

Trading Conduct Report

Market Monitoring Weekly Report

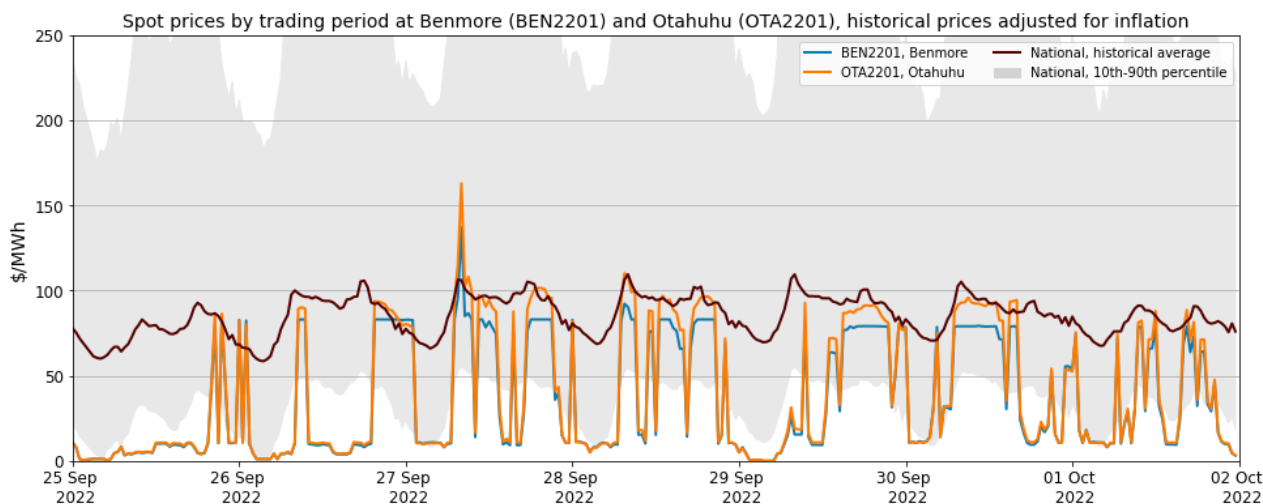
1. Overview for the week of 25 September to 1 October

- 1.1. Wholesale spot prices between 25 September and 1 October appear to be consistent with market conditions.

2. Spot Prices

- 2.1. This report monitors underlying wholesale price drivers to assess whether there are trading periods that require further analysis for the purpose of considering potential non-compliance with the trading conduct rule. In addition to general monitoring, we also single out unusually high-priced individual trading periods for further analysis by identifying when wholesale electricity spot prices at Benmore and/or Otahuhu nodes exceed their historical 90th percentiles. These historically high-priced trading periods are marked out by vertical lines in the majority of figures in this report.
- 2.2. Between 25 September and 1 October wholesale spot prices across all nodes averaged \$38/MWh, with 95 per cent of prices falling between \$0.54/MWh and \$96/MWh.
- 2.3. Figure 1 shows spot prices at Benmore and Otahuhu alongside their historic median and historic 10th- 90th percentiles adjusted for inflation. A price spike reaching ~\$170/MWh at Otahuhu occurred on Tuesday 26 September at 8:00 am. This price spike was within historic bounds.
- 2.4. Otherwise, prices hovered around \$10/MWh during offpeak (especially overnight), then rose to roughly \$80/MWh at Benmore and \$100/MWh at Otahuhu during the day and/or peak times.

