

Market Performance Quarterly Review

January – March 2023

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1. Purpose

- 1.1. This document covers a broad range of topics in the electricity market. It is published quarterly to provide visibility of the regular monitoring undertaken by the Electricity Authority (Authority).

2. Highlights

- 2.1. Throughout January to March (Q1) 2023, weekly load was mostly similar to or slightly below typical demand. Extreme weather – heatwaves, cold snaps and a cyclone – produced some weeks that deviated significantly from the historical norms.
- 2.2. There were three weeks of particular interest in this quarter where demand was affected by external conditions. The final week of January was unusually hot, pushing demand above normal levels. Mid-February had the arrival of cyclone Gabrielle and wide-ranging load outages, dropping demand below long term averages. The final week of March brought a sharp cold snap which, coupled with an outage on the high voltage direct current (HVDC) cable, caused the issuing of a Customer Advice Notice (CAN) to manage system supply for 29 March due to low residual generation.
- 2.3. Quarterly average wholesale prices increased in Q1 to \$135/MWh, well above Q4 2022, but were down around \$38/MWh compared to the same quarter last year, where average prices were around \$173/MWh.
- 2.4. Q1 2023 saw above average hydro inflows, particularly in the North Island, with Lake Taupō finishing the quarter well above its typical capacity for this time of year. As a result of high hydro inflows in both this and the previous quarter, NZ had over 4TWh of controlled storage at the end of Q1, 1TWh (33%) more than for the same time last year.
- 2.5. Gas production from Pohokura and Kupe has continued to decline in Q1 2023 but this is now being offset by new wells coming online from Maui and McKee/Mangahewa. Total daily gas production is now around 412TJ/day. Changes in daily gas consumption were influenced by gas generation, with generation from Huntly, Stratford peaking and Junction Road all increasing well above Q4 2022 levels, allowing more output from major gas users.
- 2.6. In retail, the total amount of installation control points (ICPs) increased by around 7600 in the last quarter, with more than half of these ICPs being picked up by the four major retailers. The remainder was picked up by smaller retailers, expanding their overall market share. Mercury continues to gain overall market share with the largest ICP gains, while Meridian had the largest decline. ICP switching is following the same trend as previous years, gradually increasing as we move out of the holiday season and normal business ramps up, including consumers managing their bills.
- 2.7. Forward prices for the 2023 winter months decreased by \$50-90/MWh over the quarter as hydro storage increased and hydro completed the quarter with around 1TWh more storage than this time last year. Winter forward prices for future years dropped by \$20-35/MWh over the quarter. Ongoing declines in fuel costs and a notable decline in the NZ carbon price reduced the cost inputs for marginal thermal generators, which will have contributed to the decline in the forward prices.

3. Demand

- 3.1. The first quarter of each year is typically the time of lowest demand in each year. Figure 1 shows that demand for the quarter was below the long-term historical average for this quarter in all months. This was despite a couple of weeks in January and March where demand was well above normal levels due to unusual temperatures. Individual months were 54-69GWh below their long-term averages.

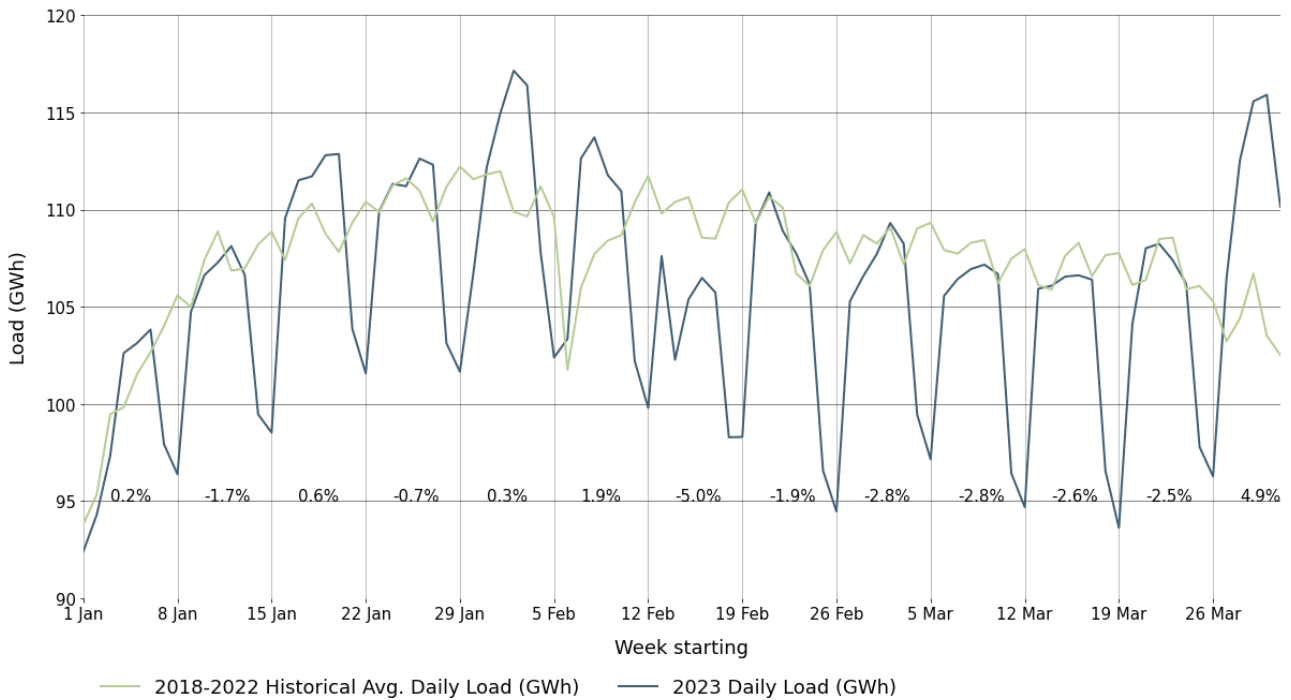


Figure 1: New Zealand daily load compared to historical average for the same quarter

3.2. The last week of January was unusually hot and humid for the time of year. As can be seen in Figure 2, the high temperatures and humidity resulted in a high cooling load that kept demand elevated for several days. This included an uplift in overnight demand of about 10% above the historical average.

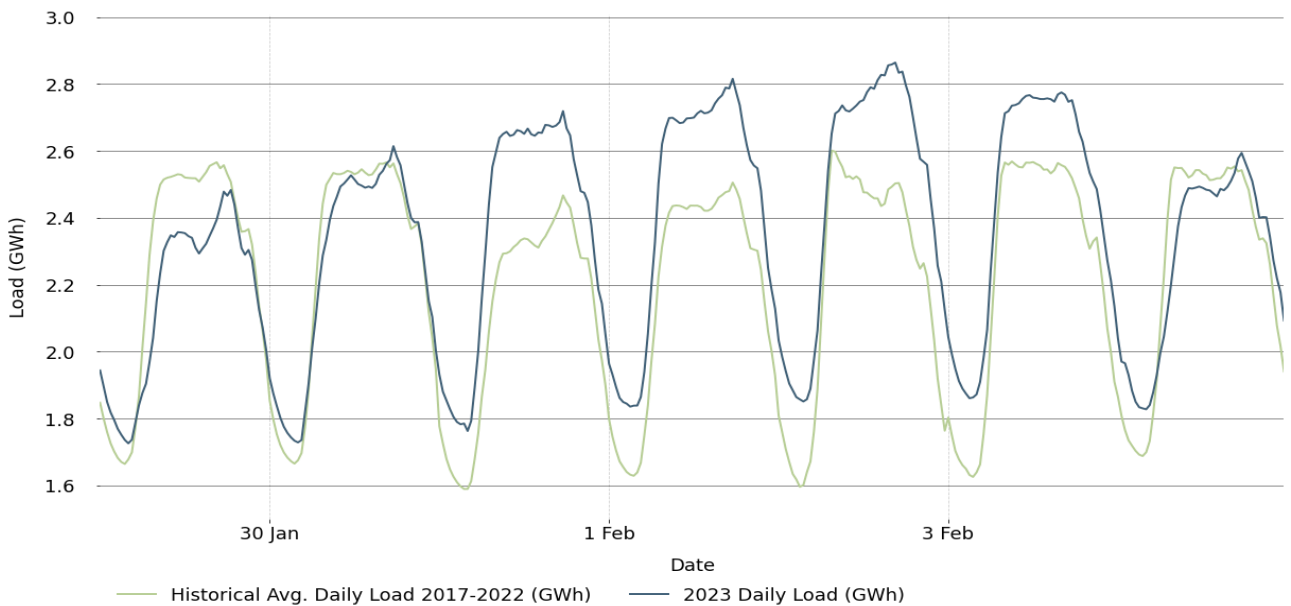


Figure 2: Daily load for 29 January – 4 February vs historical demand

3.3. In the week of 12-18 February, Cyclone Gabrielle caused a large number of load outages, resulting in a significant decrease in demand for Tuesday 14 February and Wednesday 15 February. Power was progressively restored throughout the week, allowing load to return close to typical levels by the end of the week. Of all outages, only the Redclyffe substation site was still offline at the end of Q1 2023, with extensive restoration required before it returns to service at the end of July 2023.

