

28 October 2024

Trading conduct report 20-26 October 2024

Market monitoring weekly report

Trading conduct report 20-26 October 2024

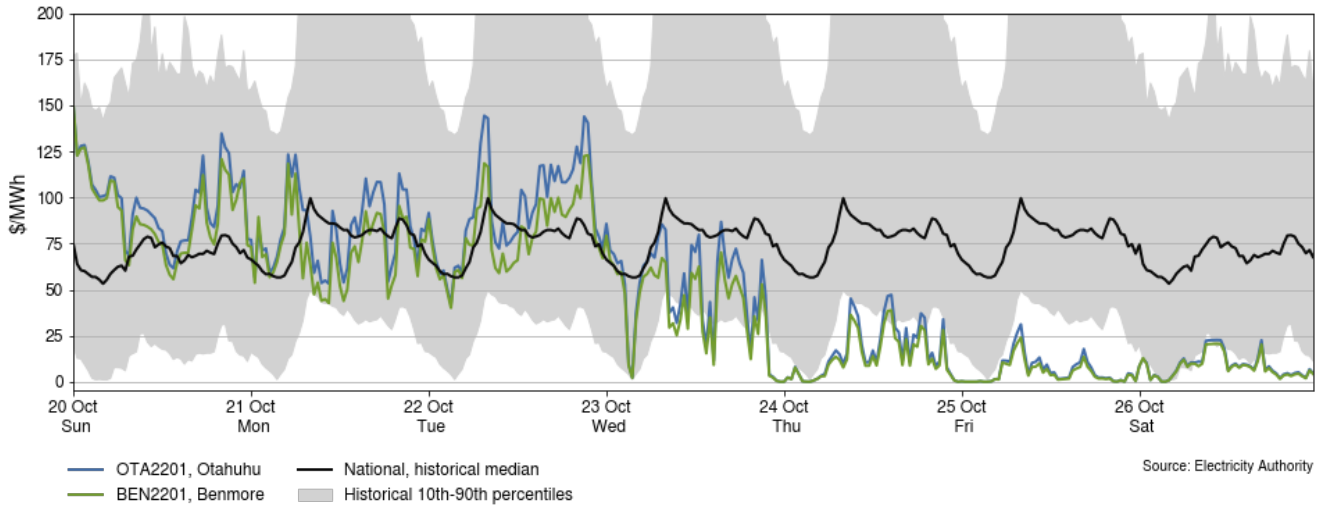
1. Overview

- 1.1. Spot prices were lower this week, particularly in the latter part of the week when wind generation increased. Thermal generation was still around 8% of weekly generation, with Huntly 5 the only slow start thermal running as baseload this week. There was some continuous generation from Stratford 1 in the first half of the week supporting baseload generation. Stratford 2 has also returned from outage, running during a couple of trading periods on Saturday afternoon. Hydro storage increased again this week, with controlled storage at ~118% of mean as of 26 October.

2. Spot prices

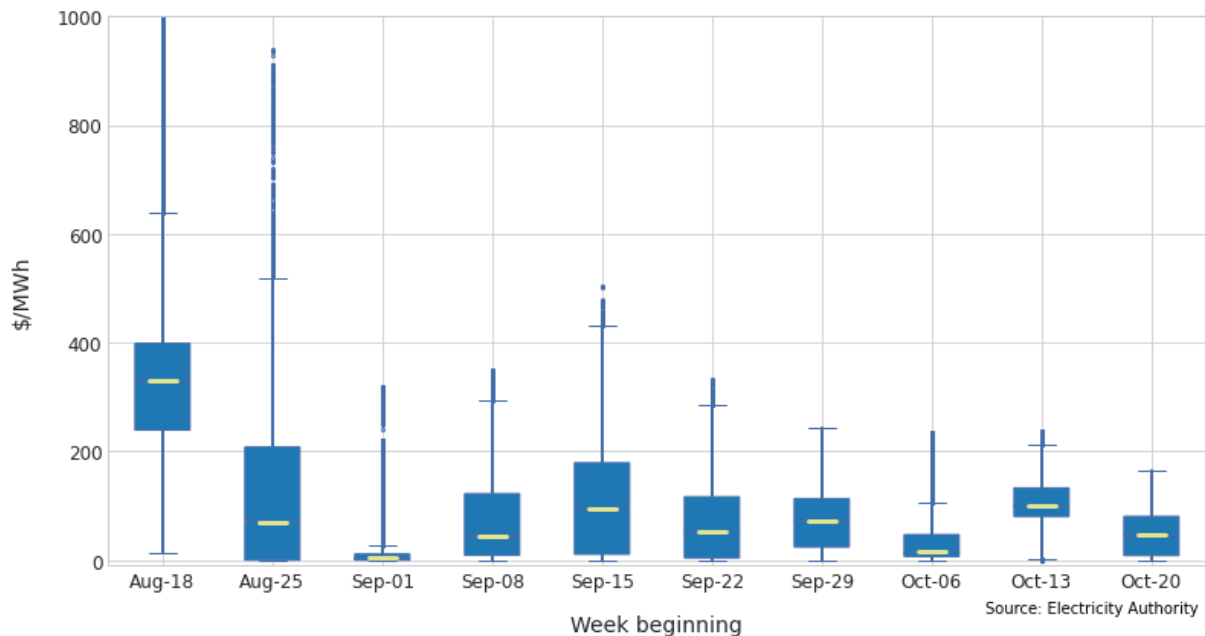
- 2.1. This report monitors underlying wholesale price drivers to assess whether trading periods require further analysis to identify potential non-compliance with the trading conduct rule. In addition to general monitoring, it also singles out unusually high-priced individual trading periods for further analysis by identifying when wholesale electricity spot prices are outliers compared to historic prices for the same time of year.
- 2.2. Between 20-26 October 2024:
 - (a) the average wholesale spot price across all nodes was \$48/MWh.
 - (b) 95% of prices fell between \$0.02/MWh and \$124/MWh.
- 2.3. Most spot prices were below \$100/MWh, meaning the weekly average price decreased by around \$58/MWh compared to the previous week. Maximum price at Ōtāhuhu and Benmore was ~\$149/MWh at midnight on Sunday.
- 2.4. Between Sunday and Tuesday prices were close to or above the historic median. From Wednesday morning onwards prices were mostly below \$75/MWh and dropped further to below \$50/MWh from late Wednesday evening. The latter part of the week saw prices below the historic 10th percentile region. A combination of lower demand and higher wind generation have influenced prices this week.
- 2.5. Figure 1 shows the wholesale spot prices at Benmore and Ōtāhuhu alongside the national historic median and historic 10-90th percentiles adjusted for inflation. Prices greater than quartile 3 (75th percentile) plus 1.5 times the inter-quartile range of historic prices, plus the difference between this week's median and the historic median, are highlighted with a vertical black line. Other notable prices are marked with black dashed lines.

Figure 1: Wholesale spot prices at Benmore and Ōtāhuhu, 20-26 October 2024



- 2.6. Figure 2 shows a box plot with the distribution of spot prices during this week and the previous nine weeks. The yellow line shows each week’s median price, while the blue box shows the lower and upper quartiles (where 50% of prices fell). The ‘whiskers’ extend to points that lie within 1.5 times of the interquartile range (IQR) of the lower and upper quartile. Observations that fall outside this range are displayed independently.
- 2.7. The distribution of prices remains small. There was a shift in the distribution this week, as around 75% of prices were lower than the middle 50% of last week’s prices. Most prices were within \$8-\$81/MWh.