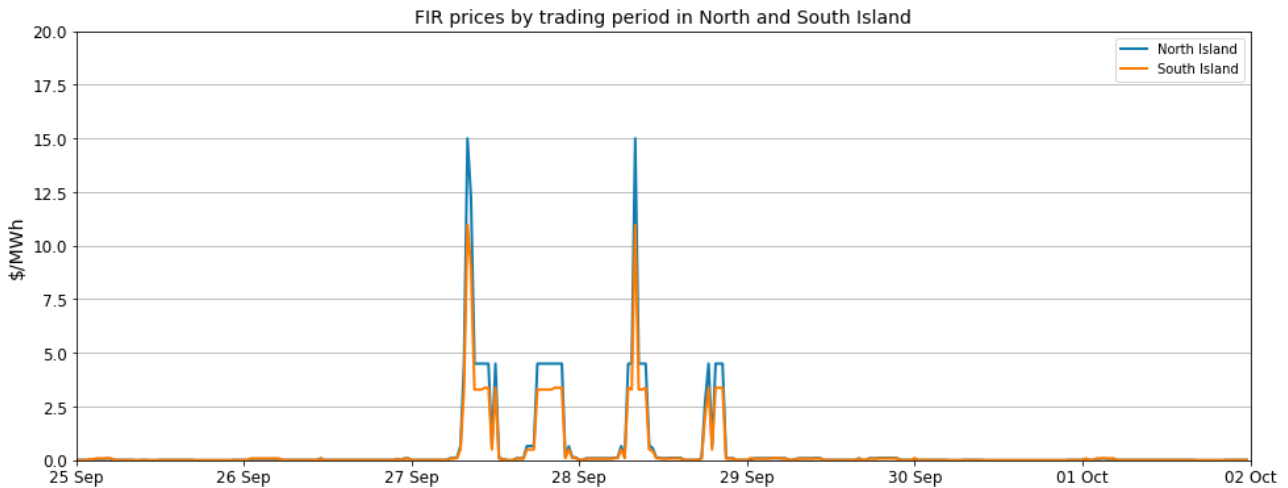
Figure 1: Wholesale Spot Prices



3. Reserve Prices

3.1. Fast instantaneous reserves (FIR) prices for the North and South Island are shown below in Figure 2. Most FIR prices fell within historical bounds this week, with the majority of trading periods below \$5/MWh. Two spikes in FIR prices occurred on Tuesday and Wednesday morning, however, these were to only roughly \$15/MWh in the North Island, and \$11/MWh in the South.

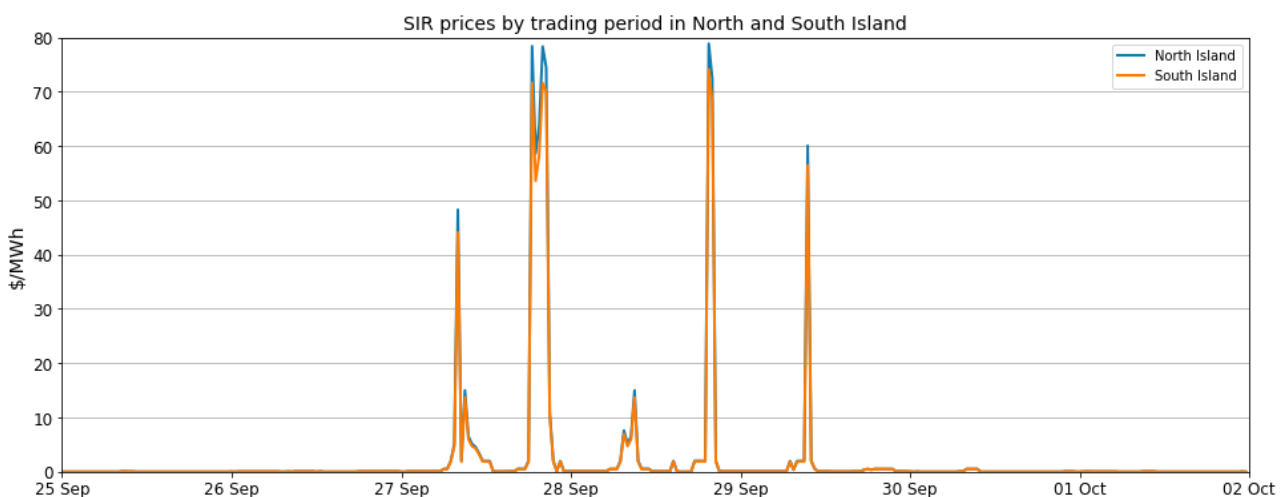
Figure 2: FIR prices by trading period and Island



3.2. Sustained instantaneous reserves (SIR) prices for the North and South Island are shown below in Figure 3. Several spikes above \$20/MWh occurred throughout the week. The first was on Tuesday morning, with SIR prices reaching almost \$50/MWh. SIR prices were high over several trading periods on Tuesday evening and spiked close to \$80/MWh. Prices then spiked again on Wednesday evening and Thursday morning.

3.3. These high SIR prices may have been due to a tight supply of reserves, resulting from South Island hydro outages, and SPD co-optimisation, with reserves being dispatched instead of higher priced energy offers.