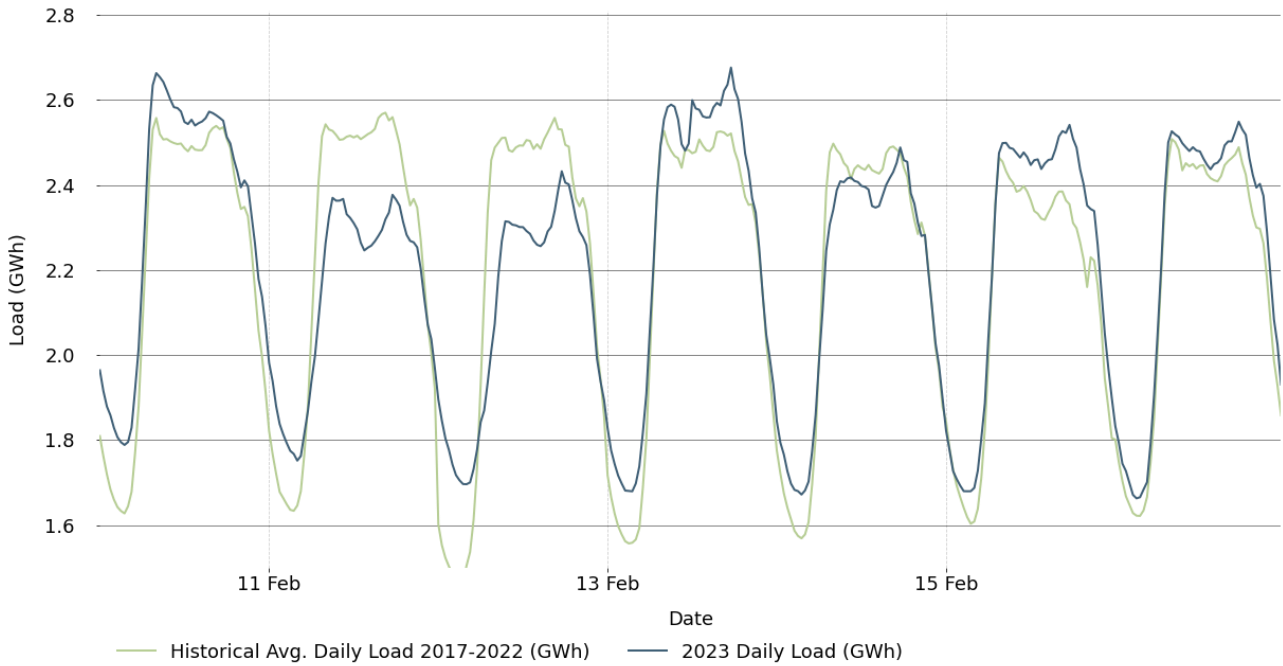


Figure 3: Daily load for 10 – 16 February vs historical demand

3.4. In the final week of March, Figure 4 shows how demand was pushed above normal values due to a cold snap that saw maximum temperatures in Christchurch and Wellington below 10C; noticeably below the long-term average temperatures for the time of year. This coincided with an outage on the HVDC line, which resulted in a CAN being issued for low residual generation for the morning of 29 March as the residual generation available dropped below 200MW.

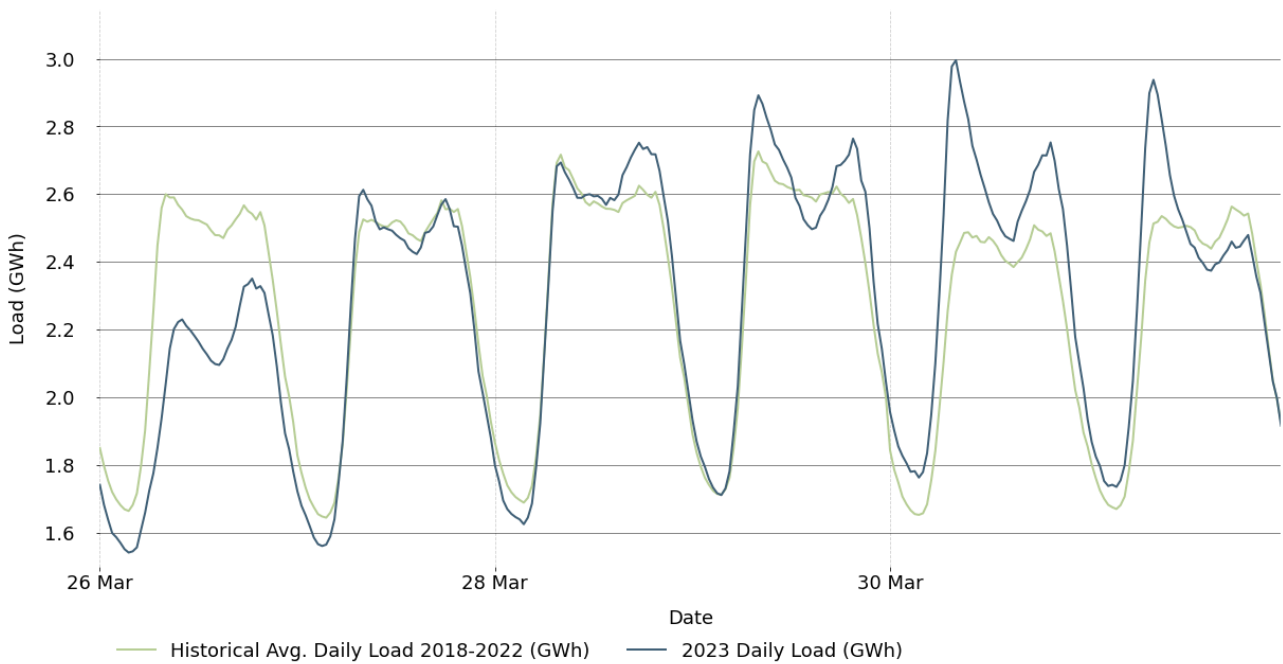


Figure 4: Daily load for 26 March - 31 March vs historical demand

4. Wholesale electricity

- 4.1. The overall range of wholesale prices was compressed for Jan and Feb at most nodes due to mild demand, but the mean and median were substantially up compared to the previous quarter, with an average price of \$135/MWh for Q1 2023. This is consistent with the annual patterns of previous years, where Q4 typically has the lowest average wholesale price for the year. Prices were elevated in the last weeks of both January and March, consistent with the high demand experienced at these times due to temperature.
- 4.2. As visible in Figure 5, the only price excursion above \$500/MWh was on 24 January as a result of Huntly 5 tripping. This caused a frequency excursion and underfrequency event. This was compounded by local transmission constraints, which led to very high prices across the North Island for that trading period.