Figure 2: Box plot showing the distribution of spot prices this week and the previous nine weeks

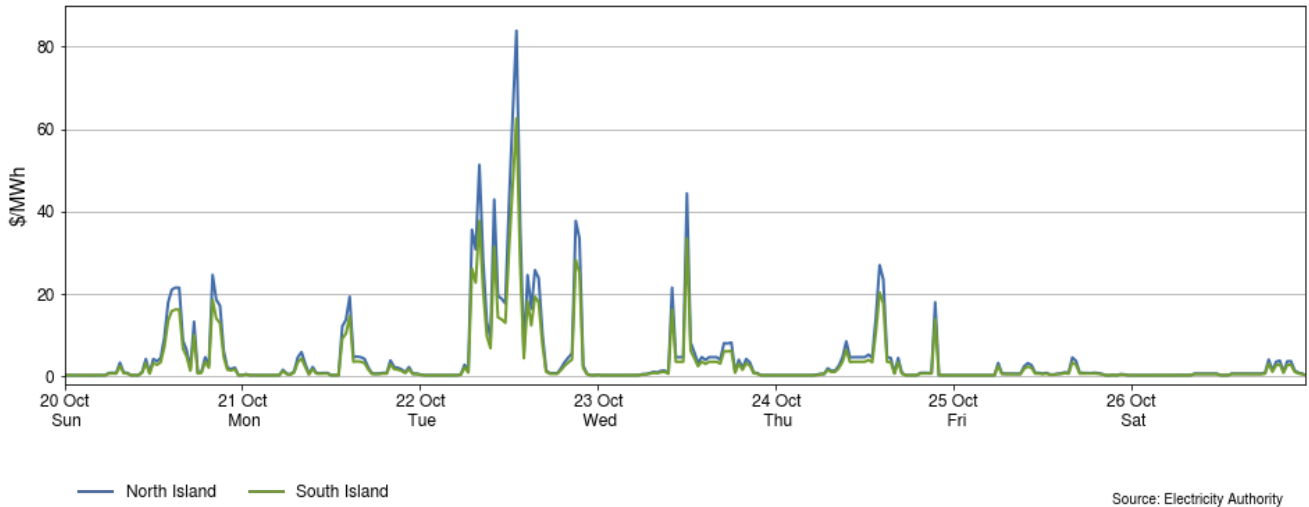


3. Reserve prices

- 3.1. Fast instantaneous reserve (FIR) prices for the North and South Islands are shown below in Figure 3. FIR prices were mostly under \$10/MWh although there were a few spikes across the week. The highest spikes occurred on Tuesday afternoon when FIR prices reached

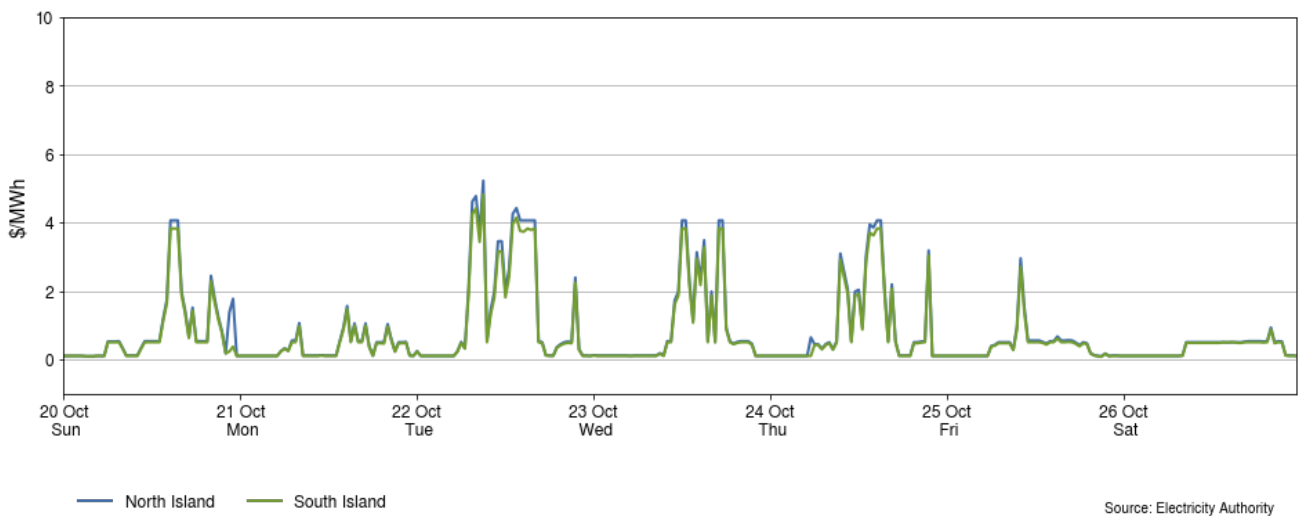
between ~\$62-\$84/MWh. This was mainly due to volume and cost of reserve available to cover the risk and is in line with spikes in spot prices at these same times.

Figure 3: Fast instantaneous reserve price by trading period and island, 20-26 October 2024



3.2. Sustained instantaneous reserve (SIR) prices for the North and South Islands are shown in Figure 4. SIR prices were mostly below \$5/MWh.

Figure 4: Sustained instantaneous reserve by trading period and island, 20-26 October 2024

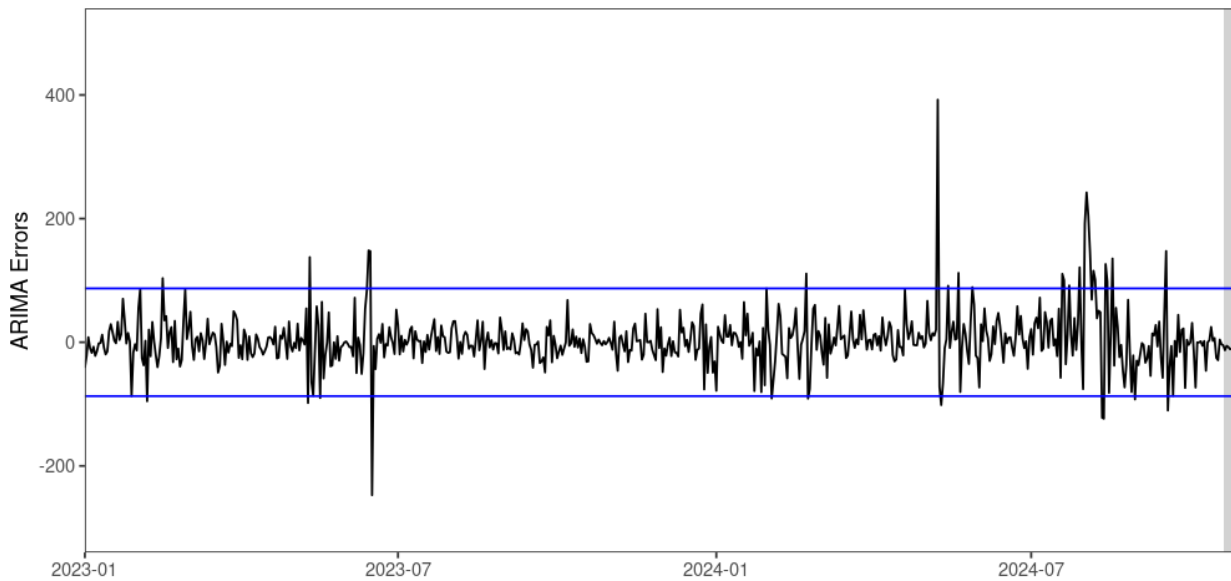


4. Regression residuals

- 4.1. The Authority’s monitoring team uses a regression model to model electricity spot prices. The residuals show how close predicted spot prices were to actual prices. Large residuals may indicate that prices do not reflect underlying supply and demand conditions. Details on the regression model and residuals can be found in [Appendix A](#).
- 4.2. Figure 5 shows the residuals of autoregressive moving average (ARMA) errors from the daily model. Positive residuals indicate that the modelled daily price is lower than the actual average daily price and vice versa. When residuals are small this indicates that average daily prices are likely largely aligned with market conditions. These small deviations reflect market variations that may not be controlled in the regression analysis.

4.3. This week all residual values were small and within two standard deviations of the data meaning the modelled prices were close to actual prices.