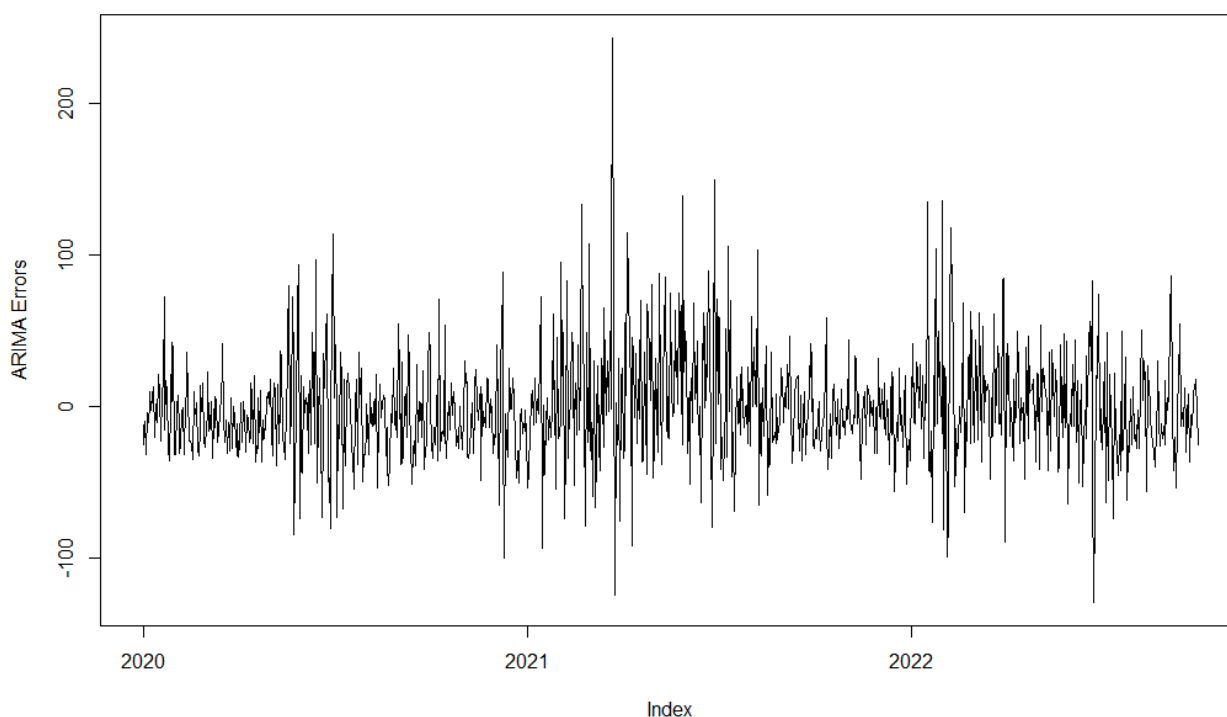
Figure 3: SIR prices by trading period and Island



4. Regression Residuals

- 4.1. The Authority's monitoring team uses a regression model to model spot price. The residuals show how close the predicted 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 A¹ on the trading conduct webpage.
- 4.2. Figure 4 shows the residuals of autoregressive moving average (ARMA) errors from the daily model. Residuals for 25 September – 1 October were relatively small, suggesting that prices on those dates appear to be aligned with market conditions.

Figure 4: Residual plot of estimated daily average spot prices

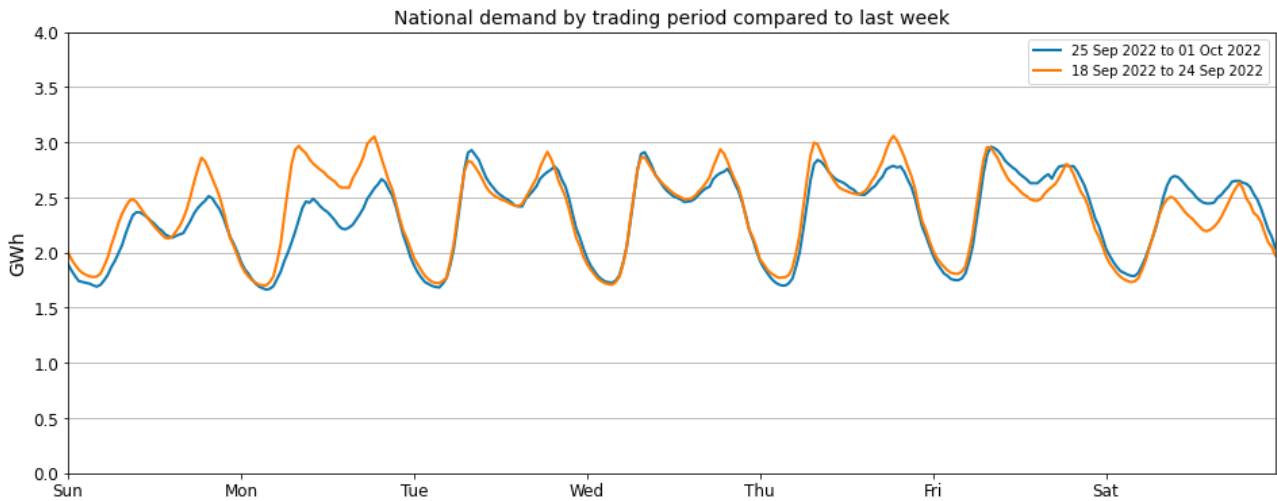


5. Demand

- 5.1. Figure 5 shows this week's national grid demand compared to the previous week.
- 5.2. Demand from 25 September – 1 October was lower on Sunday and Monday, when compared to the previous week. The difference on the Monday will be due to the public holiday observed that day. Demand on Tuesday morning was slightly higher than the previous week, and was also the highest of the week, and likely contributed to the price spike that morning. Demand between Tuesday evening through to Thursday was lower than the previous week, then it was higher on Friday and Saturday. This increase in demand was likely due to colder temperatures on those days, as seen in Figure 6.

