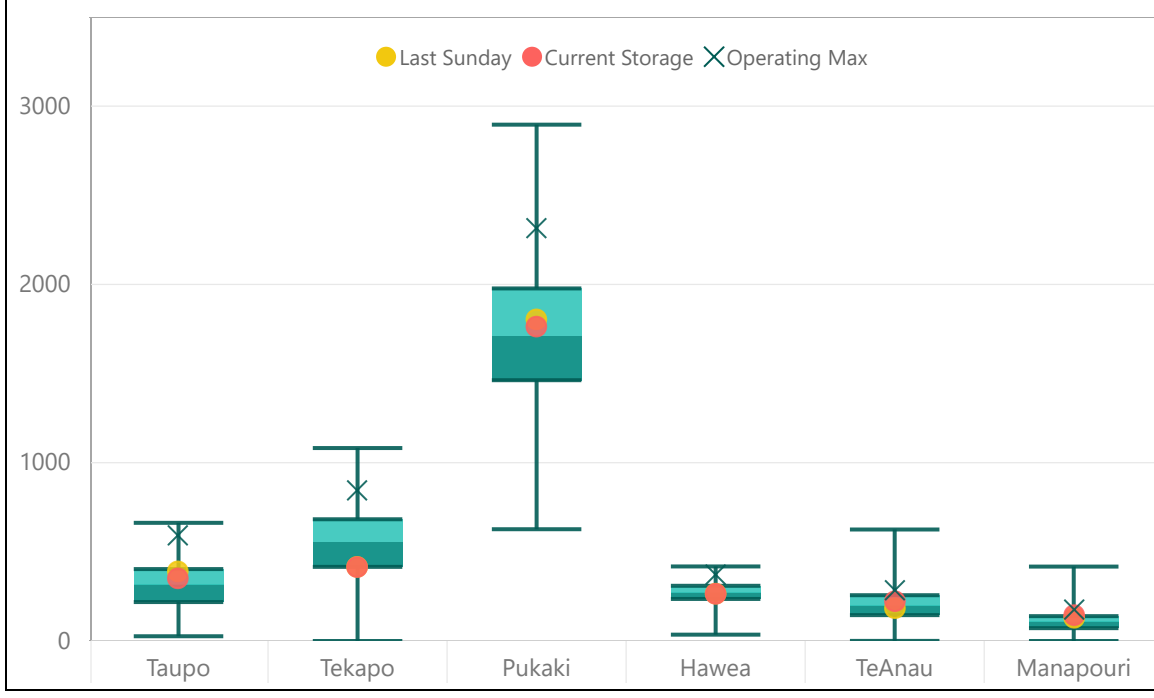
North Island Mean 7 Day Inflows (Available GWh)



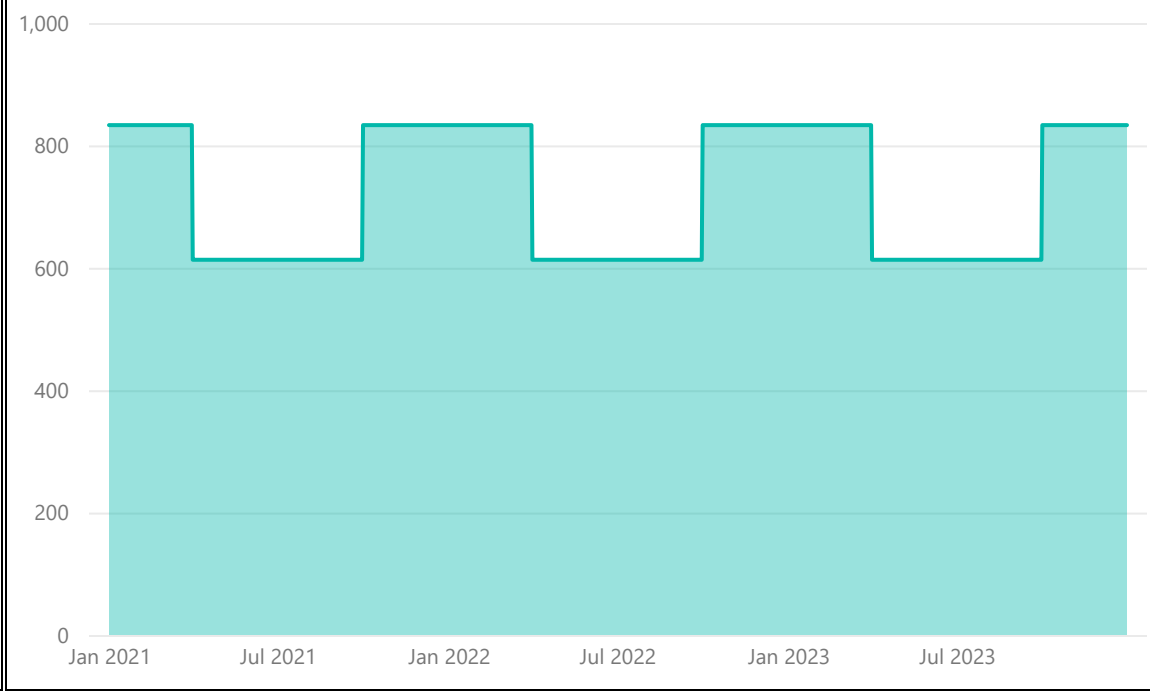
South Island Mean 7 Day Inflows (Available GWh)



