ELECTRICITY AUTHORITY
TE MANA HIKO

Market performance Quarterly review

July – September 2024

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1. Purpose

1.1. This document is a quarterly review of the performance of New Zealand's energy market from 1 July to 30 September 2024. It aims to provide visibility of the Electricity Authority Te Mana Hiko's (Authority) monitoring of the energy market during this period.

1.2. This review seeks to assess whether spot electricity prices were reflective of the underlying energy supply and demand conditions faced by the sector for Q3 2024. It also analyses changes in the retail and forward market.

1.3. We want to provide visibility of previous market conditions, and of the Authority's market monitoring, to give the energy sector higher confidence that prices are being set in a competitive market. This reflects the expectations set out in paragraph 29 of the Government Policy Statement to the Electricity Authority (October 2024) that 'effective competition is essential for our electricity system to deliver reliable electricity at lowest possible cost to consumers'.

2. Highlights

2.1. Spot prices were high in July and August. The week of 4-10 August had the highest average weekly price of the past two decades at $825/MWh. This was largely due to low hydro storage, reduced gas supply and low wind. Prices fell in the second half of the quarter as hydro storage and gas availability increased.

2.2. National electricity demand was higher in July than the 2019-23 historic average, but lower in August and September. This reduction is partly due to the Tiwai Point smelter demand response.

2.3. Two customer advice notices (CAN) were issued by Transpower warning of possible low residual supply for 17-18 September. This was primarily due to a sharp drop in temperatures and an unexpected Huntly 5 trip.

2.4. Wind generation reached a record high with a daily average of 909MW on 19 September. The week of 18-24 August had the highest proportion of wind generation at 15.5%. This increase is due to two new wind farms Kaiwera Downs and Harapaki (completed in 2023 and 2024 respectively).

2.5. Thermal generation was 38% higher in July and 20% higher in August, compared to last year, due to low hydro storage. There was a 45% decrease in September compared to last year due to substantial hydro inflows.

2.6. National controlled hydro storage declined to 32% nominally full on 15 August then increased to mean by 12 September. Storage at the end of the quarter was 65% nominally full.

2.7. The daily volume-weighted average price (VWAP) for gas reached a high of $54/GJ on 14 August. On 13 August Methanex temporarily closed its New Zealand plants and resold its gas to generators. The spot gas price fell to $10/GJ as more gas became available.

2.8. Electric Kiwi, Pulse Energy Alliance and Nova Energy lost the largest number of electricity connections (ICPs) this quarter. Contact Energy, Meridian Energy and Genesis Energy gained the largest number of ICPs this quarter.

2.9. Retail electricity prices increased roughly equal to the rate of inflation (ie, in real terms). In nominal terms (ie, not adjusted for inflation). This equates to an extra $112 for electricity compared to one year ago for the average household.

2.10. Front end forward prices decreased over the quarter due to hydro inflows. May and September 2025 futures increased, which may be due to gas supply, demand response and capacity concerns. Long term futures remained relatively consistent.

2.11. The price of New Zealand carbon units (NZUs) increased over the quarter from $51/NZU to $65/NZU.

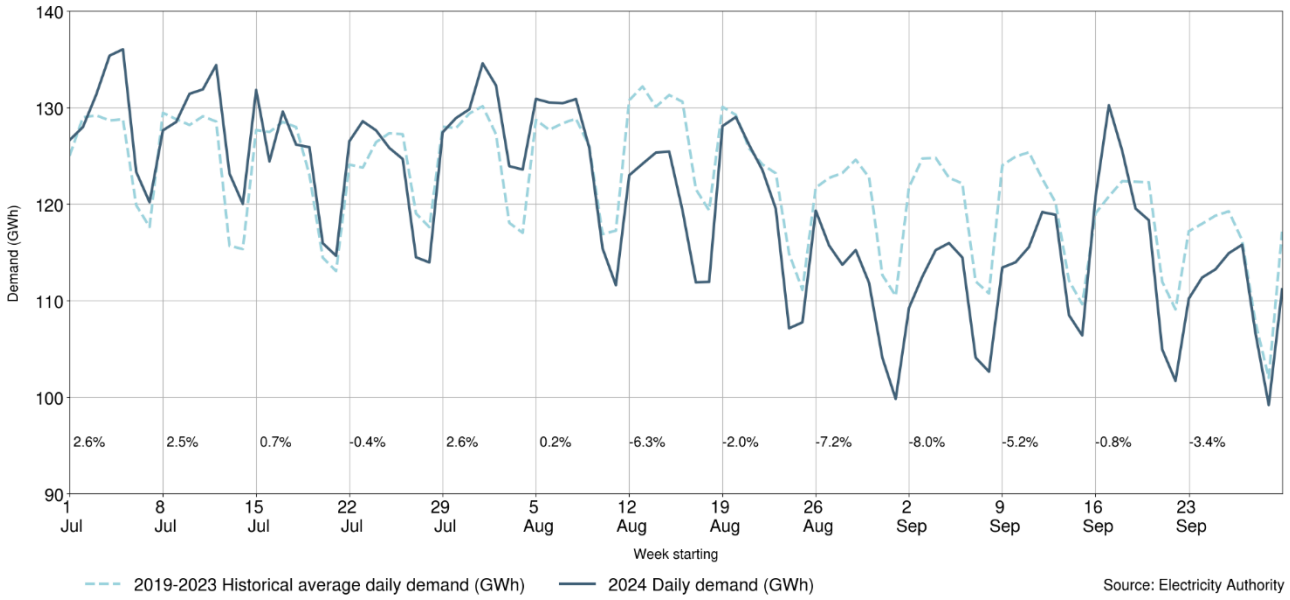
3. Electricity demand

Demand across the quarter

3.1. Figure 1 shows the total daily electricity demand in 2024 and the 2019-23 historic average demand between July and September.

3.2. National weekly demand increased by up to 2.6% in July compared to the historic average. Weekly demand in August and September was up to 8.0% lower than the historic average. This was partly due a reduction in electricity consumption by industrials such as Tiwai Point aluminium smelter. Temperatures were also largely above average for most of New Zealand in August and September.[1][2]

Figure 1: New Zealand daily demand compared to historical average, July to September 2024



3.3. Figure 2 shows the daily average apparent temperature across the three major population centres of New Zealand and the weekly historic average. There were several weeks in July and August with below average temperatures that contributed to higher demand, including a period in early August with particularly high prices. These periods of low temperatures, combined with limited availability of gas and low hydro storage, led to high electricity spot prices.

3.4. There was a severe drop in temperatures on 17 and 18 September. This led to an increase in daily electricity demand (Figure 3). Huntly 5 also tripped on the afternoon of 17 September. Two customer advice notices[3,4] (CAN) were issued by Transpower following Huntly 5 tripping. They warned of possible low residual supply on the evening of 17 September and the morning of 18 September. However, Huntly 5 was restarted in time for the peak period that evening.

[1] Climate Summary for August 2024 | NIWA
[2] Climate Summary for September 2024 | NIWA
[3] CAN Low Residual Situation 5632679884.pdf (transpower.co.nz)
[4] CAN Low Residual Situation 5632717094.pdf (transpower.co.nz)

Figure 2: Daily average apparent temperatures across Wellington, Auckland and Christchurch, July to September 2024