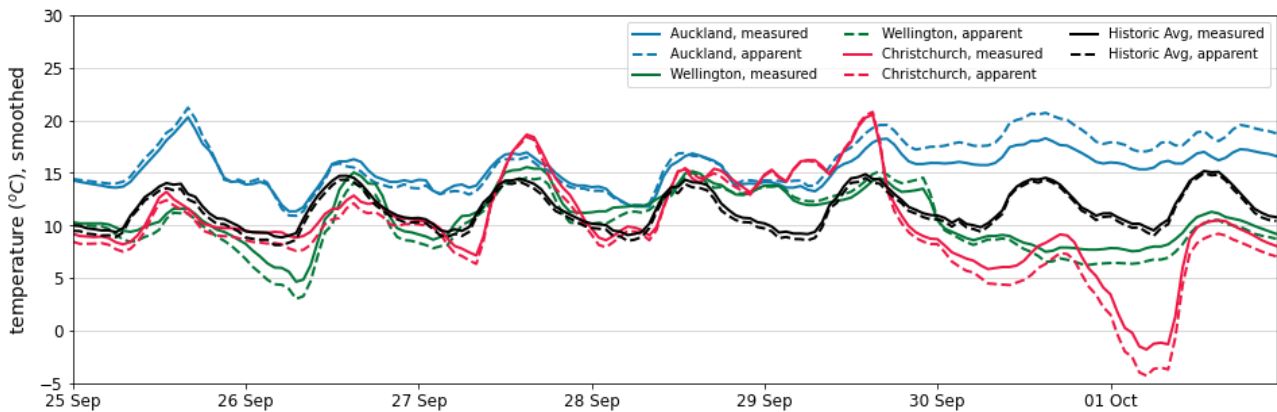
¹ <https://www.ea.govt.nz/assets/dms-assets/29/Appendix-A-Regression-Analysis.pdf>

Figure 5: National demand by trading period compared to the previous week



- 5.3. Figure 6 shows hourly temperature at main population centres. The measured temperature is the recorded temperature, while the apparent temperature adjusts for factors like wind speed and humidity to estimate how cold it feels. Also included for reference is the mean historical temperature of similar weeks from previous years averaged across the three main population centres.
- 5.4. Temperatures in Auckland stayed above the historic average all week, while temperatures in Wellington and Christchurch hovered around or above the average between Sunday and Thursday, before dipping below 10 degrees Celsius for most of Friday and Saturday.

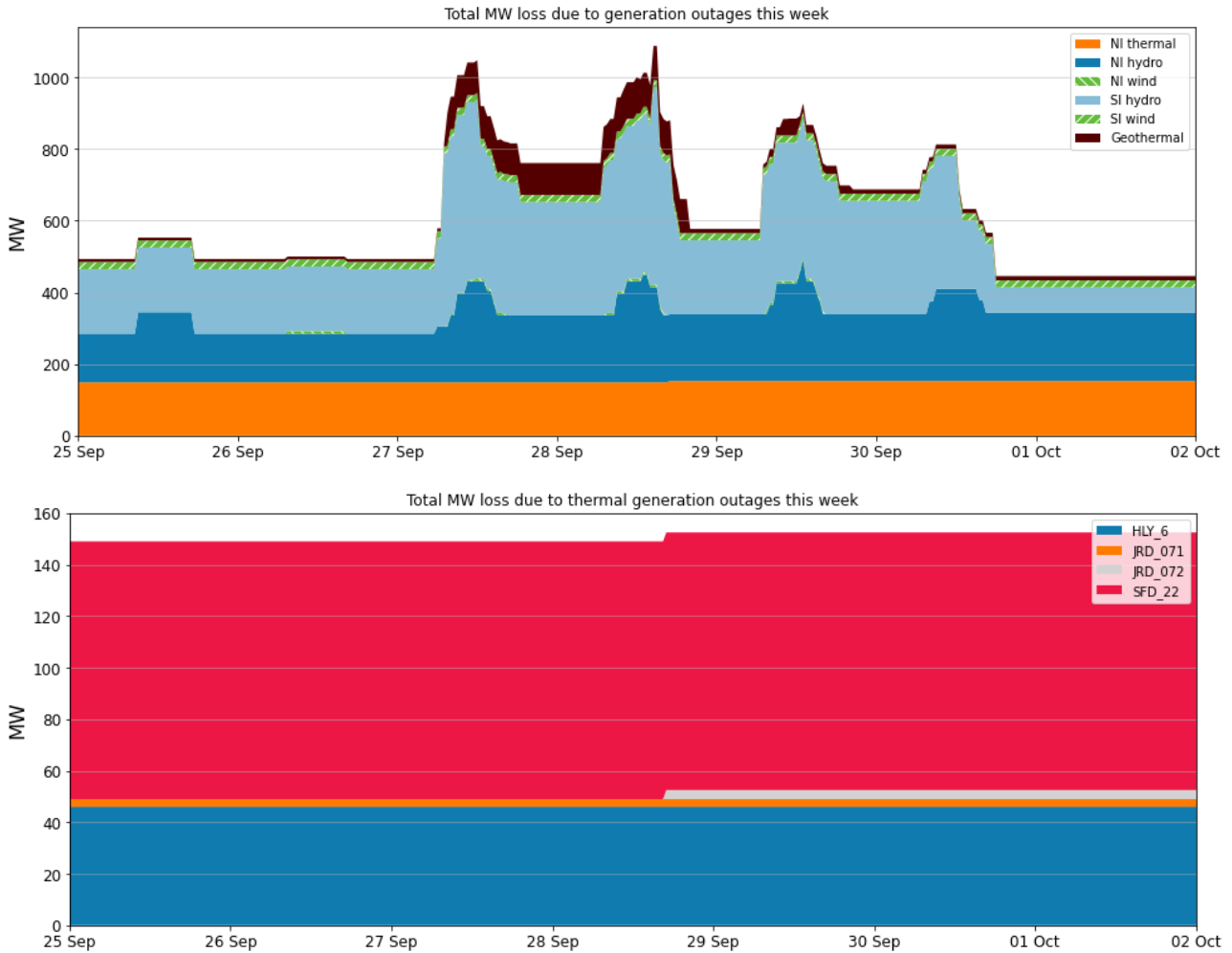
Figure 6: Temperatures across main centres