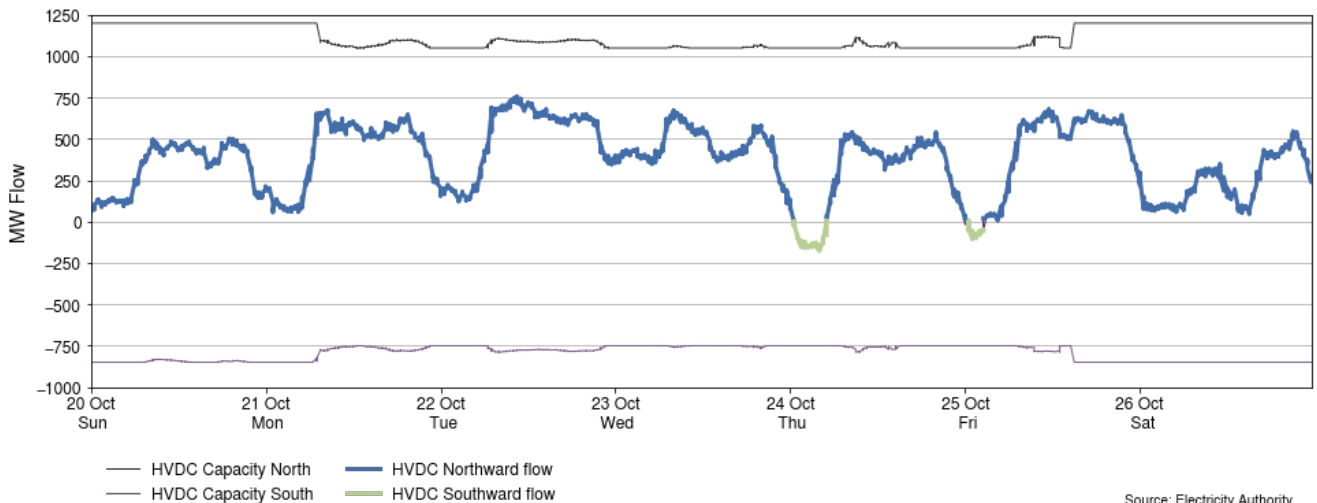
Figure 5: Residual plot of estimated daily average spot prices, 1 January 2023 - 26 October 2024



5. HVDC

5.1. Figure 6 shows the HVDC flow between 20-26 October 2024. HVDC flows were mainly northwards. There was some southward flow overnight in the second half of the week when wind generation was high.

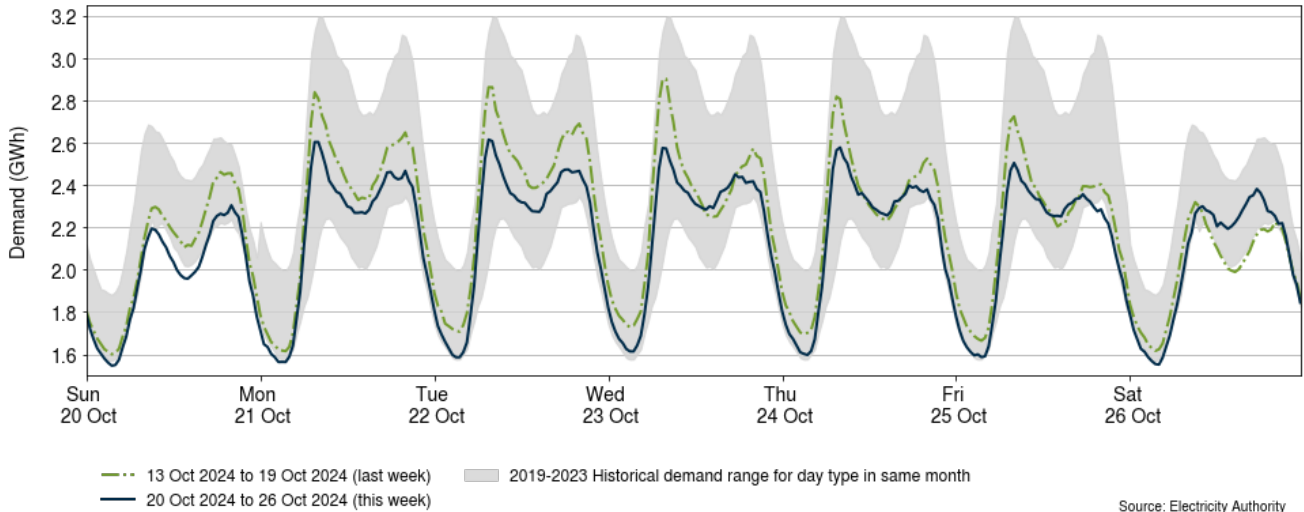
Figure 6: HVDC flow and capacity, 20-26 October 2024



6. Demand

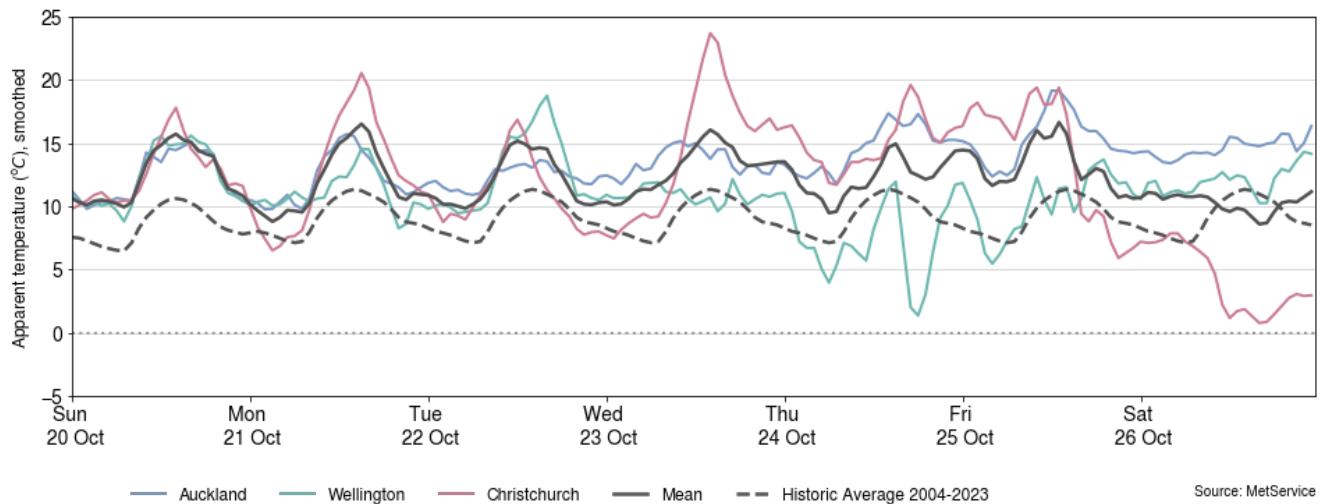
6.1. Figure 7 shows national demand between 20-26 October 2024, compared to the historic range and the demand of the previous week. Milder temperatures saw demand decrease compared to the previous week, sitting close to the lower boundary of the historic range. Over morning peak periods during the week, demand was ~2.6GWh.

Figure 7: National demand, 20-26 October 2024 compared to the previous week



- 6.2. Temperatures were mostly at or above average this week across all main centres. Wellington temperatures were cooler on Thursday when morning and evening temperatures dropped below 5°C. Christchurch saw the highest temperature this week of ~24°C on Wednesday and mainly saw temperatures in double digits until Saturday.
- 6.3. Figure 8 shows the hourly apparent temperature at main population centres from 20-26 October 2024. The apparent temperature is an adjustment of the recorded temperature that accounts for factors like wind speed and humidity to estimate how cold it feels. Also included for reference is the mean temperature of the main population centres, and the mean historical apparent temperature of similar weeks, from previous years, averaged across the three main population centres.
- 6.4. Temperatures were mostly at or above average this week across all main centres. Wellington temperatures were cooler on Thursday when morning and evening temperatures dropped below 5°C. Christchurch saw the highest temperature this week of ~24°C on Wednesday and mainly saw temperatures in double digits until Saturday.