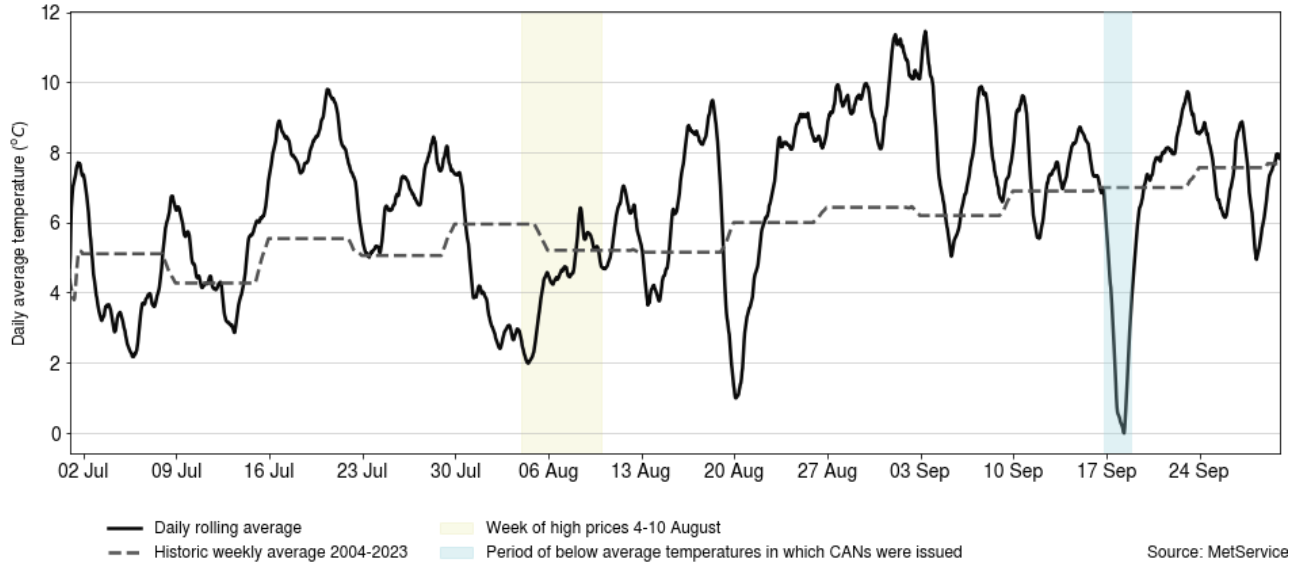
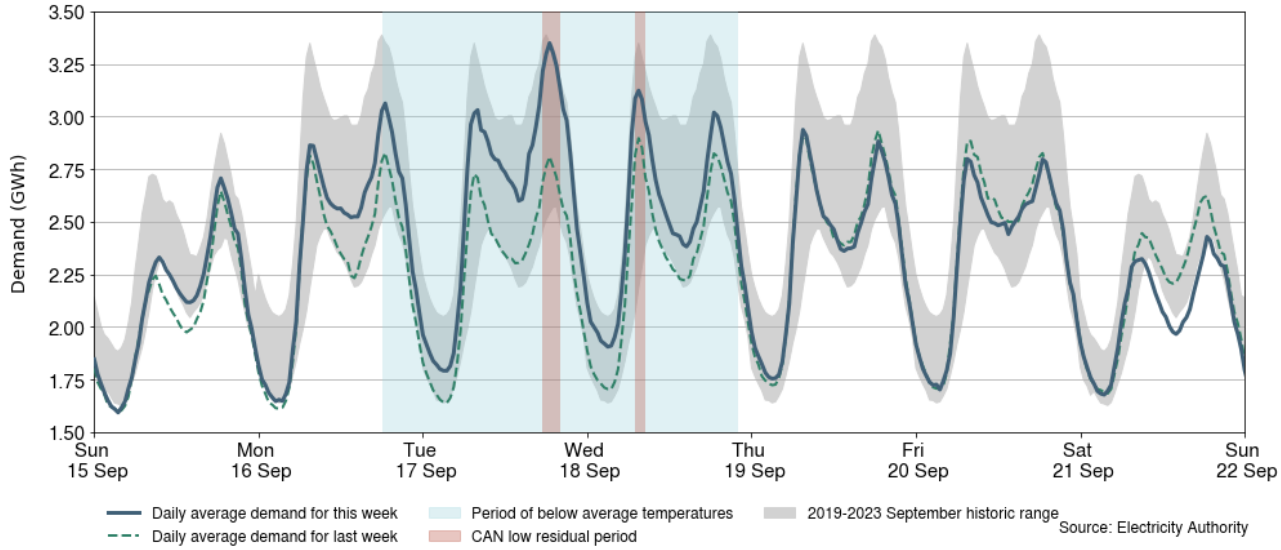


Figure 3: Daily average demand and historic range, 15-22 September 2024

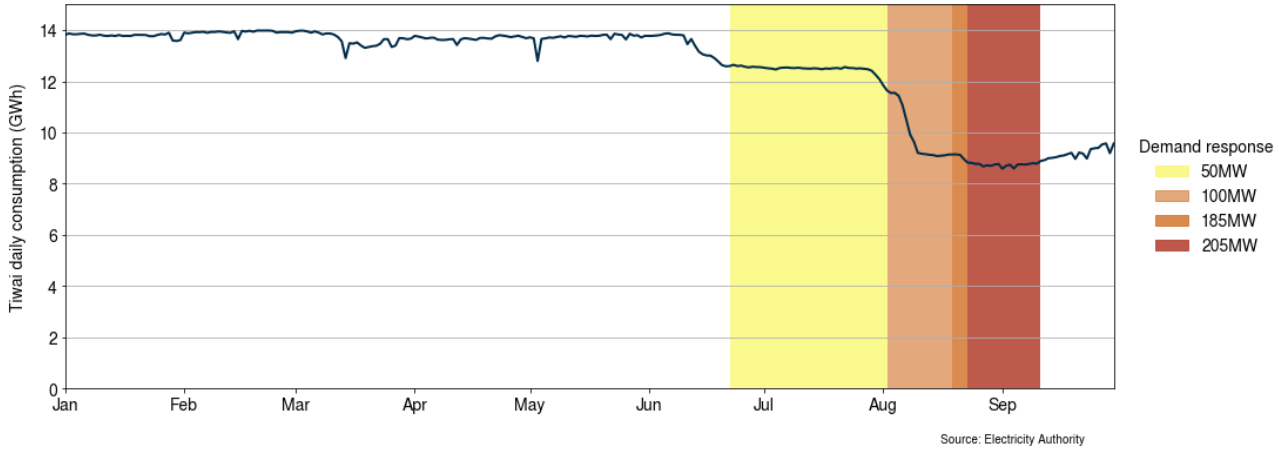


3.5. Due to limited gas and hydro storage in winter 2024, Meridian acted on a contractual agreement with the Tiwai Point aluminium smelter that called for Tiwai to reduce its electricity consumption. This agreement contained varying levels of demand response that specified how much consumption must reduce by.

3.6. Figure 4 shows the daily consumption at Tiwai with coloured bands to represent when the different levels of demand response were in effect. The highest level of demand response called this quarter, 205MW, was an additional negotiated level that was not part of the original contracted agreement.

3.7. At the end of the quarter, the reduced demand from Tiwai ended. The smelter is expected to be back to full output in mid-April 2025.

Figure 4: Tiwai daily consumption to show demand response, January to September 2024



4. Wholesale electricity price and consumption

4.1. Figure 5 shows the half hourly and daily national wholesale electricity spot prices between July and September 2024. The historic daily average between 2018-23 adjusted for inflation is also displayed. Figure 6 shows the weekly spot price distributions between July and September 2024.

4.2. The middle 50% of spot prices in Q3 2024 were between $90/MWh and $397/MWh.

4.3. The average wholesale spot price for Q3 2024 was $301/MWh. This is $40/MWh more than Q2 2024 and $177/MWh more than Q3 2023.

4.4. Spot prices were particularly high in July and August due to low hydro storage and limited gas supply. When wind generation was also low in the week of 4-10 August, and the spot price reached its highest weekly average since 2002, at $825/MWh.

4.5. The spot price reached its highest daily average since 2003 at $884/MWh on 7 August. The limited gas supply improved the following week and daily average prices fell back below $600/MWh.

4.6. At the end of August, hydro inflows began to substantially increase, leading to daily average prices below or close to the historic average for most of September. The exception was in mid-September when temperatures were low and the average daily spot price rose to $295/MWh on 17 September.

Figure 5: Half hourly, daily and daily historic average wholesale electricity prices, July to September 2024