6. Outages

- 6.1. Figure 7 shows generation capacity lost due to outages. Total capacity lost increased from ~500 MW on Sunday to ~1000MW during times on Tuesday and Wednesday, due to increased South Island hydro and geothermal outages. However, outages decreased from Thursday onwards.
- 6.2. With regards to thermal outages, the second Stratford peaker remains on outage, and Huntly 6 was on outage all week.

Figure 7: Total MW loss due to generation outages



7. Generation

7.1. Wind generation, as seen in Figure 8, varied between 100 MW to 700 MW during the week. Wind generation hovered around 400 MW on Sunday and Monday, before decreasing to between 100-300MW on Tuesday and Wednesday. Wind gradually increased throughout the rest of the week and was particularly strong on the second half of Friday and on Saturday.

Figure 8: Wind Generation

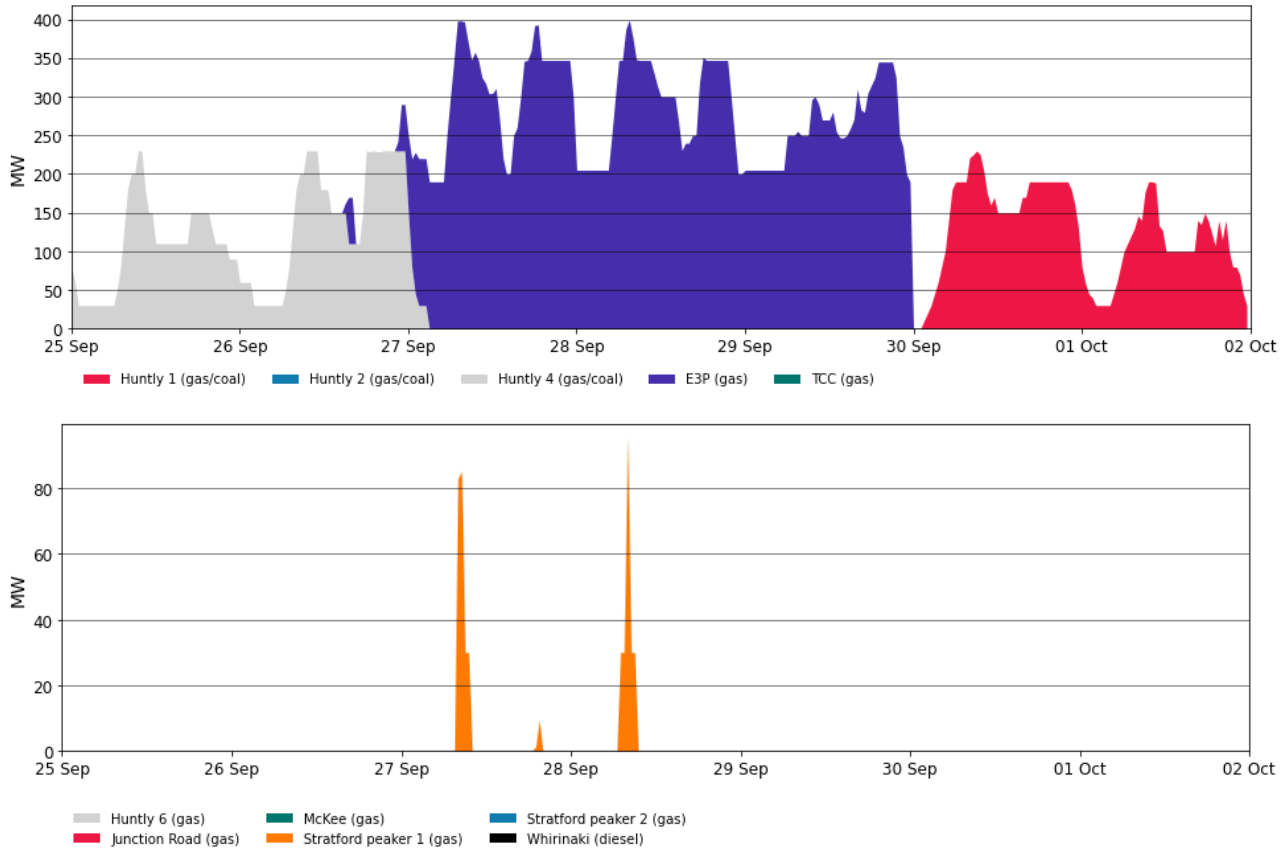


7.2. Figure 9 shows generation at thermal and thermal peaker plants between 25 September and 1 October. Huntly 4 ran only on Sunday and Monday, after which E3P was switched on between Tuesday and Thursday. E3P was turned off on Thursday evening, and Huntly 1 ran on Friday and Saturday. This switching of various Huntly units was likely a reaction to

strong wind at the beginning and end of the week, as E3P's minimum capacity is around ~200 MW, and if less is needed, Huntly 1 and 4 can run below 200 MW.