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

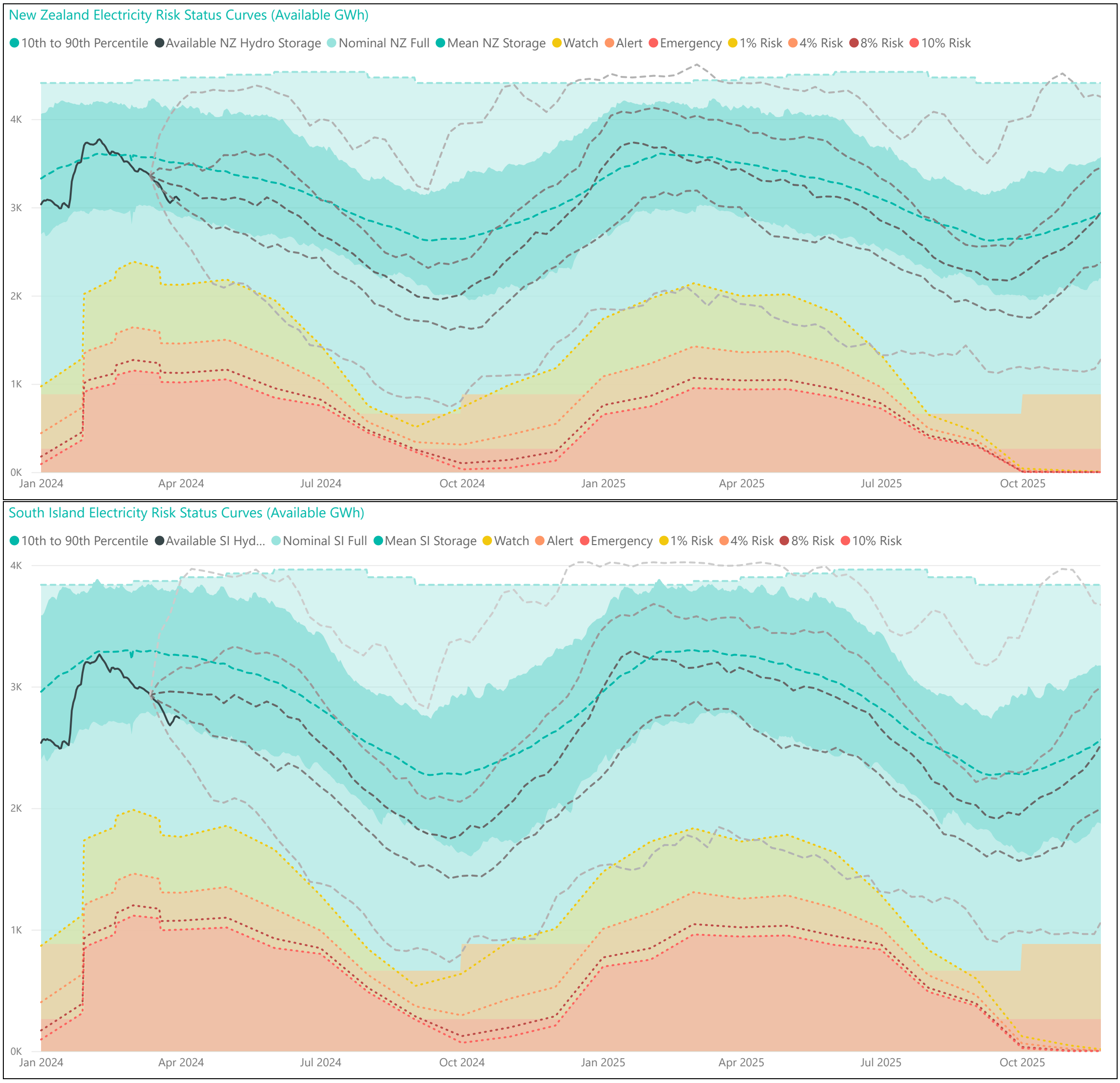
For any inquiries related to security of supply contact market.operations@transpower.co.nz

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).