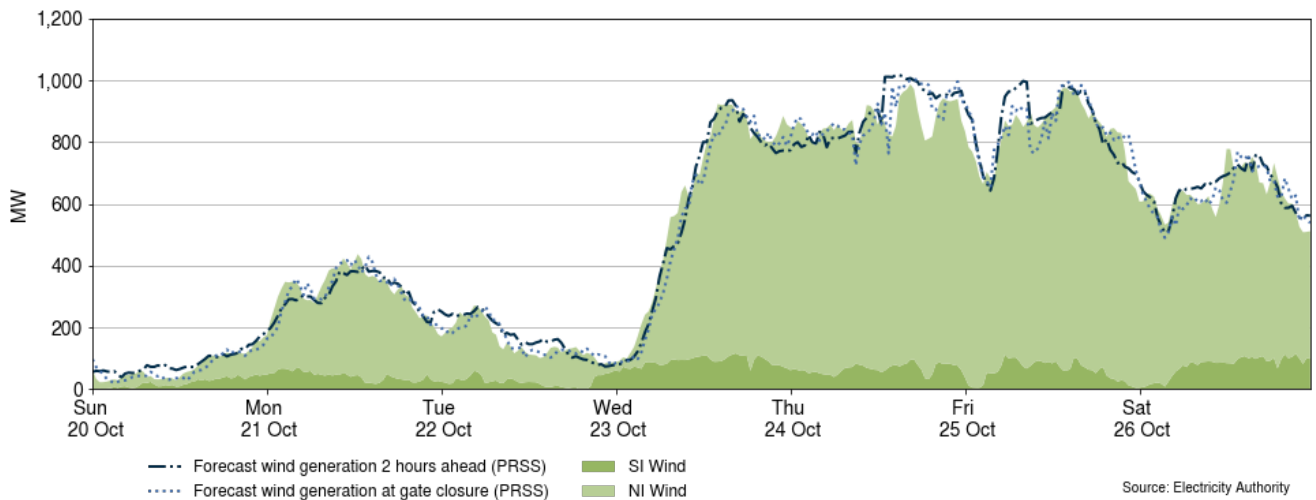
Figure 8: Temperatures across main centres, 20-26 October 2024



7. Generation

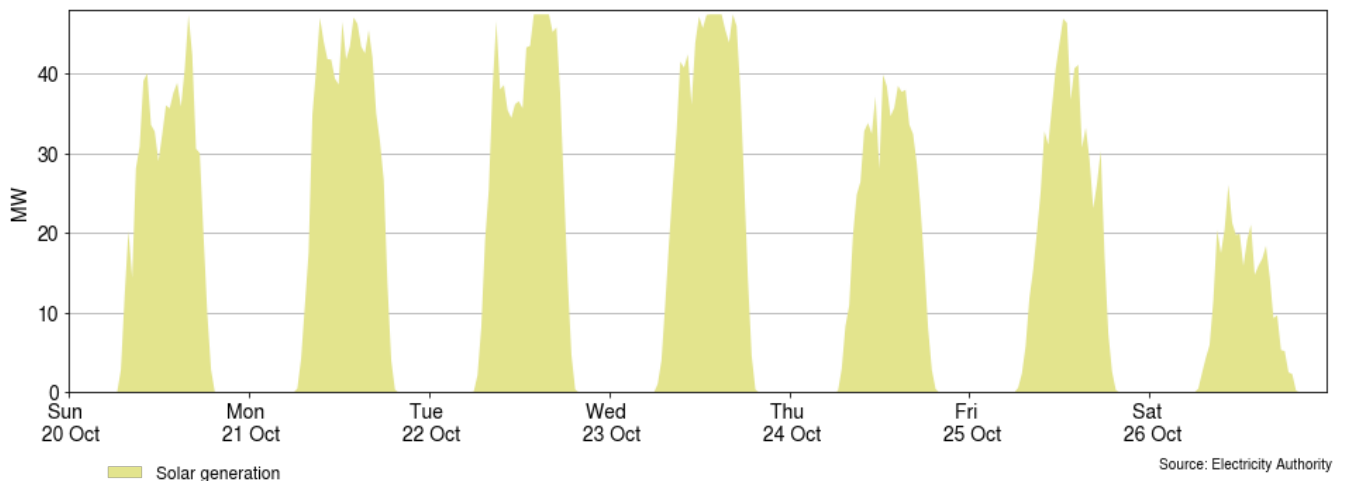
7.1. Figure 9 shows wind generation and forecast from 20-26 October 2024. This week wind generation varied between 23MW and 987MW. Wind generation was below 400MW from Sunday to Tuesday this week. The lowest generation was on Sunday with a daily average of ~72MW. From Wednesday to Saturday daily average wind generation was between ~615-870MW, as parts of the North Island were hit with strong North Westerly winds.

Figure 9: Wind generation and forecast, 20-26 October 2024



7.2. Figure 10 shows solar generation from 20-26 October 2024. Solar generation peaked at ~47MW this week from Sunday to Wednesday. Overcast conditions and unsettled weather saw lower solar generation over Thursday and Saturday.

Figure 10: Solar generation, 20-26 October 2024



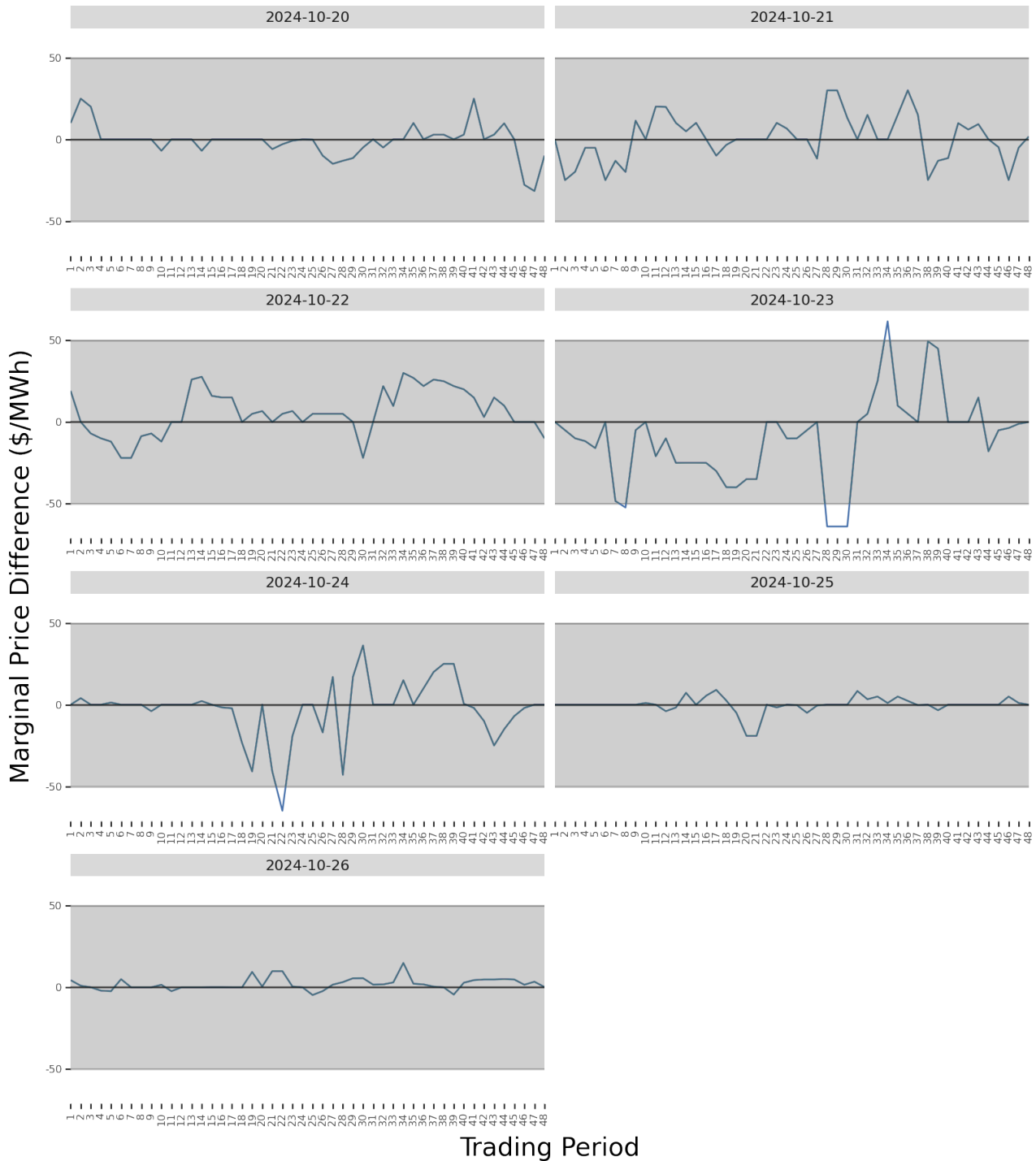
7.3. Figure 11 shows the difference between the national real-time dispatch (RTD) marginal price and a simulated marginal price where the real-time wind and demand matched the 1-hour ahead forecast (PRSS¹) projections. The figure highlights when forecasting inaccuracies are causing large differences to final prices. When the difference is positive this means that the 1-hour ahead forecasting inaccuracies resulted in the spot price being higher than anticipated - usually here demand is under forecast and/or wind is over forecast. When the difference is negative, the opposite is true. Because of the nature of demand and wind forecasting, the 1-hour ahead and the RTD wind and demand forecasts will rarely be the same. Trading periods

¹ Price responsive schedule short – short schedules are produced every 30 minutes and produce forecasts for the next 4 hours.

where this difference is exceptionally large can signal that forecasting inaccuracies had a large impact on the final price for that trading period.