- 7.3. Stratford peaker one ran on Tuesday, during both peaks, and on Wednesday morning, and was only constrained on for the Tuesday evening. For the two morning peaks the plant was dispatched as its offers tranches had reduced.

Figure 9: Thermal Generation

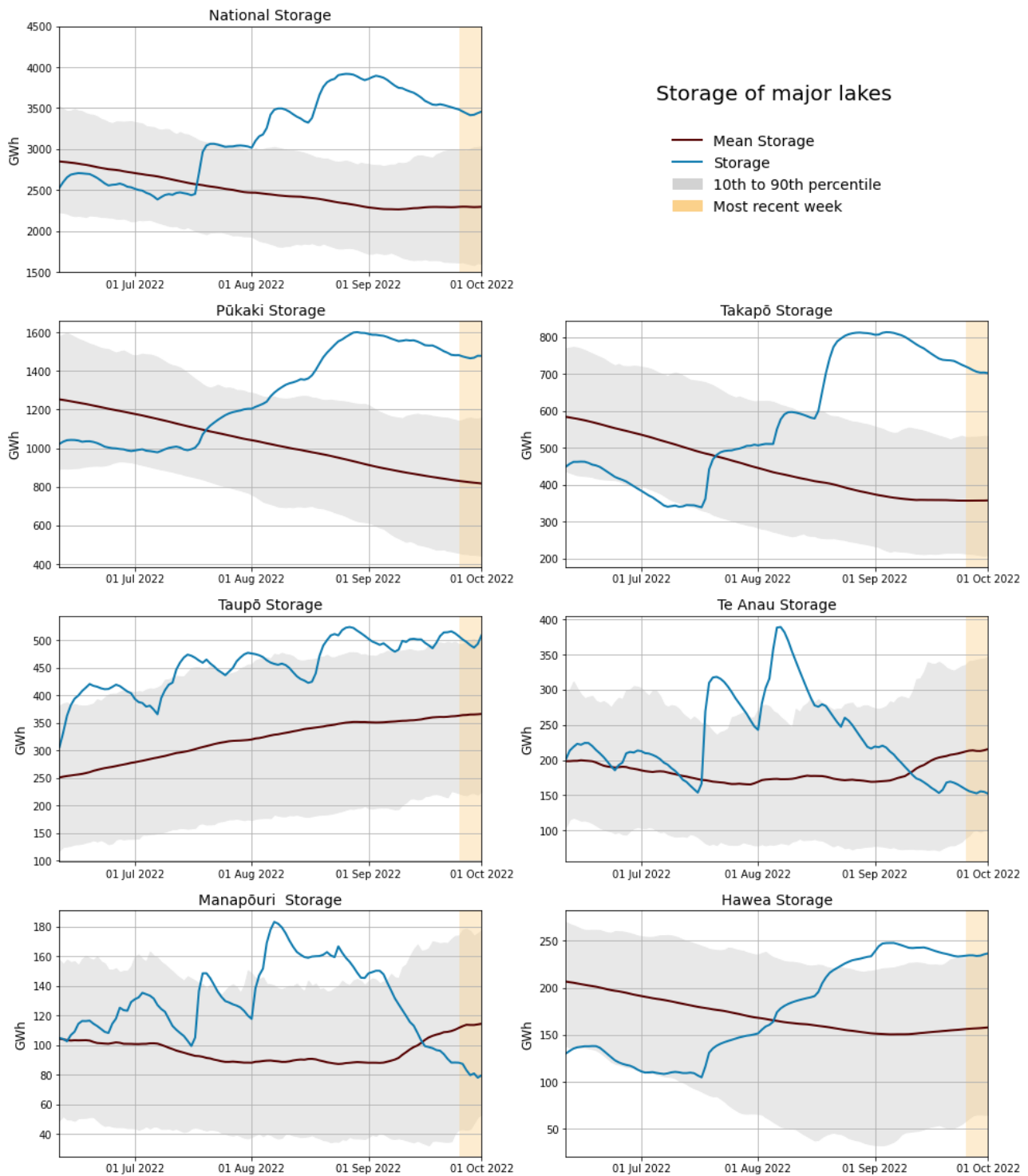


- 7.4. As a percentage of total generation, between 26 September and 2 October, hydro generation totalled 69.5 per cent, geothermal 17.4 per cent, thermal 4.4 per cent and wind 7.3 per cent. Despite periods of low wind generation, the current abundance of hydro fuel has kept spot prices low outside of peak demand periods this week.