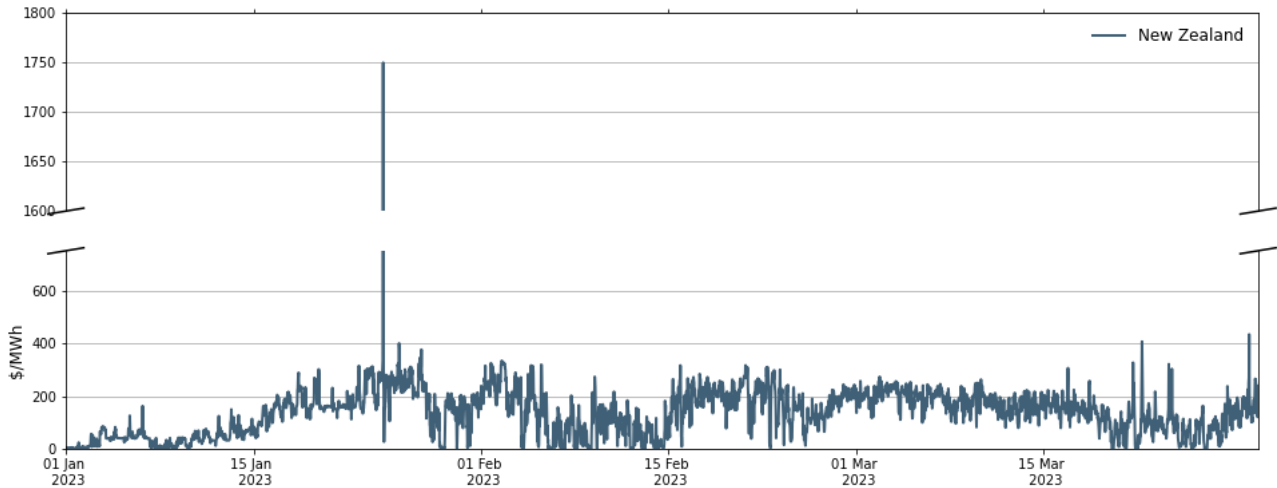


Figure 5: Average New Zealand wholesale price per half hour for January - March 2023

- 4.3. There was a planned HVDC outage that ran from 23 February to 6 March, with a bipole outage on 25 and 26 February, visualised in Figure 6. This resulted in sustained price separation between the islands for this time. There was an additional outage in late March which also produced sustained price separation. This second outage was also a contributing factor in the CAN issued for 29 March, but prices remained relatively low in both islands on this day.

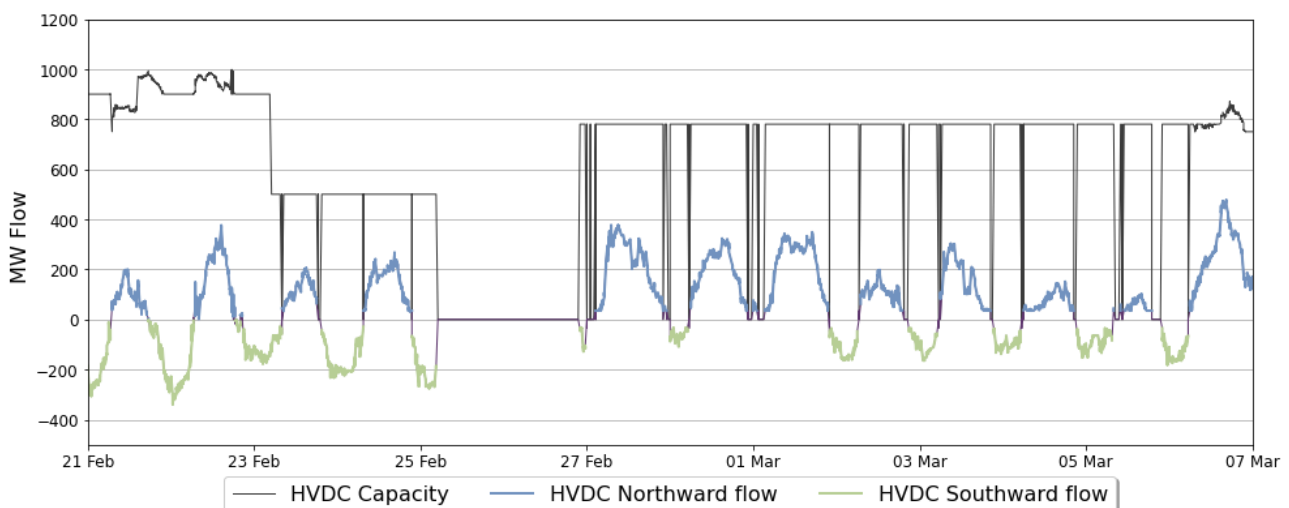


Figure 6: HVDC capacity and flows in the lead up to the planned outage

- 4.4. In the current generation mix, the availability of wind generation has a notable impact on the daily average wholesale price. If there isn't much wind, more peaking generation is

required, which pushes up prices. Figure 7 shows that at times of low wind, such as at the end of January and in mid-February, the wholesale price is driven higher.

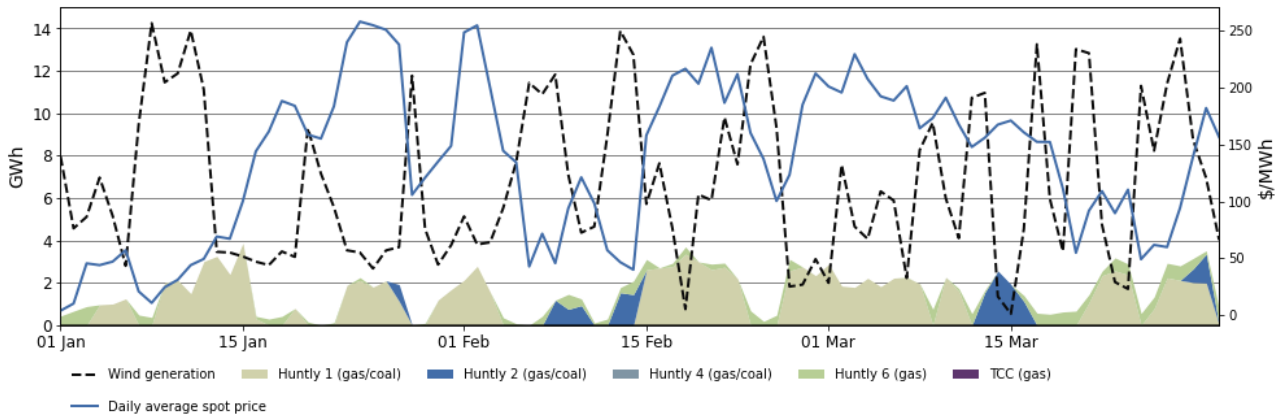


Figure 7: Daily wind and peaking generation and daily average wholesale price for January - March 2023 (excl Huntly5)

- 4.5. As noted earlier, late February and March had below average demand for the time of year. Figure 8 provides evidence of this when we examine the average MW supplied by each fuel type per day. The average daily hydro generation drops around 250MW in the second half of the quarter as compared to the first.
- 4.6. The increase of supply from thermal generation in the first weeks of the year to support demand increasing is also visible in Figure 8. In the first two weeks of the year, total demand was low and hydro reserves were high, suppressing the need for any thermal generation. As demand increased, Huntly 5 came back into full usage, as did the need for peaking generation.