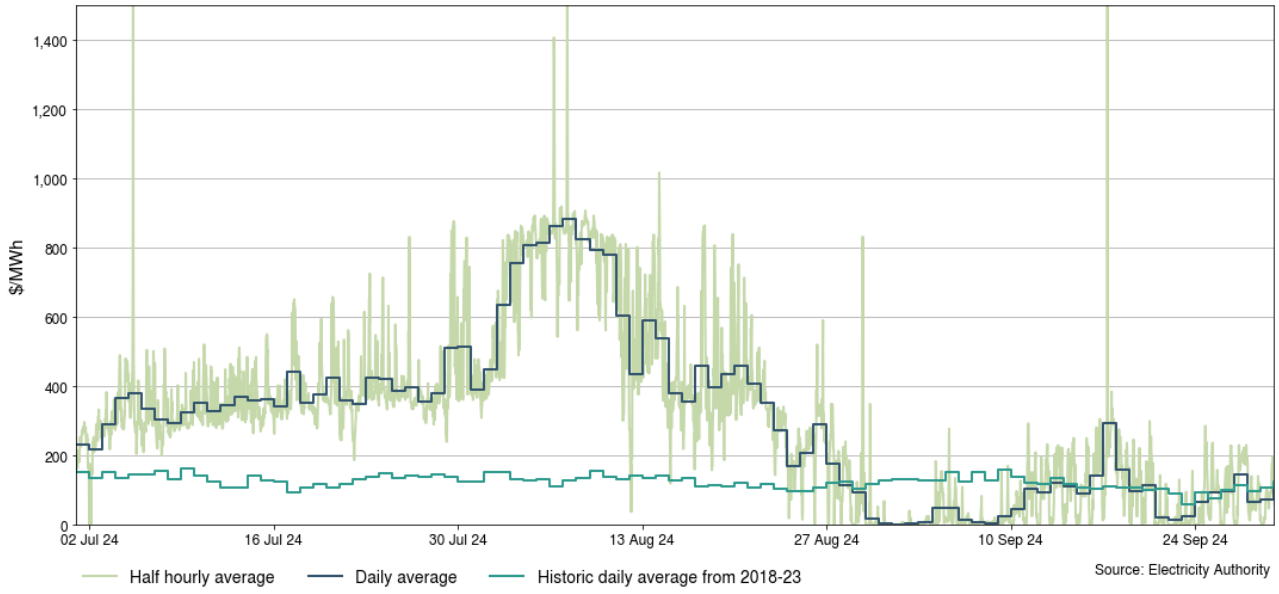
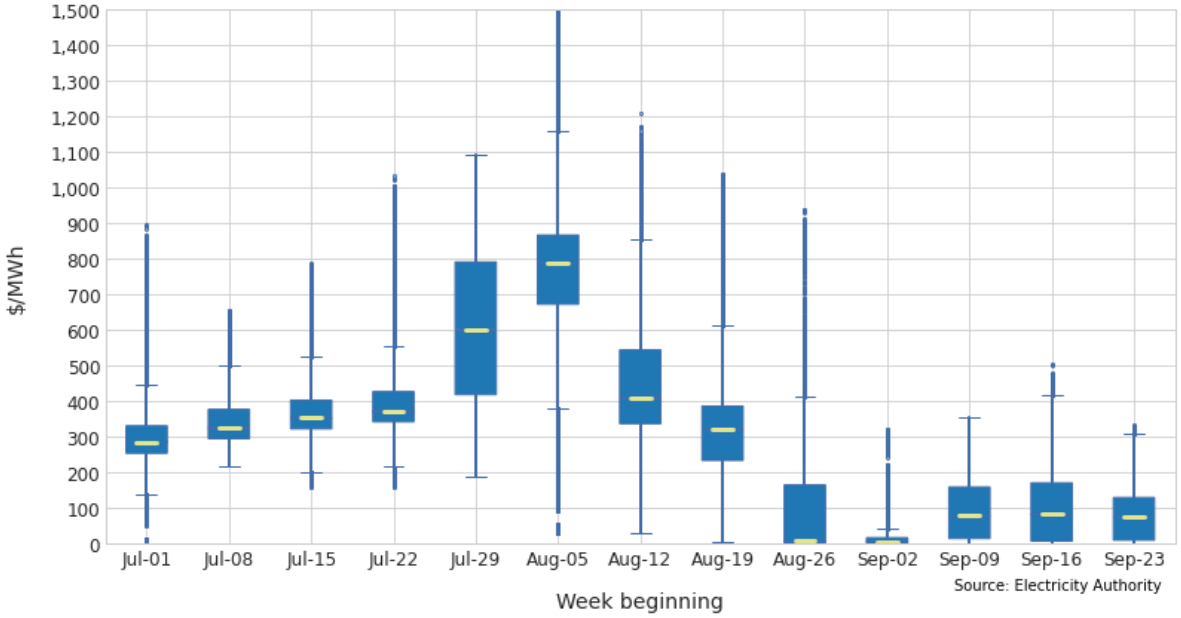


Figure 6: Box plot distributions of weekly spot prices, July to September 2024



Generation composition's influence on price

4.7. While instantaneous demand is one of the key drivers of wholesale prices, the average wholesale market price is affected by a broad range of factors. The source of electricity generation plays a role in price, as different sources have different prices and generation characteristics.

4.8. The effects of the factors are visible at different time scales:

- Wind and demand have the most impact on half-hourly prices as these elements change the most quickly.
- Thermal generation is typically on for hours or days at a time and affects daily average prices.
- Hydro storage levels take days or weeks to change significantly so they can affect prices for weeks or months.

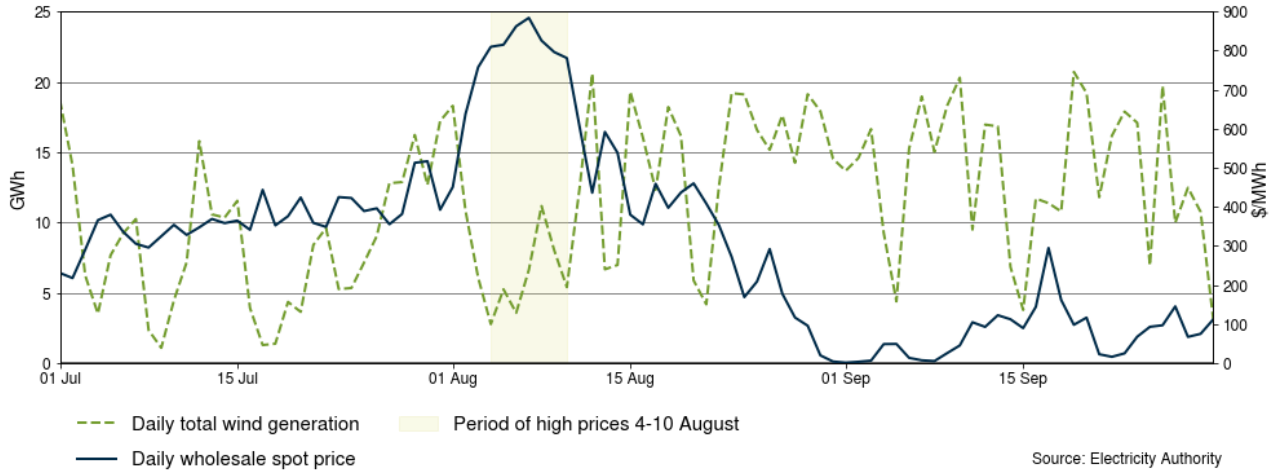
4.9. Figure 7 shows the daily total wind generation and daily average national spot prices between July and September. Wind generation typically has an inverse relationship with average wholesale price. Since wind generation has no fuel costs, when the wind is blowing generators have no reason not to offer all their wind generation into the market. With these low operating costs, it can offer a lot of generation at low prices, which displaces more expensive generation.

4.10. The relationship between wind generation and spot price is evident this quarter. For example, during the period of particularly high prices in early August, wind generation was often below 300MW. However, hydro storage and gas availability had an even greater effect on prices this quarter. These factors, combined with periods of low wind, led to the highest daily average spot prices since 2003.

4.11. There were also some weeks with high wind generation, which depressed prices in September.

4.12. Several wind generation records were achieved this quarter. The highest daily average wind generation in New Zealand to date was 909MW on 19 September. The next six highest daily averages were achieved in August and September. This is due to new wind farms, like Kaiwera Downs and Harapaki (completed in November 2023 and July 2024 respectively), that have increased New Zealand's wind generation.

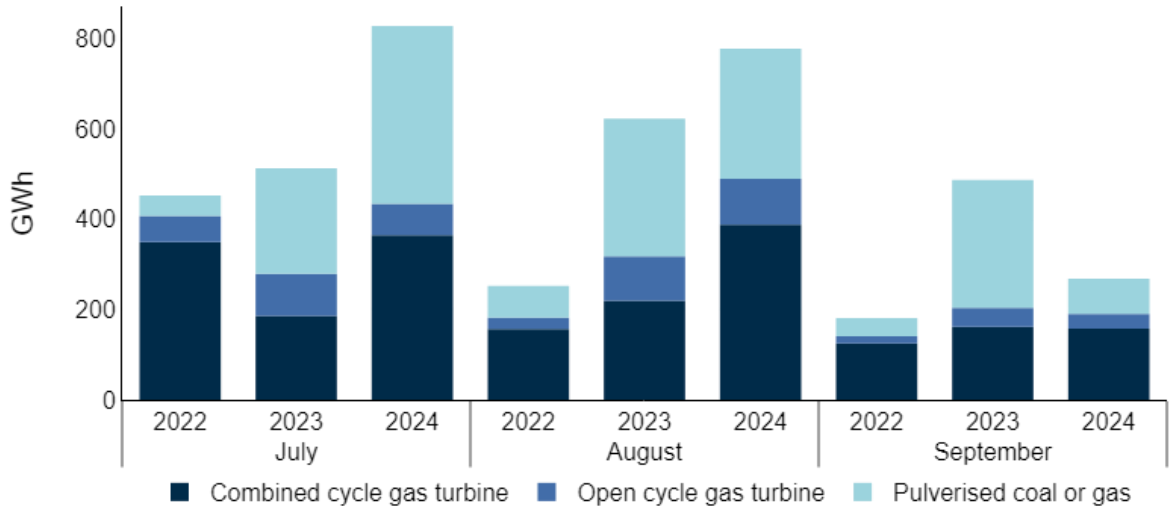
Figure 7: Daily wind generation and average wholesale price, July to September 2024



4.13. Figure 8 shows the total thermal generation by type and month in Q3 for the past three years. Due to low hydro storage and periods of low wind in July and August, more thermal generation was required. There was a 38% increase in thermal generation in July compared to last year, and a 20% increase in August.