8. Storage/Fuel Supply

- 8.1. Figure 10 shows total controlled national hydro storage as well as the storage of major catchment lakes including their historical mean and 10th to 90th percentiles.
- 8.2. Hydro storage levels continue to remain well above usual for this time of year at around 84 per cent of nominal full. Most major lakes continue to remain above their historic 90th storage percentile, except Te Anau and Manapōuri, which have fallen below their historic means.
- 8.3. The high level of hydro storage has been accompanied by an increase in lower priced hydro generation offers, contributing to the low average spot price seen during off peak periods.
- 8.4. With the abundance of low priced hydro generation in the South Island, the flow at the HVDC has been primarily northwards during the day, but southwards overnight, between 25 September and 1 October.

Figure 10: Hydro Storage

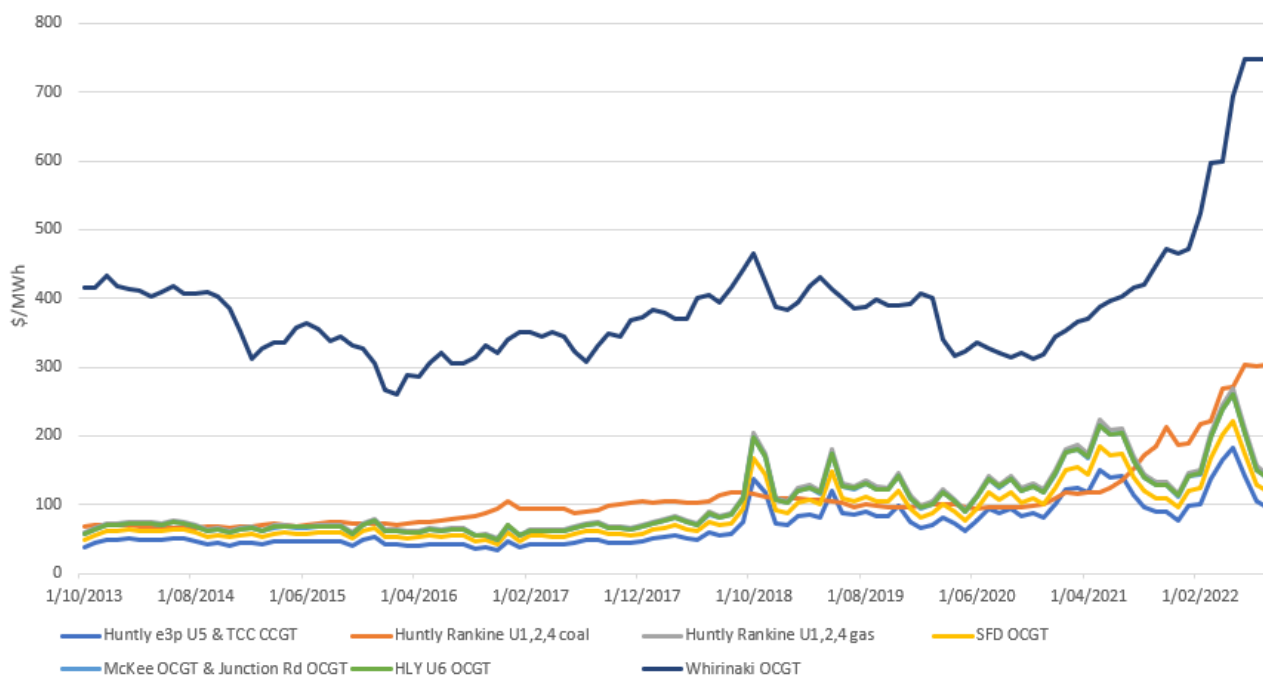


9. Price versus estimated costs

- 9.1. 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).
- 9.2. The SRMC (excluding opportunity cost of storage) for thermal fuels can be 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.

- 9.3. Figure 11 shows an estimate of thermal SRMCs as a monthly average up to 1 September 2022. The SRMC of gas fuelled plants continues to fall while the SRMC of diesel and coal fuelled plants appears to have plateaued.
- 9.4. The most recent price for Indonesian coal was around ~\$520/tonne putting the latest SRMC of Whirinaki and coal fuelled Huntly generation at around ~\$750/MWh and ~\$300/MWh respectively.
- 9.5. SRMCs of gas run thermal plants decreased to between \$96/MWh and \$144/MWh with the increase in gas fuel availability in the market.
- 9.6. More information on how the SRMC of thermal plants is calculated can be found in Appendix C² on the trading conduct webpage.