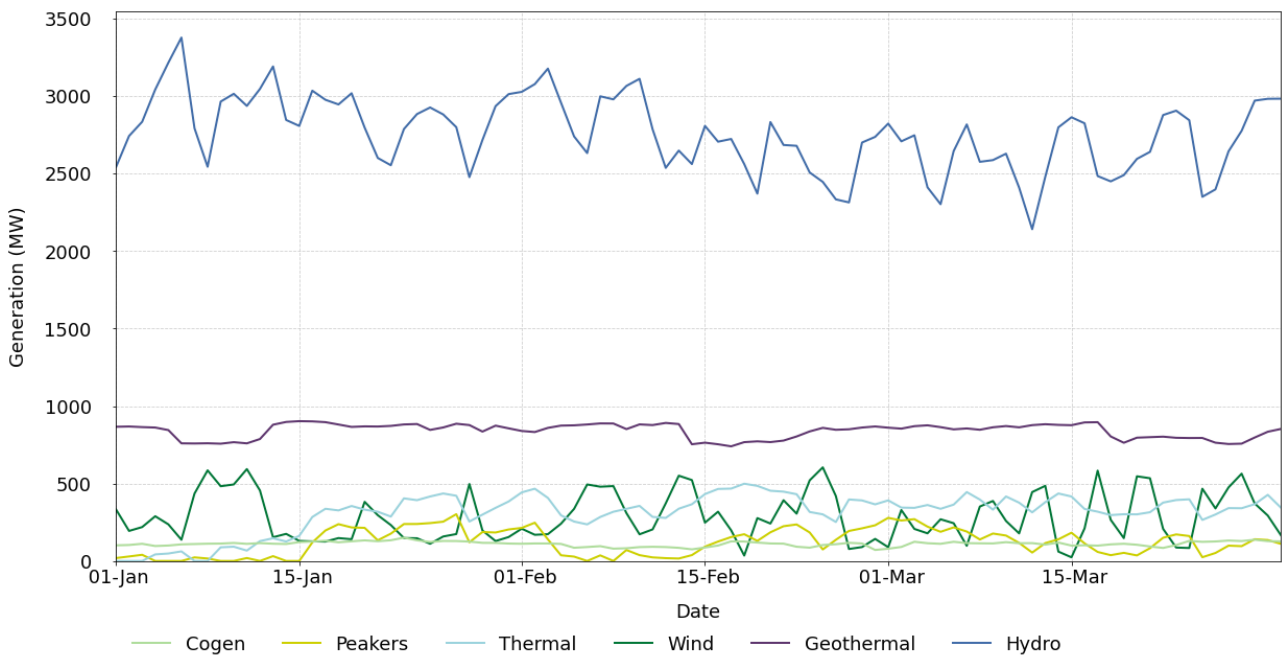


Figure 8: Average daily generation by fuel type for January - March 2023

4.7. Figure 9 shows the weekly breakdown of electricity generation by fuel type¹. The first two weeks of the quarter have a non-standard fuel mix because demand was low over the holiday period, reducing the need for thermal generation. Across the remainder of the quarter, the largest fluctuations in generation fuel type came from wind and thermal generation, ranging from 3-8% and 7-13% respectively. As demand ramped back up to normal levels, thermal generation increased to meet it, with the majority of this being met by Huntly 5. Geothermal generation maintained a relatively even share of around 16-18% and hydro was between 60-65% for most weeks in the quarter.

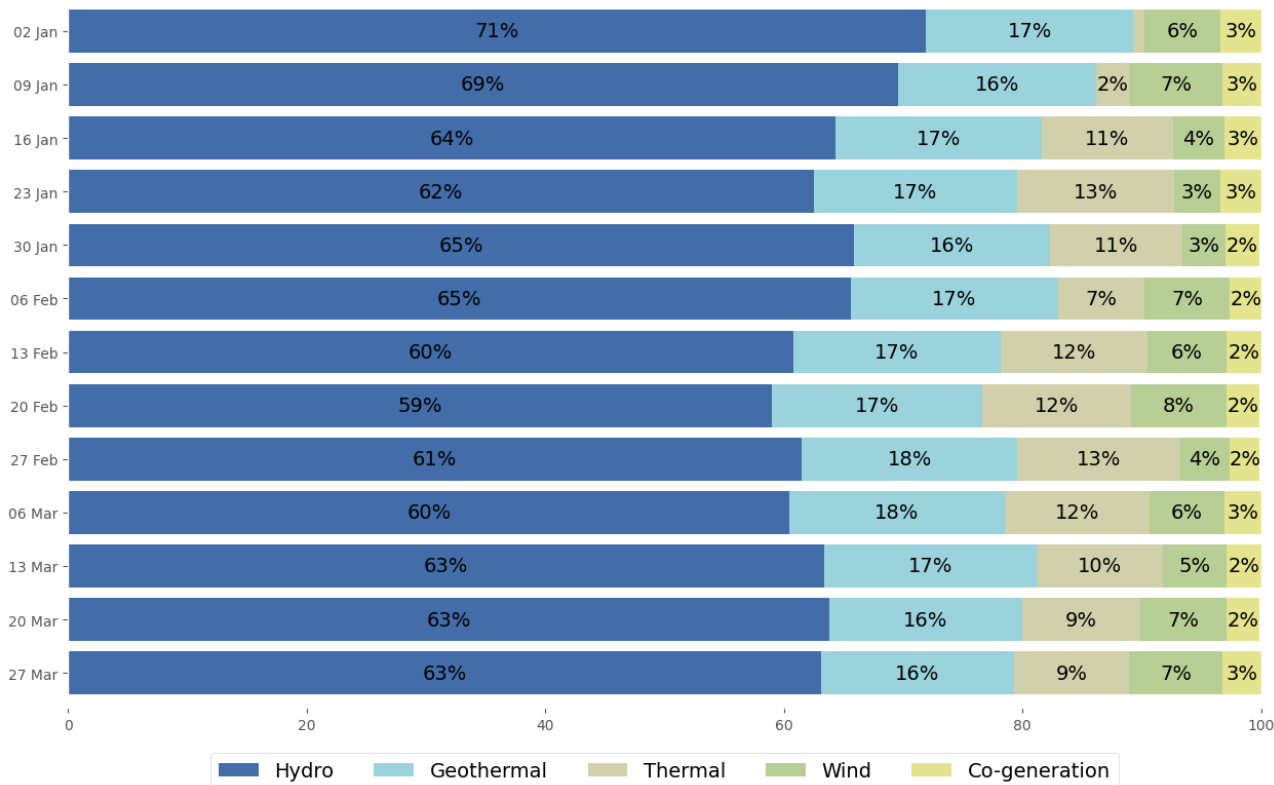


Figure 9 Weekly generation share by fuel type for January - March 2023

¹ Labels on Figure 9 may not add up to 100% due to rounding.

5. Water storage

- 5.1. Q1 2023 finished with most hydro dams at or well above average levels. In particular, the North Island received above normal rainfall in both January and February, boosting levels in Lake Taupō well above typical levels. While rainfall on the North Island eased in March, Figure 10 shows that Taupō remained exceptionally high at the end of the quarter, even with more generation than average dispatched by Mercury.
- 5.2. In contrast, water inflows in the South Island were below average in January and February, leading to several storage locations dropping well below average levels, restricting the total generation able to be supplied by Meridian in particular. Above average rainfall in March lifted most locations to average or above average levels, but Lake Hawea missed out on most of the rainfall and remained low.