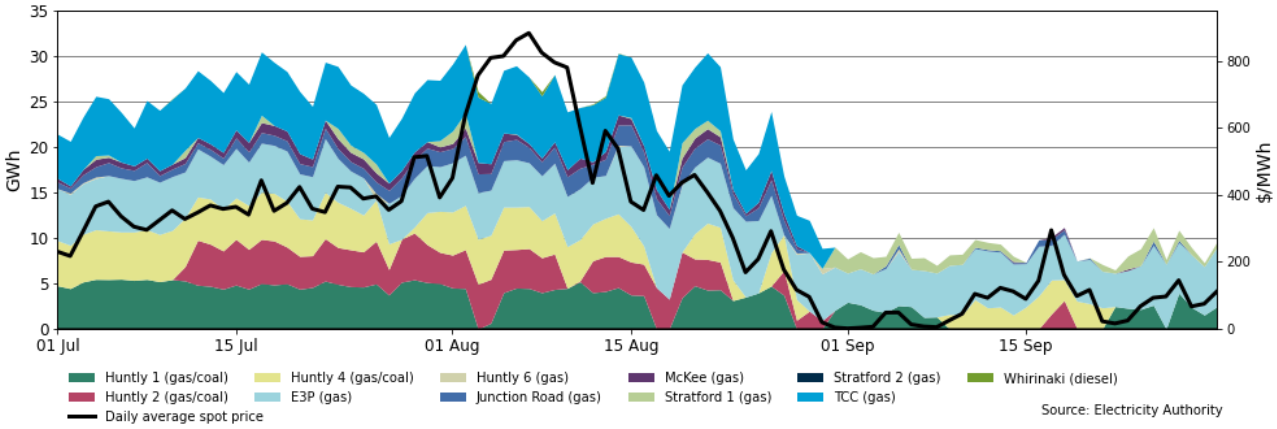
4.14. When hydro storage significantly increased in September, thermal generation decreased by 45% compared to the previous year. Overall, there was a 13% increase in thermal generation in this quarter compared to the same quarter last year, a total of 1,877GWh of generation.

Figure 8: Monthly total thermal generation, Q3 2022-24



4.15. Figure 9 shows the daily total thermal generation and daily average spot price between July and September 2024. Long periods of increased thermal generation in July and August contributed to high prices in those months. Several thermal generators, such as TCC (Taranaki Combined Cycle) and Junction Road, were turned off or used sparingly in September during substantial hydro inflows. The three Rankine units (Huntly 1, 2, and 4) ran frequently in July and August, but then decreased activity in September. E3P (Huntly 5) ran continuously the entire quarter

Figure 9: Daily total thermal generation and average wholesale price, July to September 2024

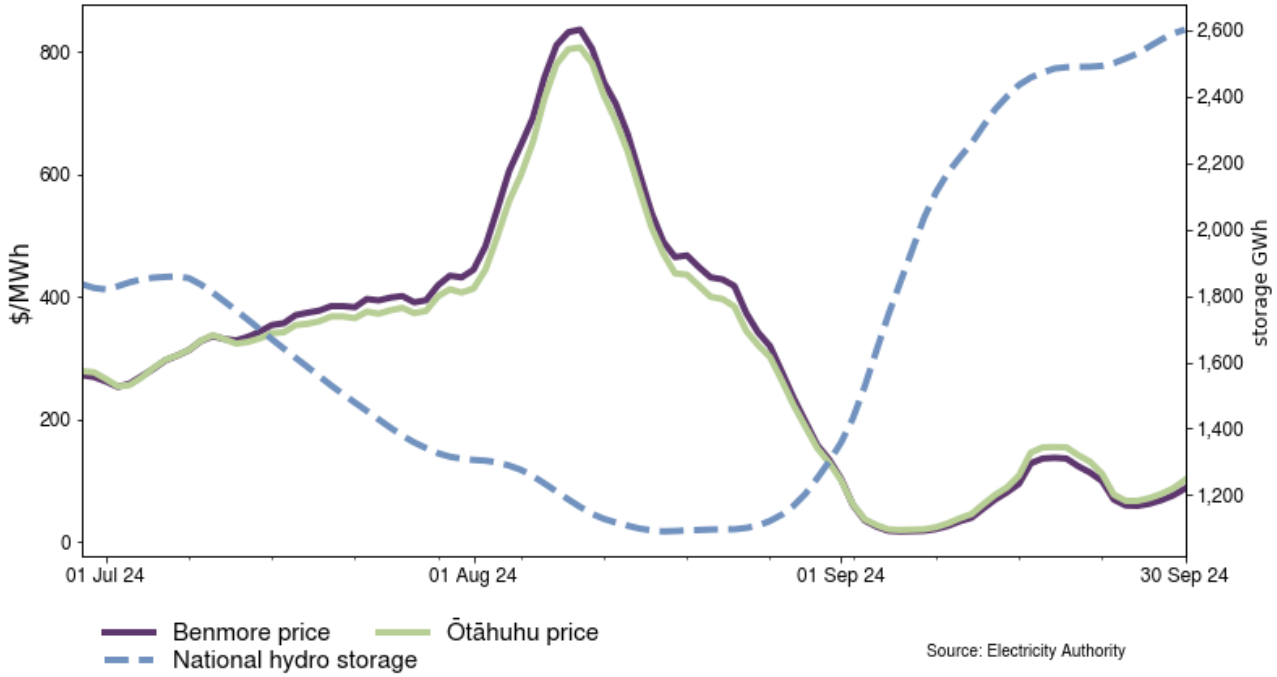


4.16. Figure 10 shows the rolling seven-day average wholesale prices at Benmore and Ōtāhuhu and the daily national hydro storage.

4.17. The amount of hydro energy in storage is the final element that affects wholesale electricity prices. High amounts of hydro storage keep prices lower, while low storage levels typically correlate with higher prices. This is not always clear on a day-to-day basis, but is easier to see over a rolling average, as in Figure 10.

4.18. This quarter, the relationship between hydro storage and wholesale spot prices was very pronounced. Declining hydro storage throughout July and August led to higher average spot prices, while significant inflows in September allowed prices to decrease. Record low hydro storage in early August led to long periods of very high prices when other types of generation were also limited.

Figure 10: Rolling seven-day average of wholesale price versus hydro storage, July to September 2024



Generation by fuel type

4.19. Figure 11 shows the weekly breakdown of electricity generation by fuel type. The proportion of hydro generation was frequently under 50% in July and August when hydro storage was low. The proportion of hydro generation increased in September when hydro storage increased.

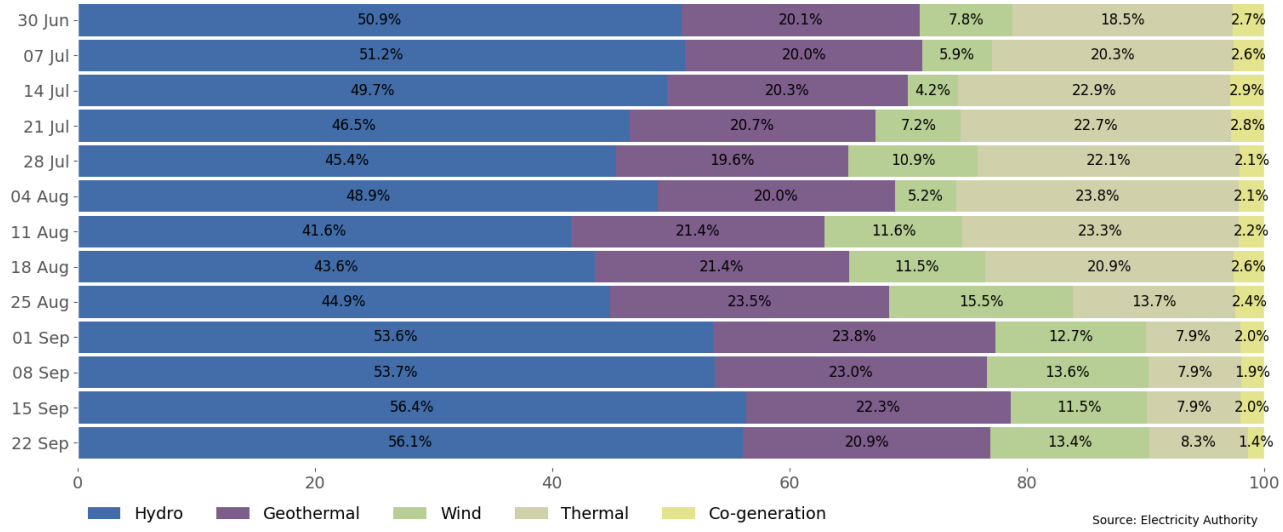
4.20. Geothermal provides baseload generation and is generally consistent. There was an increase in the proportion of geothermal generation in September. This was due to Tauhara (a new geothermal station completed in May) being on partial outage in July and some of August, then operating closer to full capacity for the end of August and most of September.

4.21. As discussed in 4.11, this quarter saw several days of record wind generation. The week of 25-31 August saw the highest proportion of wind generation so far at 15.5%.

4.22. The inverse relationship between renewable and thermal generation can be seen in Figure 11. When wind or hydro generation is low, thermal generation generally increases to compensate. In July and August, the weekly proportion of thermal generation was higher due to lower hydro generation.

4.23. Gas availability was also limited for much of this quarter, so in weeks with low wind, such as the week starting 4 August, high priced hydro still had to be dispatched. This led to higher proportions of hydro generation and record high weekly average spot prices. The proportion of thermal generation was lowest when wind and hydro generation were high in September.