Figure 11: Estimated monthly SRMC for thermal fuels



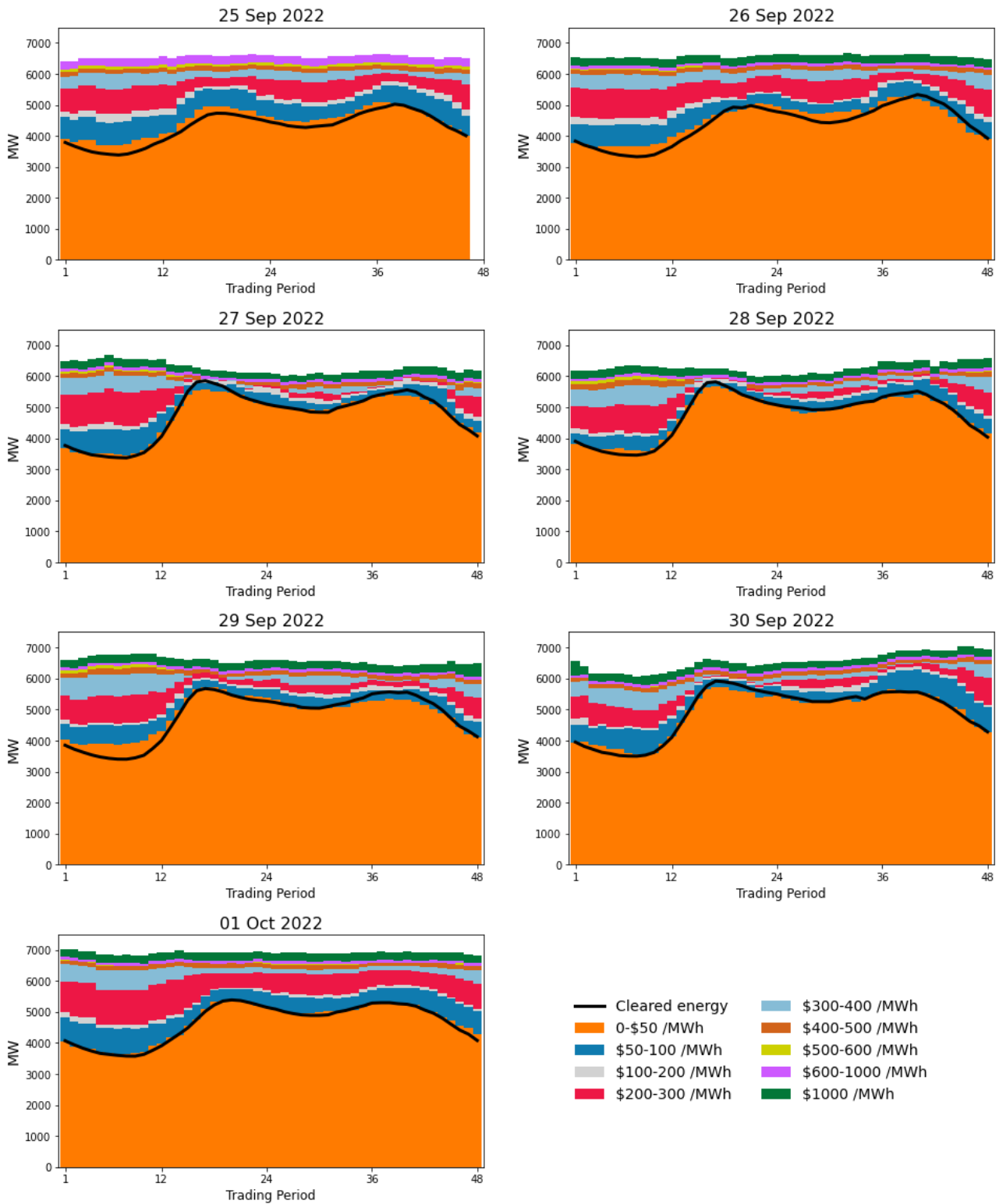
10. Offer Behaviour

- 10.1. Figure 13 shows this week's daily offer stacks, adjusted to take into account wind generation, transmission constraints, reserves and frequency keeping³. The black line shows cleared energy, indicating the range of the average final price.
- 10.2. The majority of cleared energy fell below in either the \$0-50/MWh or \$50-100/MWh bands. The unusual abundance of hydro has changed the offer stack with decreased mid-priced generation offers and increased lower priced generation offers. Final tranche thermal generation offers are priced higher than usual, likely to recoup higher operating costs, with runtime costs, etc more likely to be condensed in shorter run time periods resulting in higher prices. The resulting offer curve means that small increases in demand or drops in wind generation can lead to quick advancement up the offer curve leading to jumps from \$100-200/MWh to \$600/MWh+ prices quite easily.

² <https://www.ea.govt.nz/assets/dms-assets/30/Appendix-C-Calculating-thermal-SRMCs.pdf>

³ The offer stacks show all offers bid into the market (where wind offers are truncated at their actual generation and excluding generation capacity cleared for reserves) in price bands and plots the cleared quantity against these.

Figure 12: Daily offer stack



11. Ongoing Work in Trading Conduct

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

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

Table 1: Trading periods identified for further analysis

Date	TP	Status	Notes
19/02/22-24/02/22	Several	Compliance enquiries in progress	After reviewing information received from Genesis regarding offers from Tekapo B while Lake Tekapo was spilling, this case has been passed to compliance to assess if the offers were compliant with trading conduct rules.