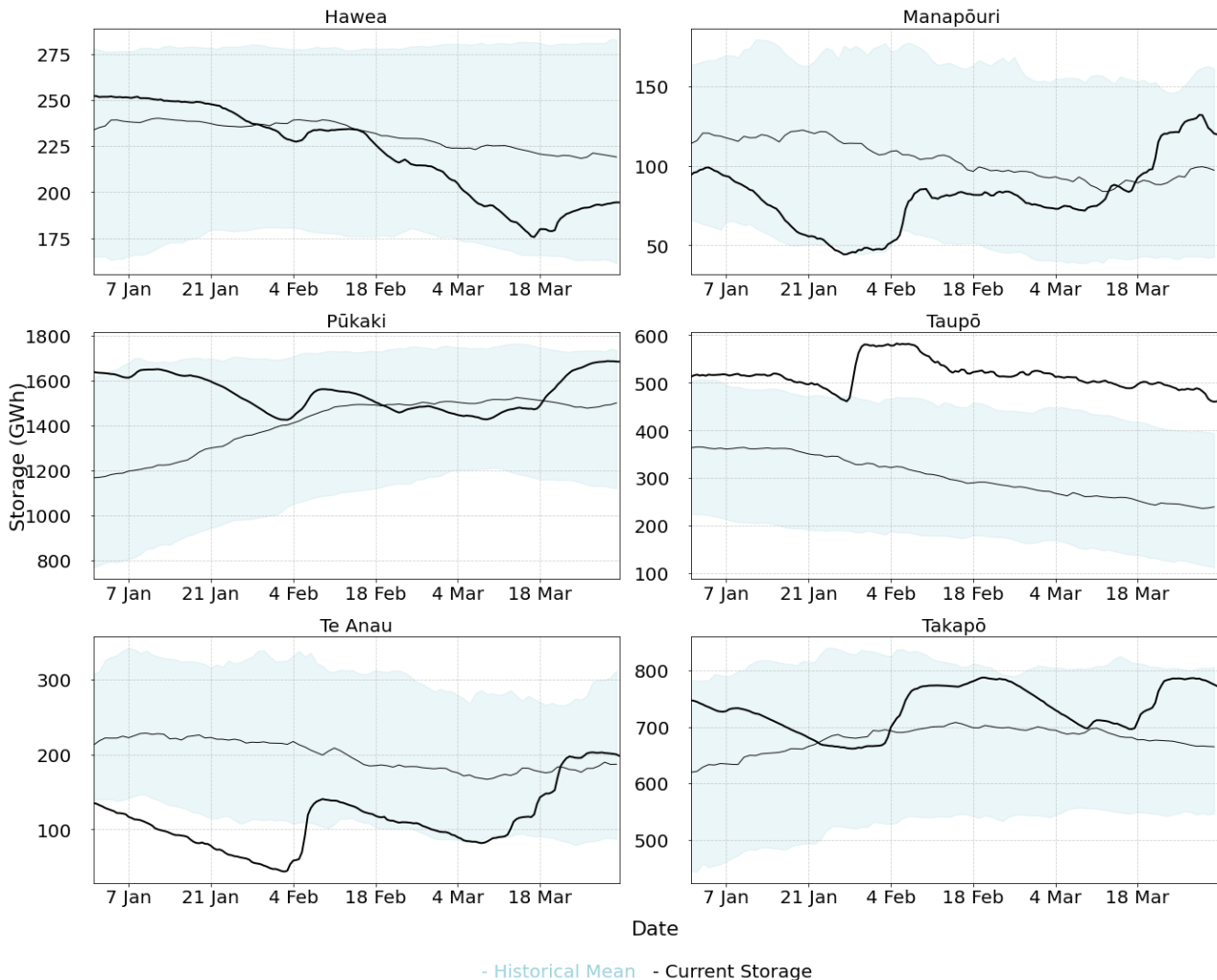


Figure 10: Lake storage levels for January – March 2023 vs typical historical storage levels

- 5.3. While the proportion of wind generation was noted earlier to be a factor in determining the average half-hourly and daily wholesale price, an additional factor affecting prices over longer periods is the amount of hydro storage available. Figure 11 shows the 7-day rolling average of both hydro storage and North and South Island wholesale prices. The inverse relationship between storage and price is visible, particularly in late January and early February as South Island storage reached its lowest levels of the quarter, and at the end of March as levels were at their highest and prices were lower.

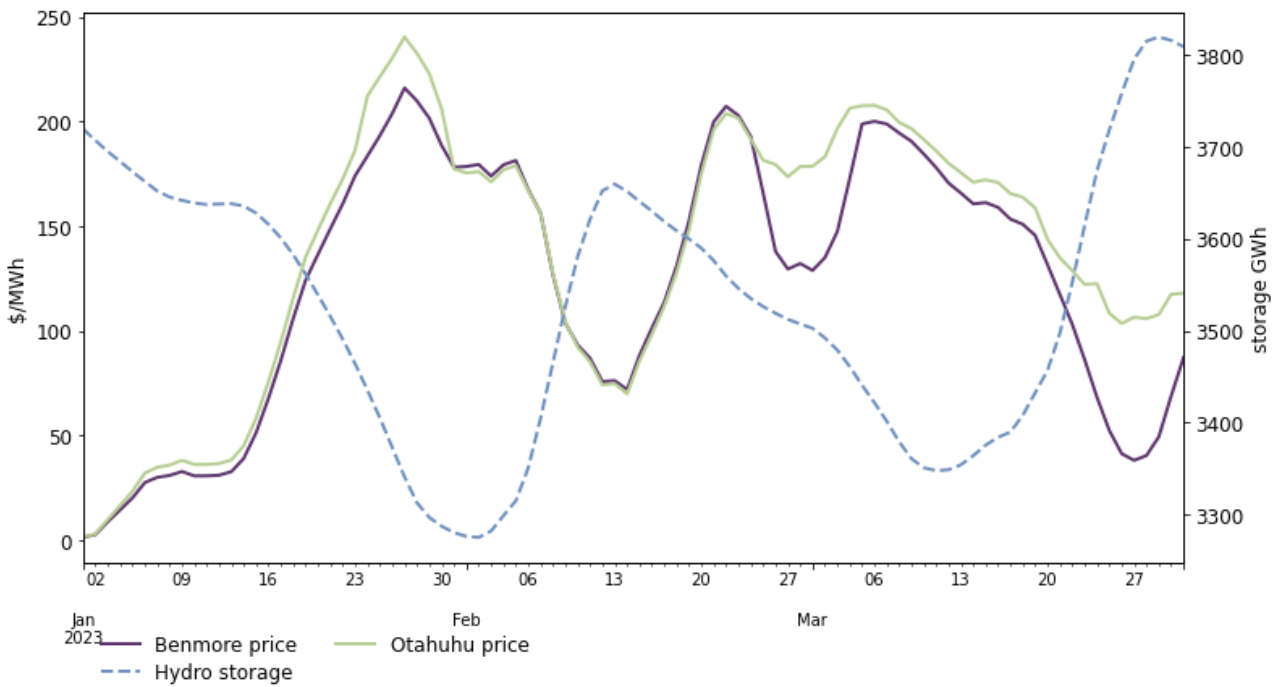
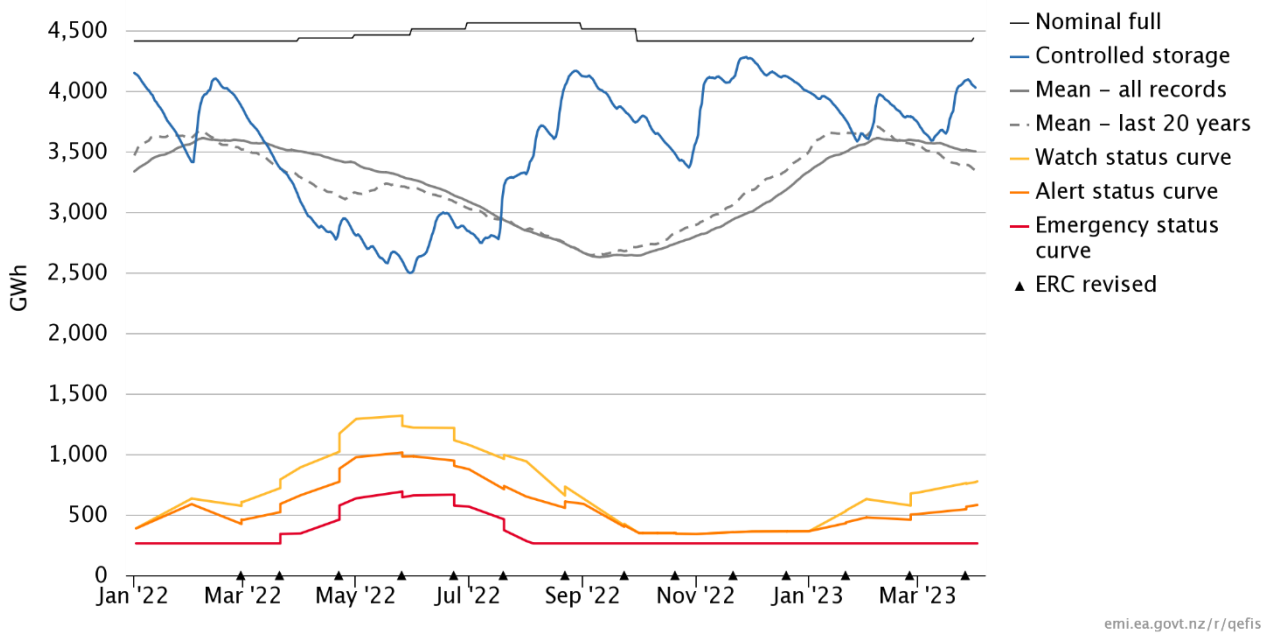