Figure 11: Weekly generation share by fuel type, July to September 2024



5. Water storage levels

National hydro storage levels

5.1. Figure 12 shows the national hydro storage levels from January 2023 and September 2024.

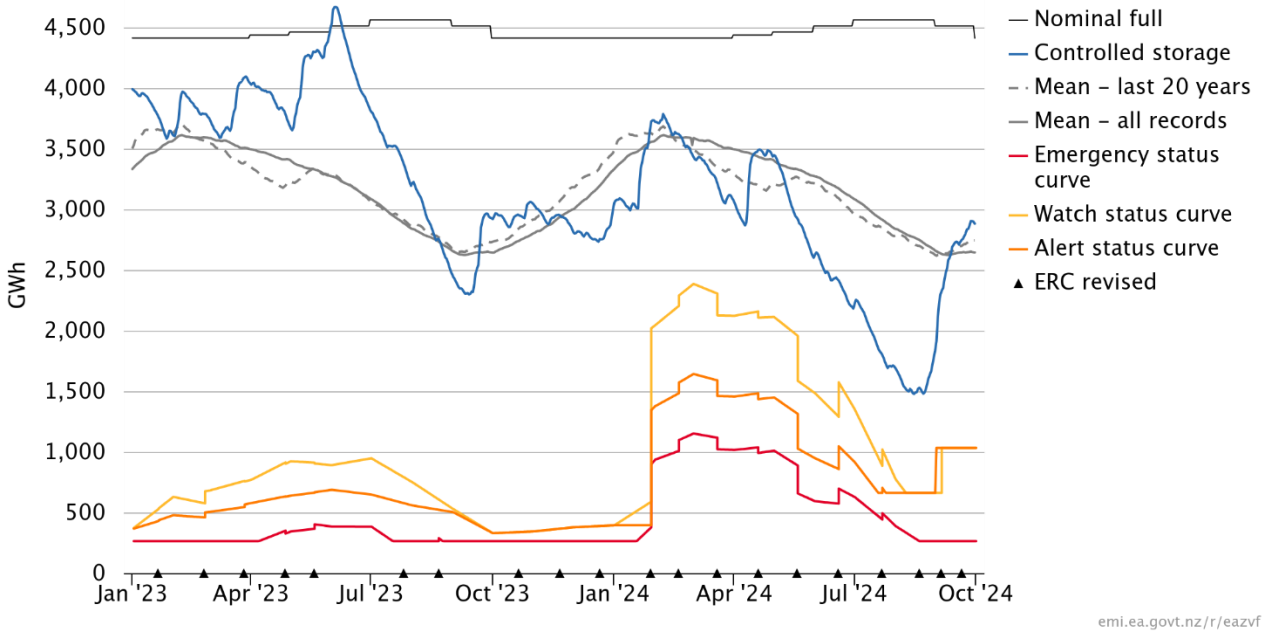
5.2. This quarter saw significant changes in hydro storage with declines to a record low of ~53% of the historic average and 32% nominally full on 15 August and a return to the historic mean on 12 September. At the end of September, hydro storage was ~109% of the historic average and 65% nominally full.

5.3. On 22 August, due to low hydro storage, Transpower announced it would temporarily add a new buffer to raise the contingent storage boundary and make it easier for hydro generators to access contingent storage, if necessary[5]. The alert curves were increased in September

[5] Managing security of supply risks 2024 | Transpower

and October. However, inflows in September prevented the need for contingent storage access this quarter.

Figure 12: National hydro storage levels, January 2023 to September 2024



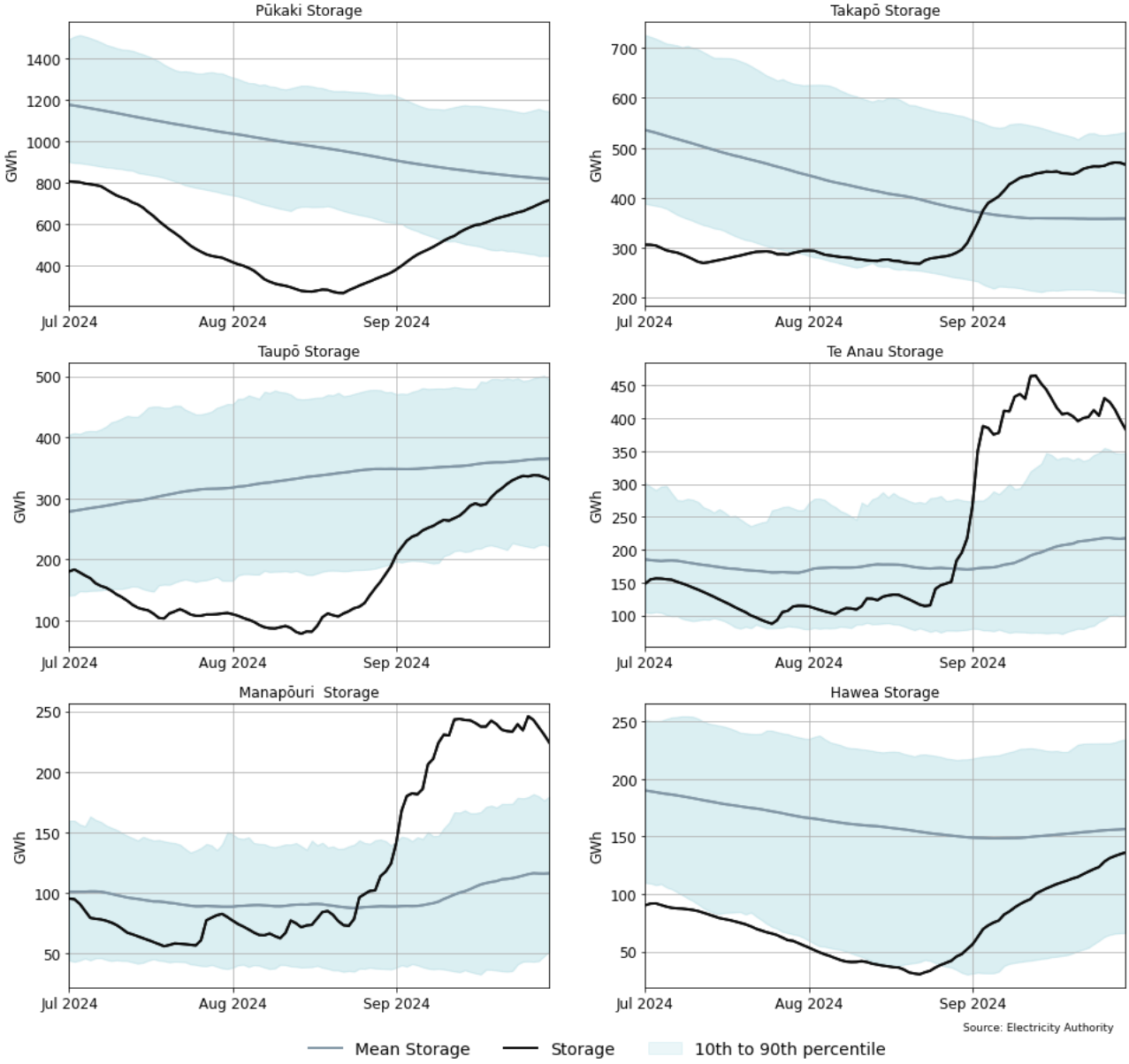
Lake storage levels

5.4. Figure 13 shows individual lake levels for July to September 2024 and the difference location can have on hydro inflows.

5.5. In July and August, Pūkaki, Takapō, Taupō and Hawea usually had storage levels below or close to their historic 10th percentiles. All these lakes received substantial inflows in September and ended the quarter close to or above their historic means.

5.6. Manapōuri and Te Anau remained above their 10th percentiles but under their historic means for the majority of July and August. They also received large inflows in September, staying above their historic 90th percentiles for the entire month.

Figure 13: Lake storage levels for July to September 2024 versus historical average and 10th and 90th percentiles



6. Wholesale gas prices, production and consumption

Gas prices

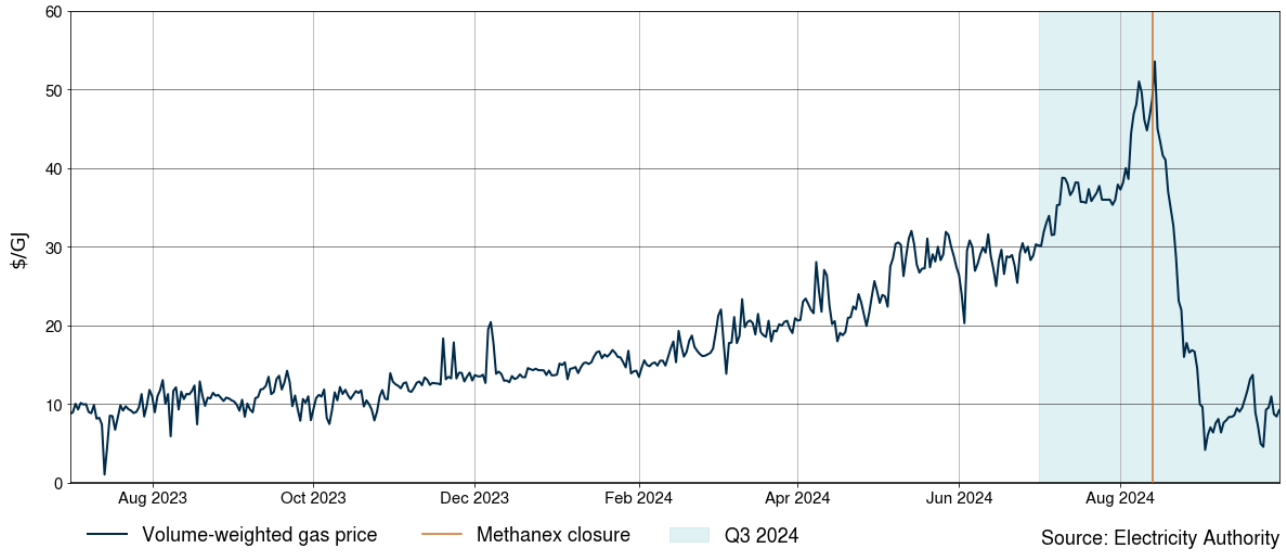
6.1. Figure 14 shows the daily volume-weighted average gas price for July 2023 to September 2024.