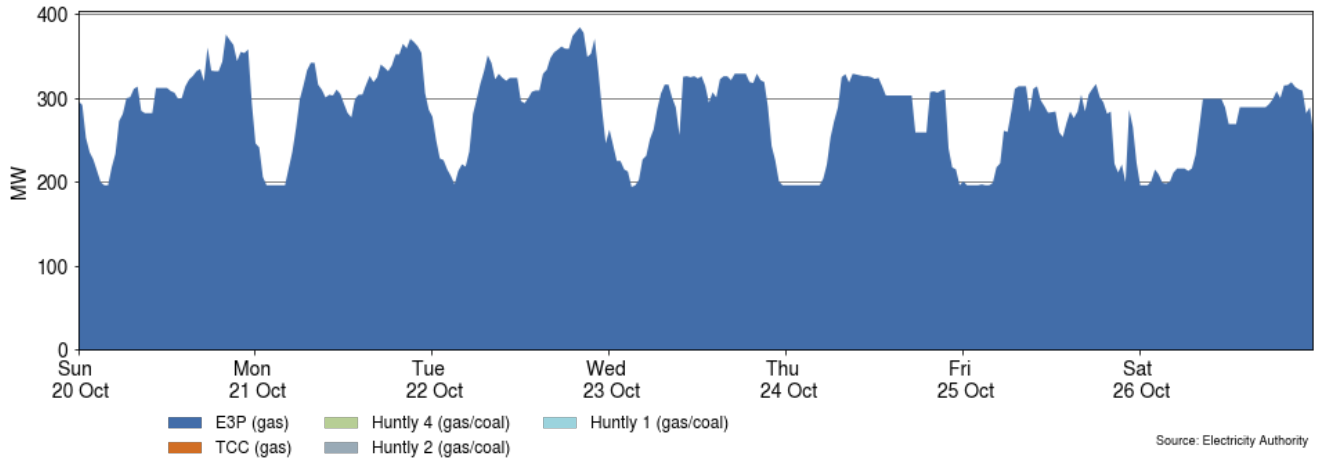
7.4. Most differences were within $\pm\$50/\text{MWh}$ this week. The largest positive difference occurred on Wednesday when the RTD price was around $\$62/\text{MWh}$ higher than the simulated marginal price. This was during trading period 34 and when there were $\sim 65\text{MW}$ of forecasting errors.

Figure 11: Difference between national marginal RTD price and simulated RTD price, with the difference due to one-hour ahead wind and demand forecast inaccuracies, 20-26 October 2024



7.5. Figure 12 shows the generation of thermal baseload between 20-26 October 2024. Thermal baseload generation came from Huntly 5 this week, running continuously all week.

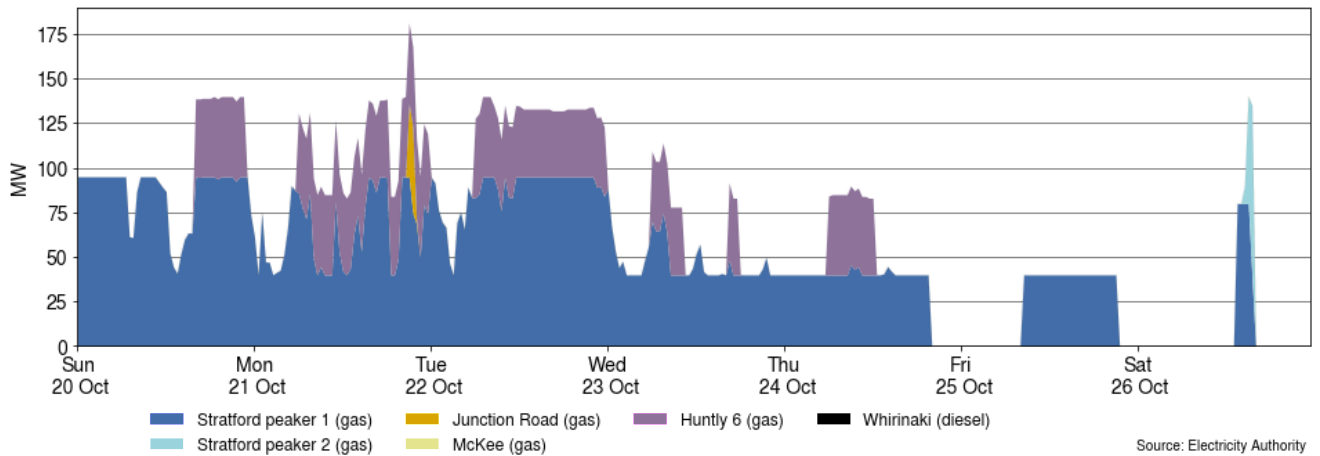
Figure 12: Thermal baseload generation, 20-26 October 2024



7.6. Figure 13 shows the generation of thermal peaker plants between 20-26 October 2024. Peaker generation this week was mainly from Stratford 1 and Huntly 6, with Stratford 1 generating continuously until late Thursday. Stratford 1 also ran during the day on Friday and a short while on Saturday afternoon. Thermal generation from peaking plants was higher during the days of low wind generation early in the week.

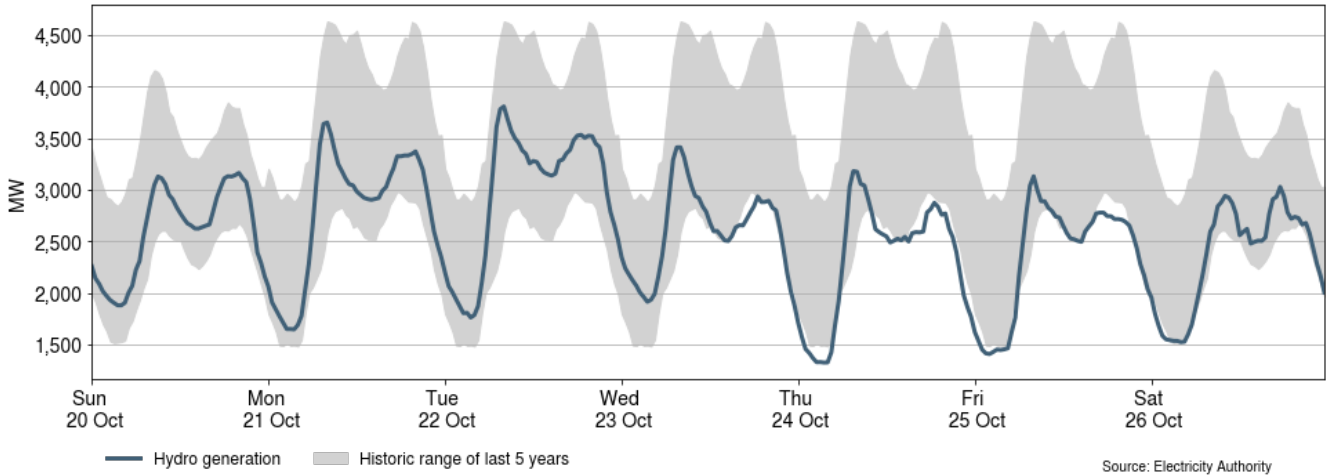
7.7. Stratford 2 was due back from outage on Saturday evening. It ran during a couple of trading periods on Saturday afternoon likely as testing before returning fully.