Figure 11: Rolling 7-day average wholesale price vs national hydro storage levels for January - March 2023

5.4. As Figure 12 shows, the quarter finished with more than 4TWh of hydro storage, an increase of around 1TWh on the previous year, due to the strong rainfall across the quarter. This is the highest level of hydro storage entering the cooler months in more than 5 years and should minimise the need for higher priced coal and gas generation through winter.



emi.ea.govt.nz/r/qefis

Figure 12: National storage levels for January 2022 to March 2023

6. Wholesale Gas

- 6.1. While daily average prices in Q1 2023 were quite volatile – ranging between \$1.57/GJ to just over \$19/GJ as shown in Figure 13, the volume weighted average price for the quarter was \$11.09/GJ, about \$2/GJ lower than the previous quarter. Low traded volumes and low liquidity due to planned outages at the Ahuroa storage facility and Kapuni contributed to these lower values.

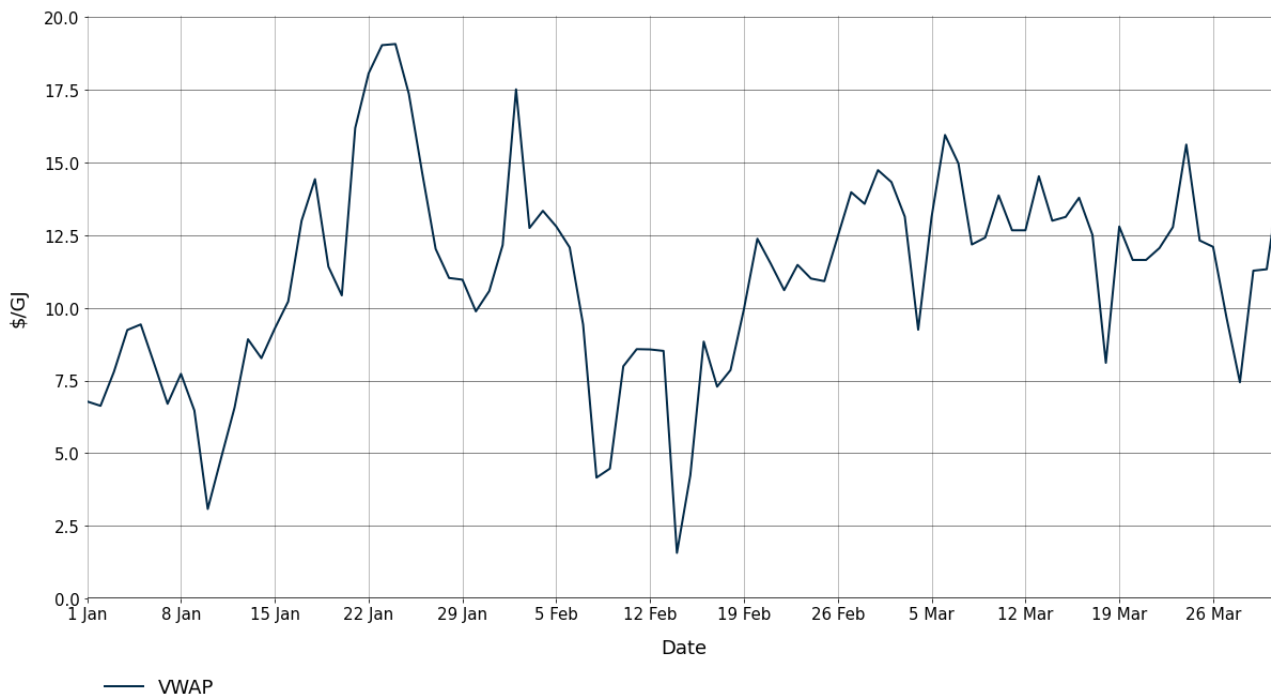


Figure 13: Daily volume-weighted average price for gas for January - March 2023

- 6.2. Gas production started the quarter at 303TJ/day and finished the quarter at 412TJ/day. While Pohokura production is continuing to decline, Maui and McKee/Mangahewa both increased their production as new wells from infill drilling came online, with more wells from McKee/Mangahewa still to come this year. This now makes Pohokura the third largest producer, having been bypassed by both Maui and McKee/Managahewa, as visible in Figure 14.
- 6.3. The drops in production in March from Maui and McKee/Mangahewa were from planned outages.

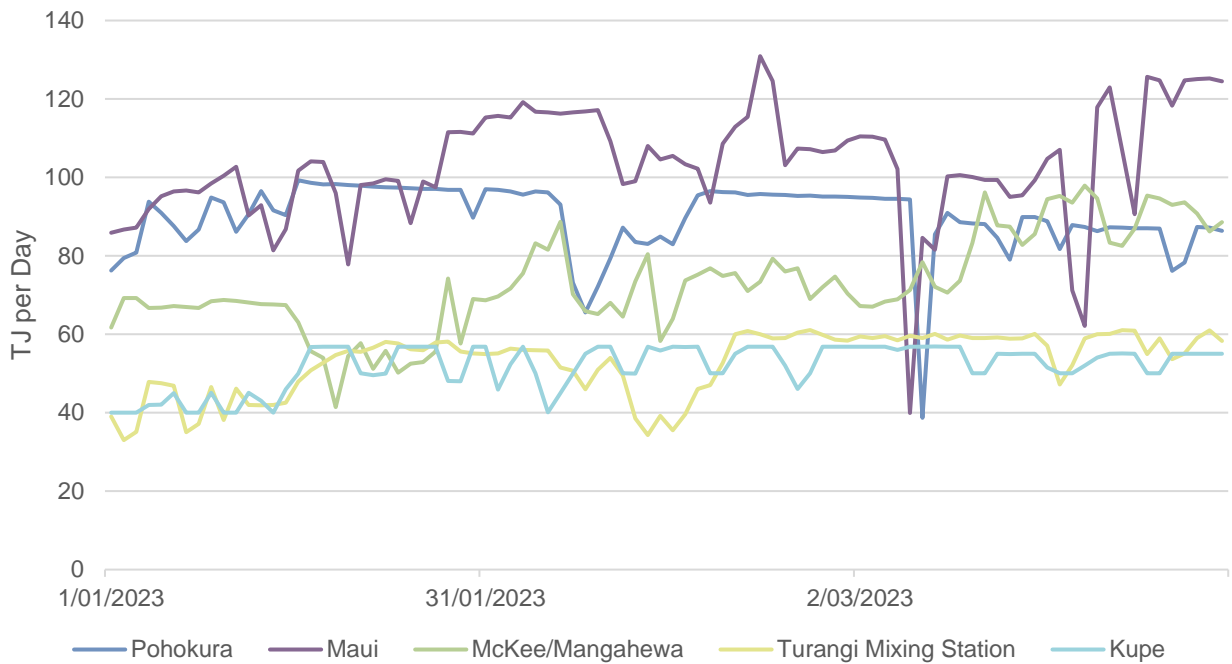


Figure 14: New Zealand gas production for January to March 2023

- 6.4. Gas consumption by Huntly power station ramped up through January to return to normal consumption levels, as visible in Figure 15. Stratford power station remained on scheduled outage for the full quarter, but is expected to return to service in time for the cooler months.
- 6.5. Methanex continued to operate at normal levels for most of the quarter, with a dip in operation in early March that coincided with the outages at Maui and Pohokura. The Waitara Valley distillery occasionally provided support to Motunui, running at about 6-7TJ/day when in operation.