6.2. The average daily volume-weighted average price (VWAP) for gas in Q3 2024 was $27/GJ. This is fairly consistent compared to the previous quarter's average of $26/GJ. However, it is significantly higher than the gas price of the same quarter last year ($10/GJ). This is largely due to the decreased gas production this year coupled with higher demand for gas due to declining hydro storage.

6.3. Due to limited gas supply, significant increases in gas price can be seen in the first half of this quarter, reaching a high of $54/GJ on 14 August. These high gas prices drove up the cost of thermal generation and contributed to the record high weekly average wholesale electricity price seen in August. On 13 August, Methanex temporarily closed all its

New Zealand plants until the end of October so it could resell its gas to generators.[6] There was a noticeable drop in wholesale electricity prices following this announcement. The gas price also started falling substantially to below $10/GJ as more gas became available.

Figure 14: Daily volume-weighted average price for gas, July 2023 to September 2024

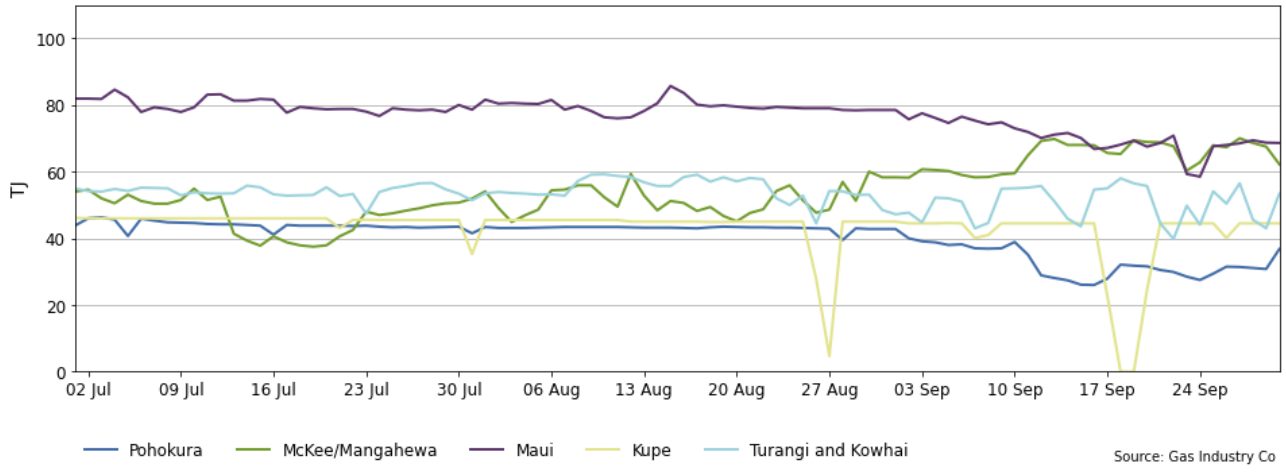


Gas production

6.4. Figure 15 shows daily gas production at major fields between July to September 2024.

6.5. Total gas production at major fields ranged from 224-283TJ/day this quarter, with an average of 267TJ/day. This is a decrease of 14TJ/day compared to the average last quarter. Kupe experienced two unplanned outages from 26-28 August and 17-20 September that halted production.[7]

Figure 15: New Zealand gas production, July to September 2024



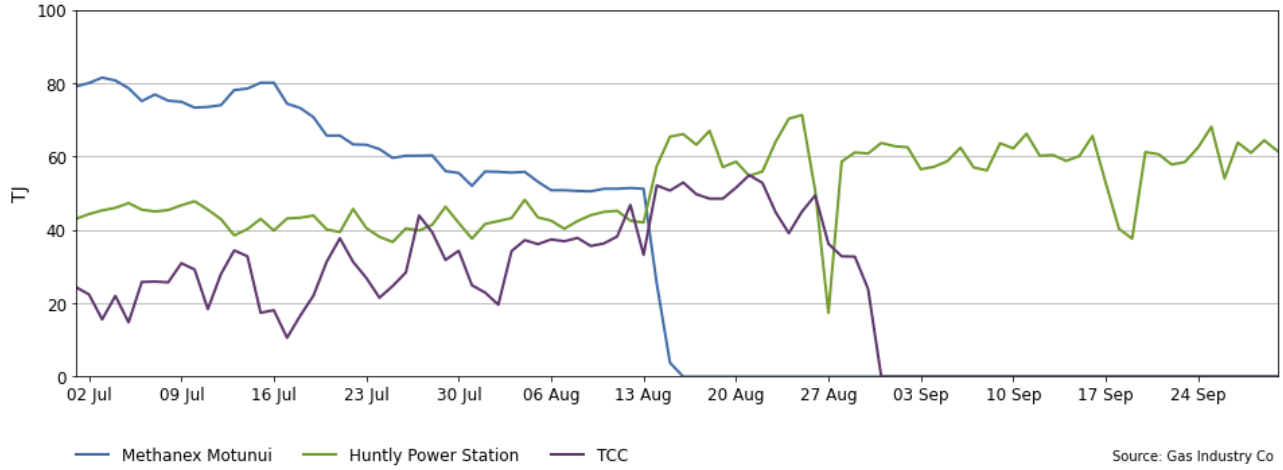
[6] Methanex Corporation to Temporarily Idle New Zealand Operations to Assist in Improving Energy Balances - Methanex | Methanex

[7] Home · Outage Disclosure (gasindustry.co.nz)

Gas consumption

6.6. Figure 16 shows the daily gas consumption by major users between July to September 2024.

Figure 16: New Zealand gas consumption, July to September 2024

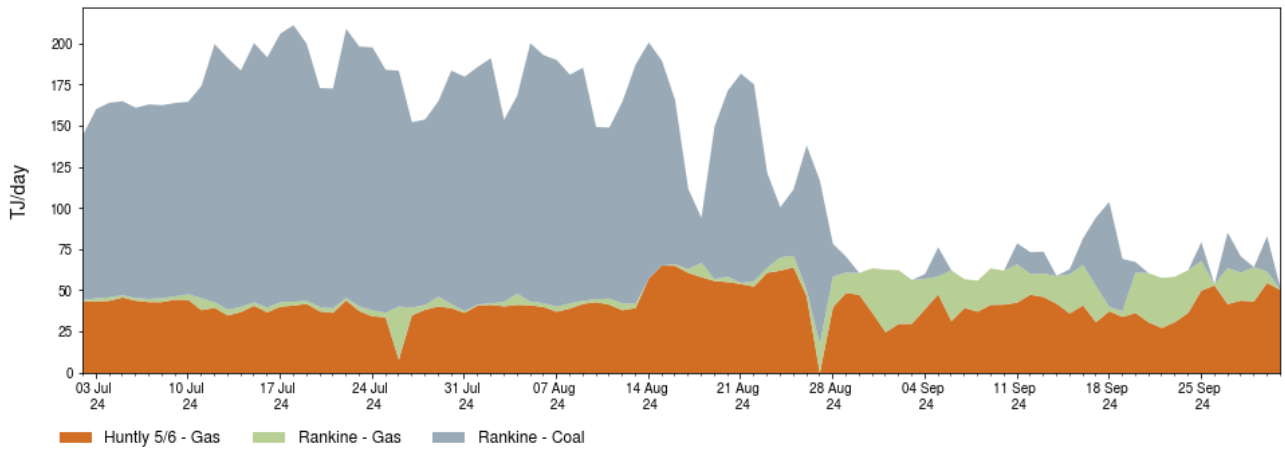


6.7. Total gas consumption by major users ranged from 38-153TJ/day, with an average of 104TJ/day. This is a decrease of 38TJ/day from last quarter's average.

6.8. Methanex (New Zealand's largest gas user) shut down on 13 August and TCC turned off on 30 August. Huntly's gas consumption dipped sharply from 26-28 August and 17-20 September when Kupe experienced unplanned outages.