Figure 13: Thermal peaker generation, 20-26 October 2024



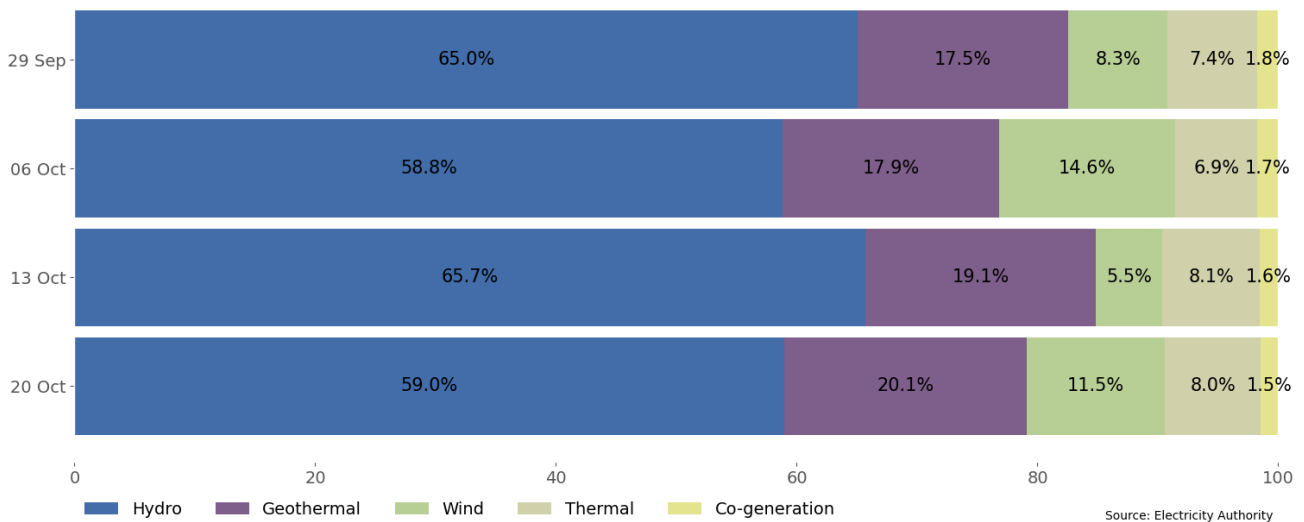
7.8. Figure 14 shows hydro generation between 20-26 October 2024. Hydro generation was close to the low end of the historic range. Hydro generation decreased from Wednesday in line with the increase to wind generation.

Figure 14: Hydro generation, 20-26 October 2024



7.9. As a percentage of total generation, between 20-26 October 2024, total weekly hydro generation was 59%, geothermal 20.1%, wind 11.5%, thermal 8%, and co-generation 1.5%, as shown in Figure 15. The proportion of hydro generation was lower this week due to the increased wind generation.

Figure 15: Total generation by type as a percentage each week, 29 September and 26 October



8. Outages

8.1. Figure 16 shows generation capacity on outage. Total capacity on outage between 20-26 October 2024 ranged between ~1080MW and ~2000MW. Figure 17 shows the thermal generation capacity outages.

8.2. Notable outages include:

- (a) Huntly 4 was on outage 23 October
- (b) Huntly 2 is on outage until 6 December
- (c) West Wind had various short outages over 24 and 25 October
- (d) Stratford 2 was on outage until 26 October

- (e) Te Mihi geothermal plant had one unit on outage until 24 October and another is on outage until 31 October
- (f) One unit at Whirinaki is on outage from 24 October-9 November
- (g) Various North and South Island hydro units were on outage over the week.

Figure 16: Total MW loss from generation outages, 20-26 October 2024

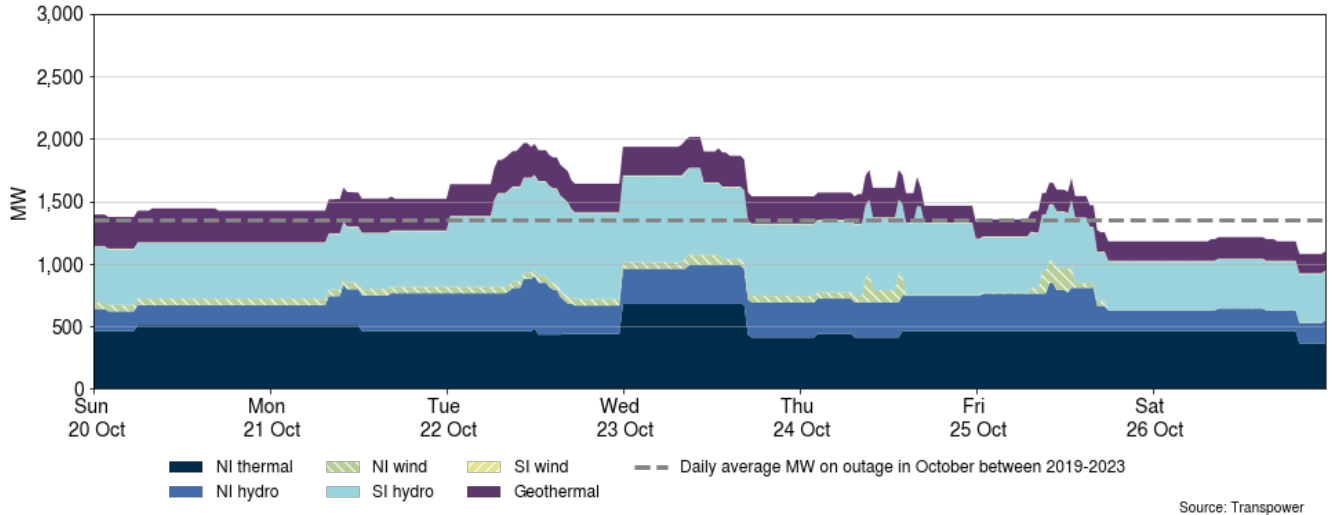
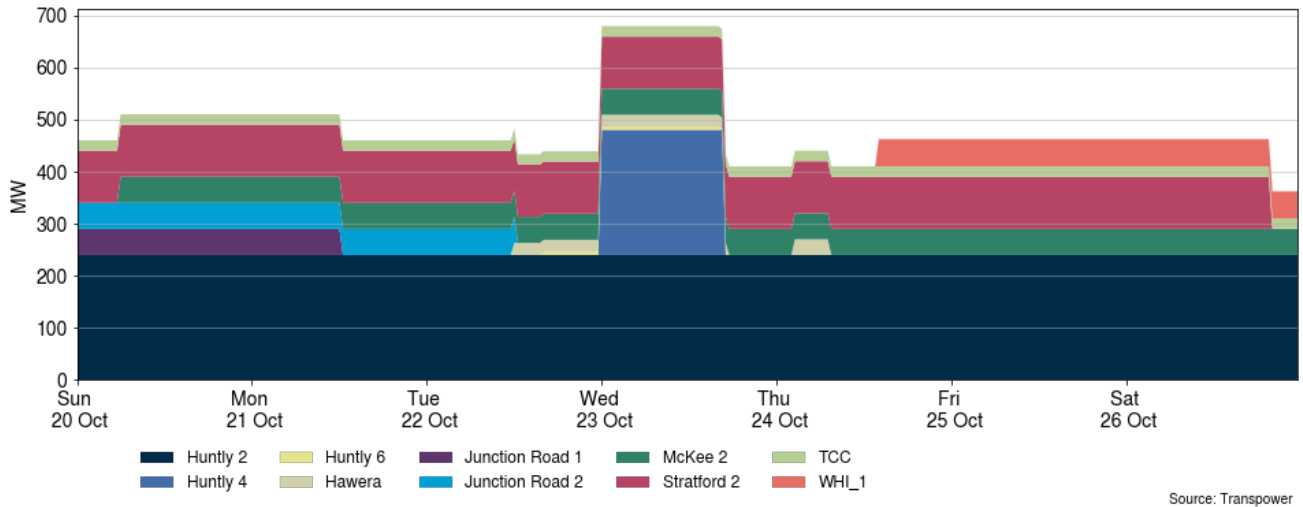