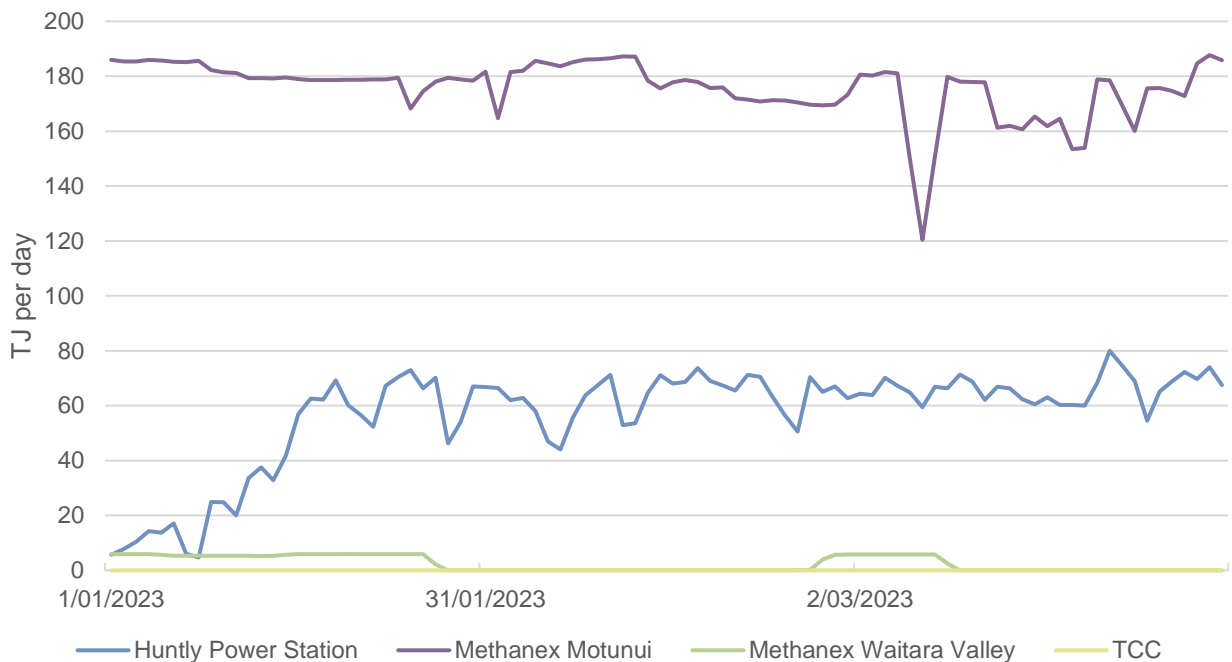


Figure 15: New Zealand gas consumption by major consumers January to March 2023

- 6.6. Figure 16 shows the fuel consumption of the largest thermal generator in New Zealand as it ramped back up to normal operation after several unit outages over the low-demand holiday season. All units are now back to typical gas consumption levels, but coal consumption remains suppressed when compared to the last two years.
- 6.7. In February, Genesis successfully² trialed the use of torrefied wood pellets from Canada as a potential substitute for coal; the trial period is visible in Figure 16 as an extended period of coal generation. Genesis was able to run a Rankine unit on biomass alone for several hours, showing that biomass generation is possible.

Huntly fuel consumption

Estimated daily coal and gas consumption — last 12 months

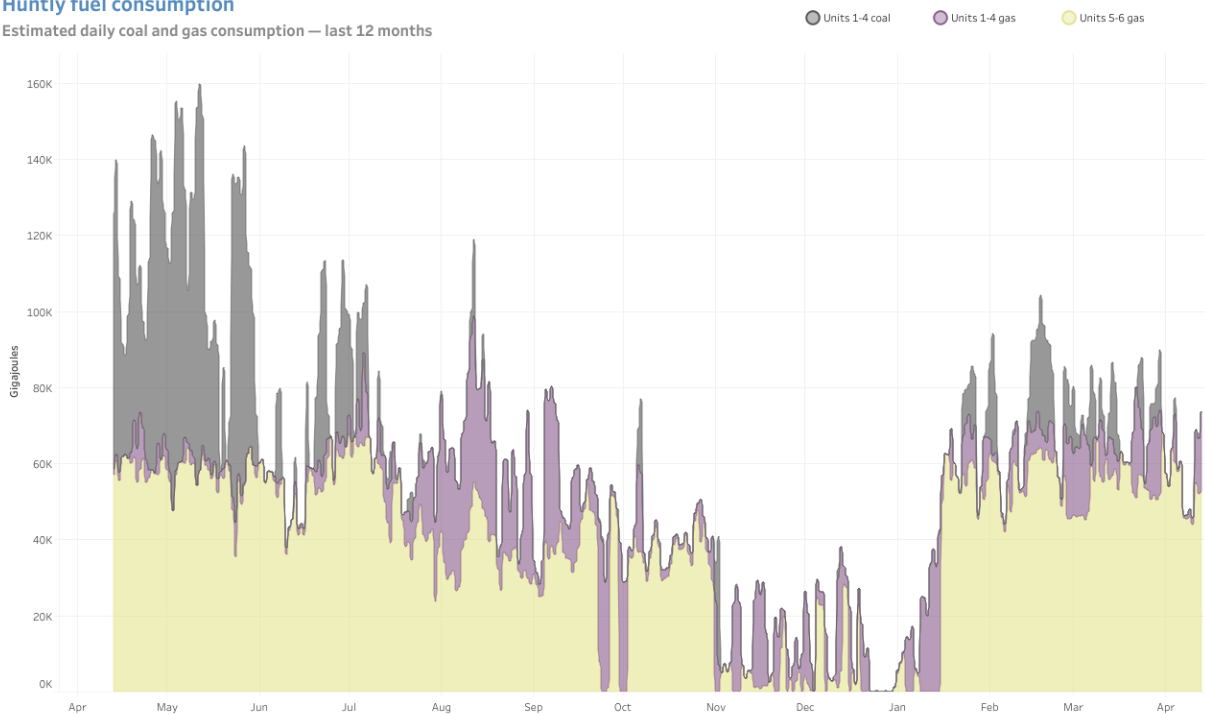


Figure 16: Huntly fuel consumption for the last 12 months

² <https://www.genesisenergy.co.nz/about/news/genesis-biomass-trial-successful>

7. Retail

7.1. In the first quarter of 2023, total ICPs increased by around 7600. Of the major retailers, only Mercury achieved a net gain of ICPs across the quarter, expanding its total market share. The other major retailers all lost ICPs as evident in Figure 17, with Meridian losing the largest share of its customers. While the major retailers still retain over 84% of market share, this is gradually declining as smaller retailers continue to pick up more ICPs. While not all small retailers gained customers, retailers such as Nova and 2degrees increased their market share.