6.9. Figure 17 shows the estimated daily total fuel consumption across all Huntly units between July and September 2024.

Figure 17: Estimated Huntly fuel consumption, July to September 2024



6.10. Due to gas shortages, the Huntly's Rankine units ran almost entirely on coal in July and August, as per the previous quarter. In September gas started being used more after gas prices fell. Fuel consumption at Huntly was high in July and August, then lower in September, in line with changes in hydro storage and thermal generation.

7. Retail electricity

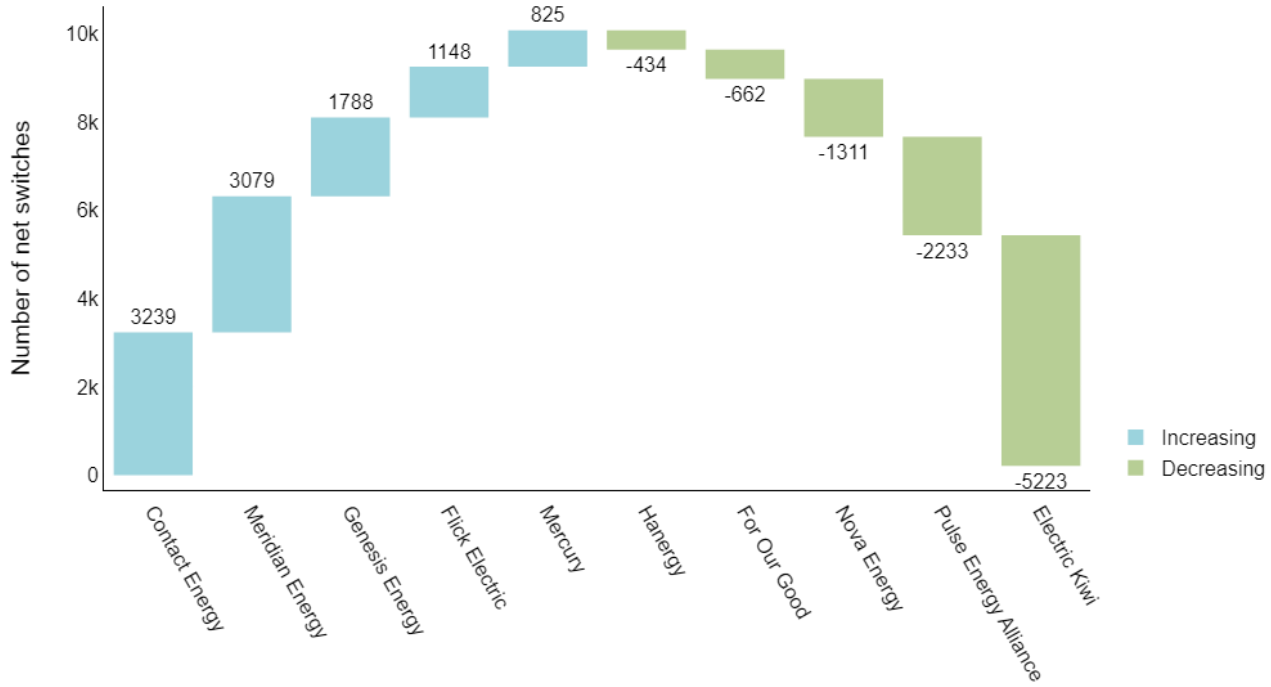
Retailer switching

7.1. Figure 18 shows the top 5 retailers who gained and the bottom 5 retailers who lost the most electricity connections (ICPs) between July and September 2024.

7.2. Contact Energy experienced the greatest net gain in ICPs at 3,239 net switches. Meridian Energy was a close second at 3,079 net switches. Flick Electric continued to gain market share for the sixth quarter in a row, with a net gain of 1,148 ICPs this quarter.

7.3. Electric Kiwi experienced the greatest net loss in ICPs by a significant margin, losing 5,223 over the quarter.

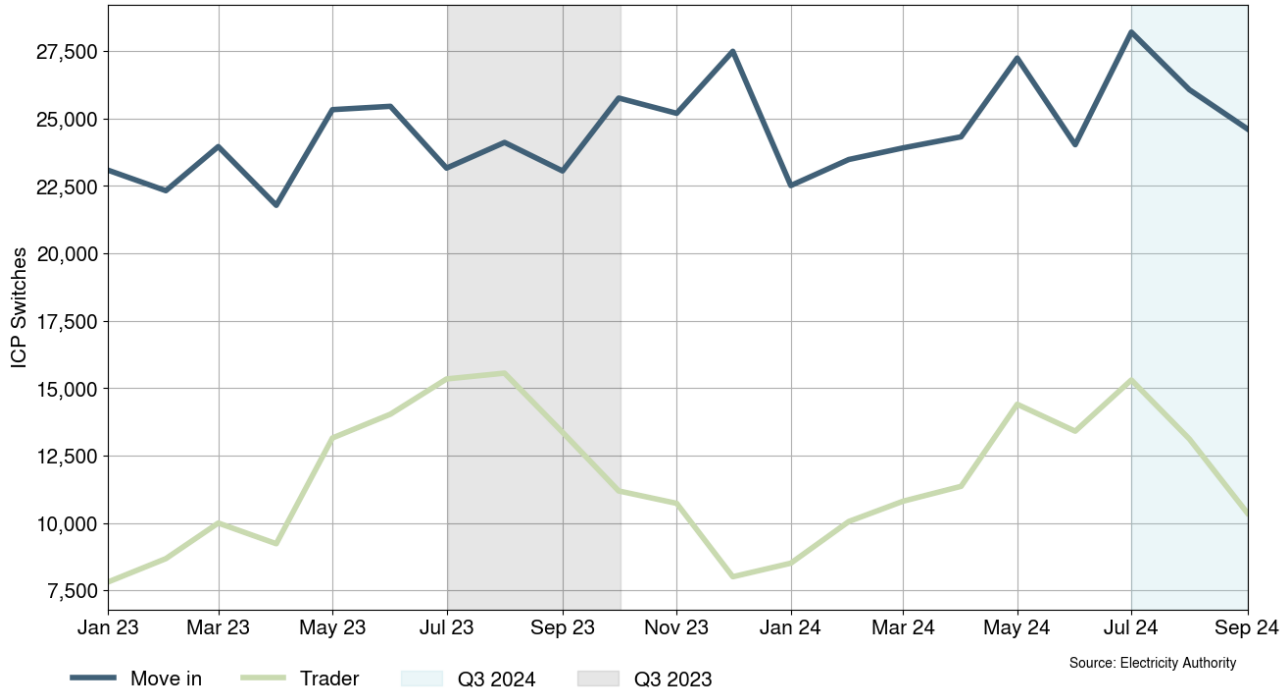
Figure 18: Top 5 increases and bottom 5 decreases in ICP net switching by retailer, July to September 2024



7.4. Figure 19 shows the number of ICPs that changed electricity suppliers between January 2023 and September 2024 categorised by ‘move in’ and ‘trader’ type. Move in switches (at an ICP) are switches where the customer does not have an electricity provider contract with a trader. In contrast, trader switches are switches where the customer does have an existing contract with a trader, and the customer obtains a new contract with a different trader.

7.5. In Q3 2024, move in and trader switching rates both increased in July then decreased in August and September. This is different from the same quarter last year, when trader switching rates decreased in July and both switching rates increased in August.

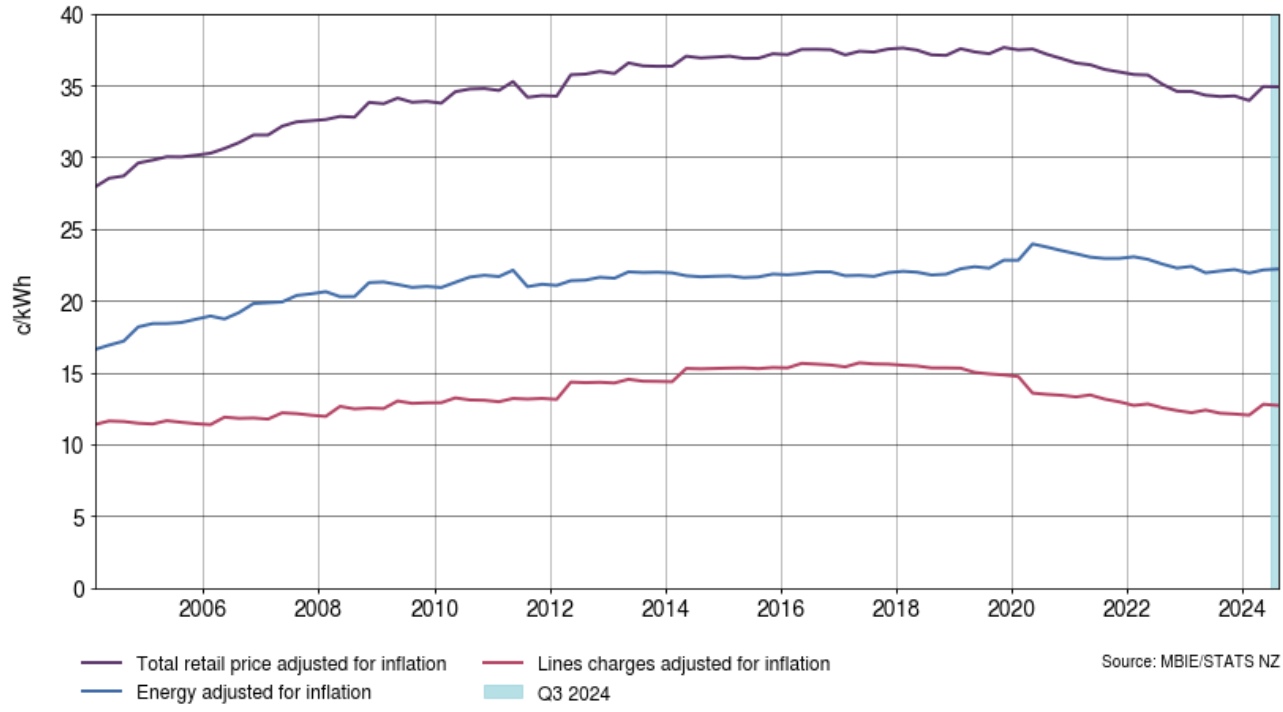
Figure 19: Breakdown of monthly ICP switching by type, January 2023 and September 2024



Retail prices

7.6. Figure 20 shows the domestic electricity price by component (QSDEP) adjusted for inflation from 2004-24. Energy retail prices increased roughly equal to the rate of inflation this quarter.