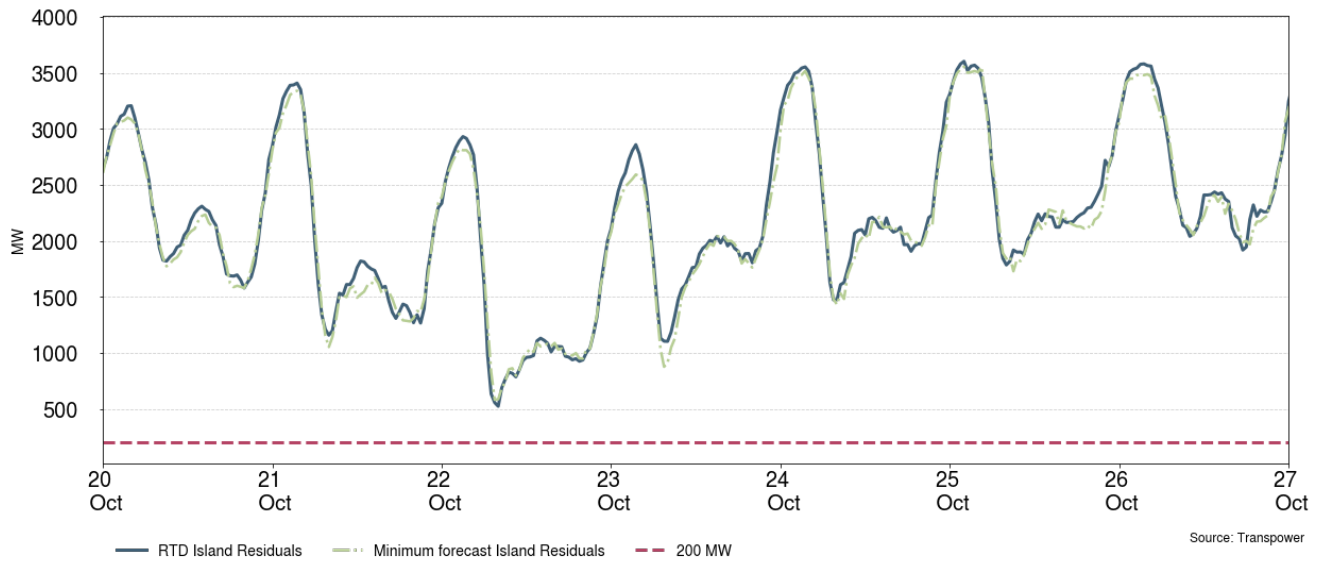
Figure 17: Total MW loss from thermal outages, 20-26 October 2024



9. Generation balance residuals

- 9.1. Figure 18 shows the national generation balance residuals between 20-26 October 2024. A residual is the difference between total energy supply and total energy demand for each trading period. The red dashed line represents the 200MW residual mark which is the threshold at which Transpower issues a customer advice notice (CAN) for a low residual situation. The green dashed line represents the forecast residuals, and the blue line represents the real-time dispatch (RTD) residuals.
- 9.2. Generation balance residuals were healthy this week. The lowest residual generation was on Tuesday morning (525MW) at 8.00am. The North Island residuals were ~ 378MW at this time.

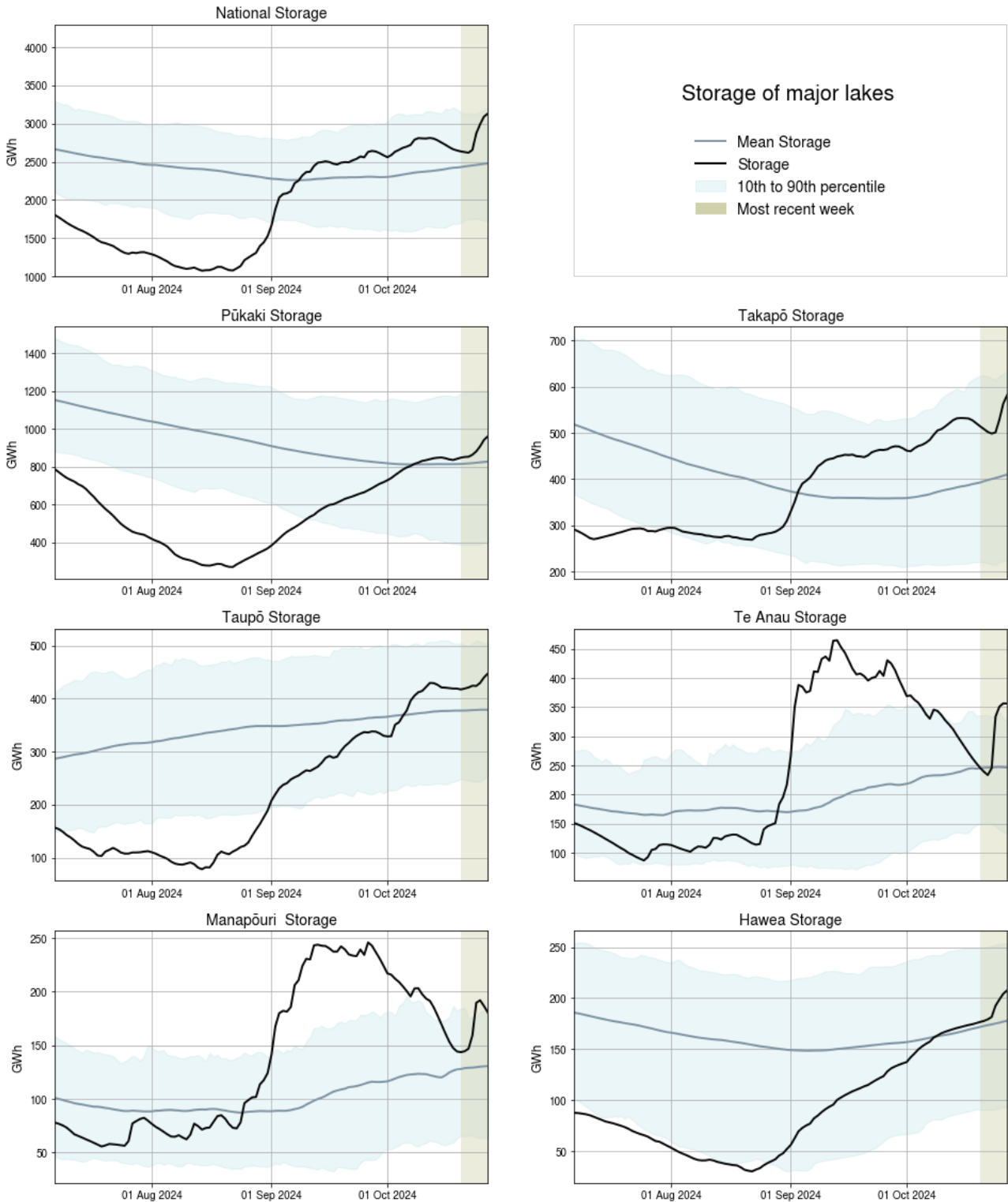
Figure 18: National generation balance residuals, 20-26 October 2024



10. Storage/fuel supply

- 10.1. Figure 19 shows the total controlled national hydro storage as well as the storage of major catchment lakes including their historical mean and 10th to 90th percentiles.
- 10.2. National controlled storage increased this week to ~74% nominally full and 117.6% of the historical average as of 26 October.
- 10.3. All lakes saw an uptick in storage this week. Taupō had a steady increase across the week and remains above its historic mean storage level. Both Pūkaki and Takapō have increased, with Takapō seeing a steep uptick from midweek and now approaching its historic 90th percentile region.
- 10.4. All other South Island lakes also saw a steep increase to storage this week. Manapōuri and Te Anau both went back above their 90th percentile region. Heavy rain in the South-West catchment area means both lakes are above their high operating ranges, meaning there may be some spilling down the Waiau river.