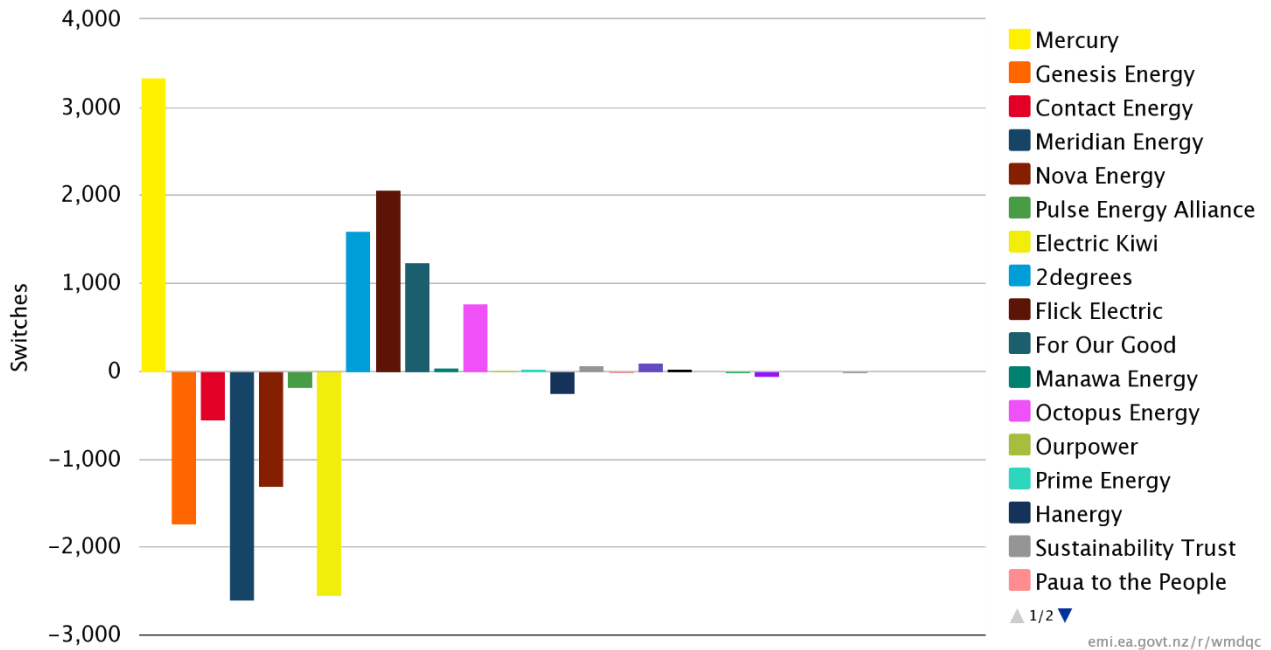


Figure 17: Electricity retailer net switching for January – Match 2023 from emi.ea.govt.nz/r/windqc

7.2. While annual trends of trader switching remain consistent in Figure 18, with declines in switching in the months of December and January, overall trader switches have not reached the levels seen pre-covid. Move-in switching, where new metering connections are added, rather than transferring from another retailer, has eased since the peak in July 2022 and the broader trend appears to be easing when compared to recent years.

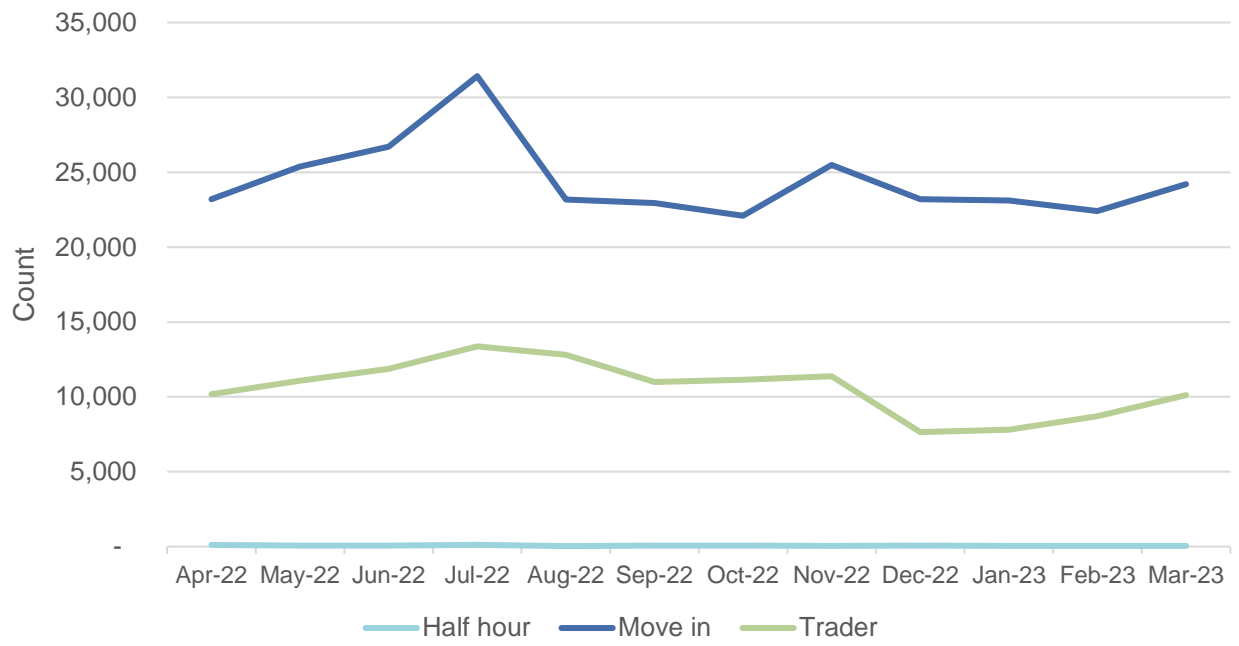


Figure 18: Breakdown of monthly ICP switching by type from emi.ea.govt.nz/r/14qr

8. Forward Market

8.1. Forward prices for the next two years (2023-2024) have eased notably since the last quarter, as shown in Figure 19. In particular, winter forward prices for 2023 have eased considerably as hydro storage levels have remained high. In addition to this, global fuel prices for gas and coal have eased considerably across the quarter, reducing the operational costs for thermal generation.

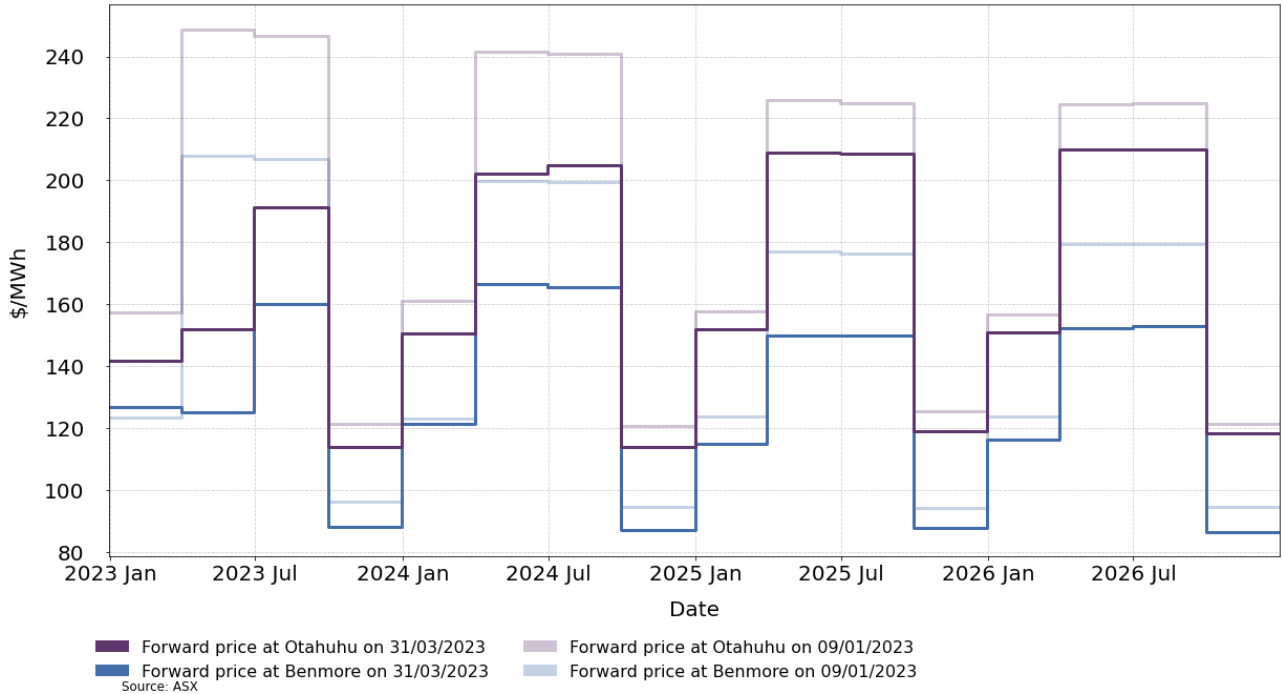


Figure 19: ASX forward prices for the start and finish of Q1 2023

8.2. One additional factor reducing the cost of production for thermal generators is the rapid decline in the net zero unit (NZU) price over the quarter. NZU prices peaked in December 2022 above \$88. As visible in Figure 20, at the end of the quarter, NZU prices had dropped to \$54, following the decision not to increase the NZU reserve price to the levels to the extent encouraged by the Climate Commission



Figure 20: NZU price from April 2022 to March 2023