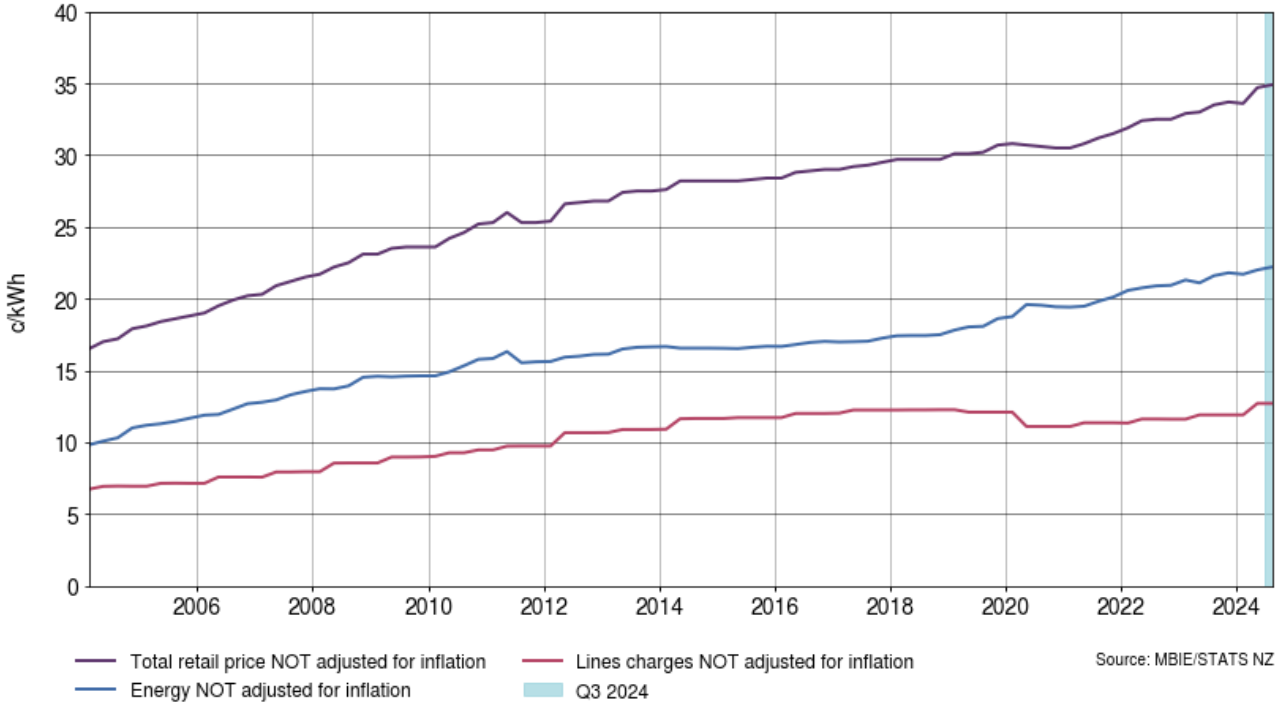
Figure 20: Domestic electricity prices by component adjusted for inflation (base Q3 2024 CPI), 2004-24



7.7. Figure 21 shows the domestic electricity prices by component without adjusting for inflation. In the last 12 months, nominal values rose by 4.2%. For a typical household using

8,000kWh annually, this equates to an extra $112 per year on their electricity bill compared to one year ago.

Figure 21: Domestic electricity prices by component without inflation adjustment, 2004-24



8. Forward market and carbon pricing

Forward pricing

8.1. Figure 22 shows the quarterly forward prices up to 2027, with the first snapshot (dashed lines) at the beginning of July 2024 and second snapshot at the end of September 2024 (solid lines).

8.2. This quarter, near term forward prices decreased, likely due to the substantial hydro inflows throughout September.

8.3. Short term forward prices, particularly May and September 2025 futures, increased significantly. This may be related to concerns surrounding:

(a) declining gas production

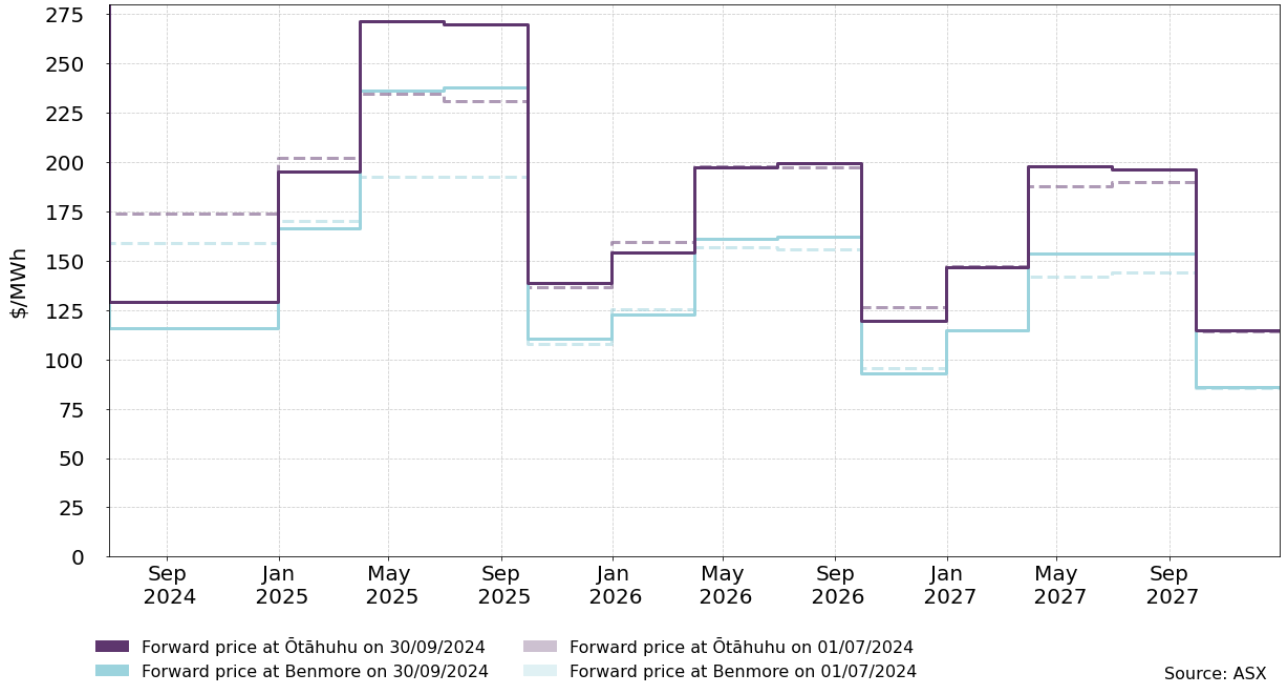
(b) the gas reallocation agreement between Methanex and generators ending from November 2024

(c) the TCC thermal generator, which has a capacity of 385MW, was signalled to be retired next year.

(d) and the two largest Tiwai demand responses, 100MW and 185MW, being unavailable.

8.4. Long term forward prices remained relatively consistent.

Figure 22: ASX forward prices for the start and finish of Q3 2024



Carbon pricing

8.5. Figure 23 shows the New Zealand carbon unit price between July 2023 and September 2024 as recorded by the European Capital Markets Institute.

8.6. The average daily volume-weighted average price (VWAP) for a carbon unit in Q3 2024 was $55/NZU. It increased over the quarter from $51/NZU at the beginning of the July to $65/NZU at the end of September. Carbon prices increased most rapidly in the second half of August while gas prices were dropping. The increase in price may be due to a higher demand for lower priced credits after the Government passed the industrial allocation bill in August 2023, which will decrease the amount of 'free credits' given to certain industries at the start of 2025.

Figure 23: New Zealand Units price, July 2023 to September 2024