Figure 19: Hydro storage

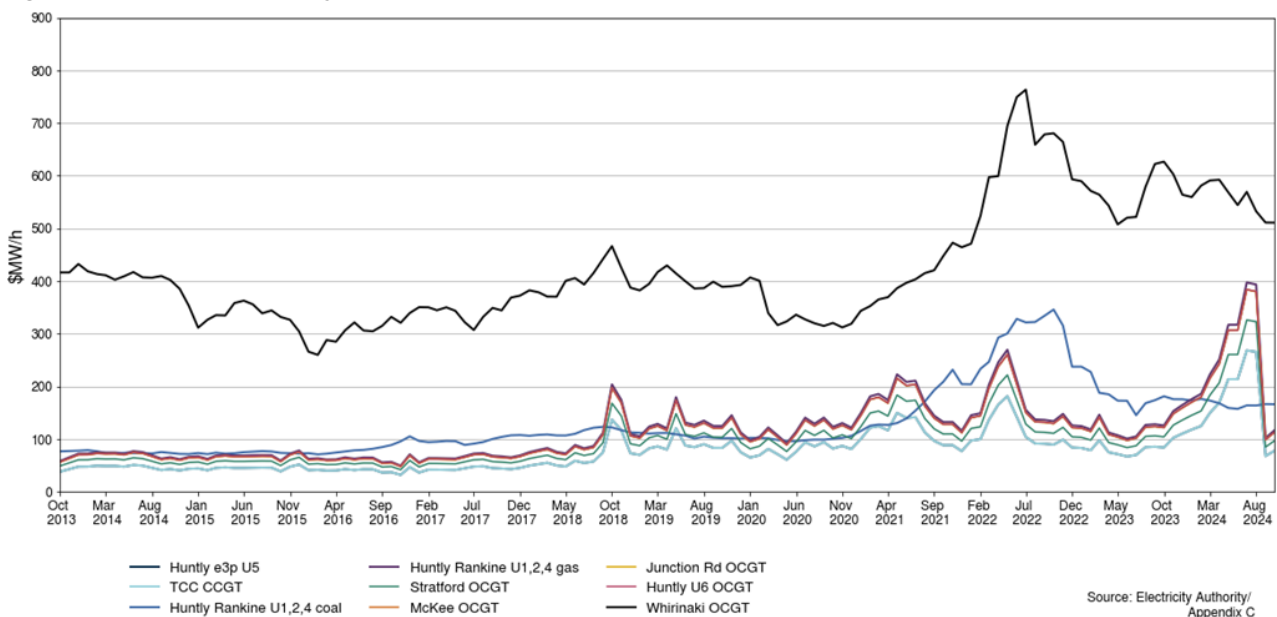


Source: Electricity Authority

11. Prices versus estimated costs

- 11.1. In a competitive market, prices should be close to (but not necessarily at) the short-run marginal cost (SRMC) of the marginal generator (where SRMC includes opportunity cost).
- 11.2. The SRMC (excluding opportunity cost of storage) for thermal fuels is estimated using gas and coal prices, and the average heat rates for each thermal unit. Note that the SRMC calculations include the carbon price, an estimate of operational and maintenance costs, and transport for coal.
- 11.3. Figure 20 shows an estimate of thermal SRMCs as a monthly average up to 1 October 2024. The SRMC for gas has increased slightly from the previous month, while the coal SRMC and diesel SRMC have remained stable.
- 11.4. The latest SRMC of coal-fuelled Rankine generation is ~\$167/MWh. The cost of running the Rankines on gas remains less expensive at ~\$117/MWh.
- 11.5. The SRMC of gas fuelled thermal plants is currently between ~\$78/MWh and ~\$117/MWh.
- 11.6. The SRMC of Whirinaki is ~\$511/MWh.
- 11.7. More information on how the SRMC of thermal plants is calculated can be found in [Appendix C](#).

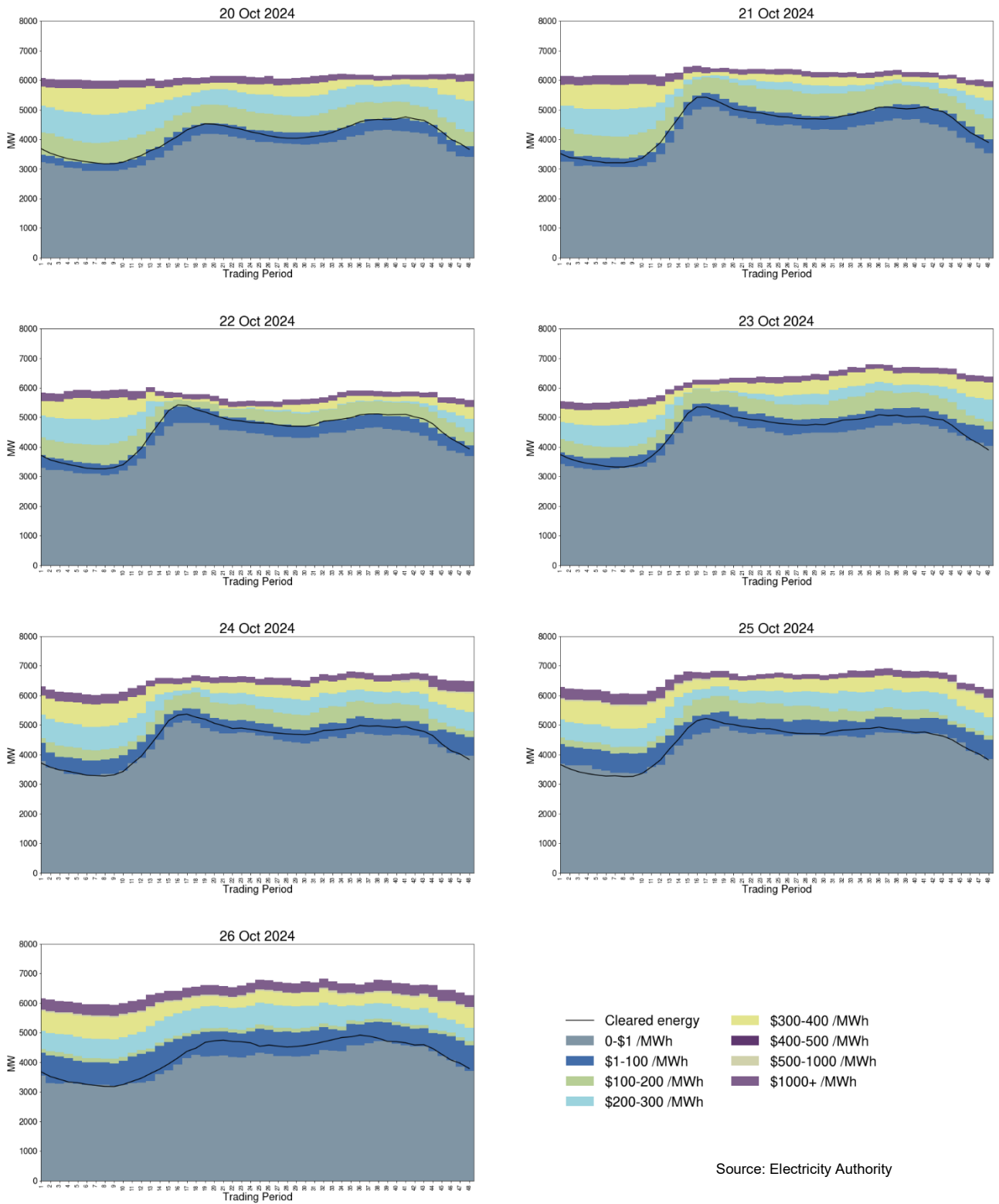
Figure 20: Estimated monthly SRMC for thermal fuels



12. Offer behaviour

- 12.1. Figure 21 shows this week's national daily offer stacks. The black line shows cleared energy, indicating the range of the average final price.
- 12.2. At the start of the week offers were clearing within the \$1-\$200/MWh range. From Wednesday offers cleared below \$100/MWh and from Thursday onwards prices were clearing close to or under \$50/MWh. The lower prices towards the end of the week were in line with increased wind generation as well as lower demand.

Figure 21: Daily offer stacks



13. Ongoing work in trading conduct

13.1. This week prices generally appeared to be consistent with supply and demand conditions.

13.2. Further analysis is being done on the trading periods in Table 1 as indicated.

Table 1: Trading periods identified for further analysis

| Date | Trading period | Status | Participant | Location | Enquiry topic |
|-------------------------------|-----------------|--|----------------|---------------|---|
| 14/06/2023-15/06/2023 | 15-17/ 15-19 | Passed to Compliance for advice | Genesis | Multiple | High energy prices associated with high energy offers |
| 22/09/2023-30/09/2023 | Several | Passed to Compliance for advice | Contact | Multiple | High hydro offers |
| 1/07/2024-23/08/2024 | Several | These trading periods are now part of a s16 review | N/A | N/A | High energy prices |
| 3-4/09/2024 and 13-18/09/2024 | Several | Further analysis | Contact Energy | Clutha scheme | Hydro offers |