25 October 2022

# Trading Conduct Report

## Market Monitoring Weekly Report

## 1. Overview for the week of 16-22 October

1.1. Wholesale spot prices between 16-22 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.

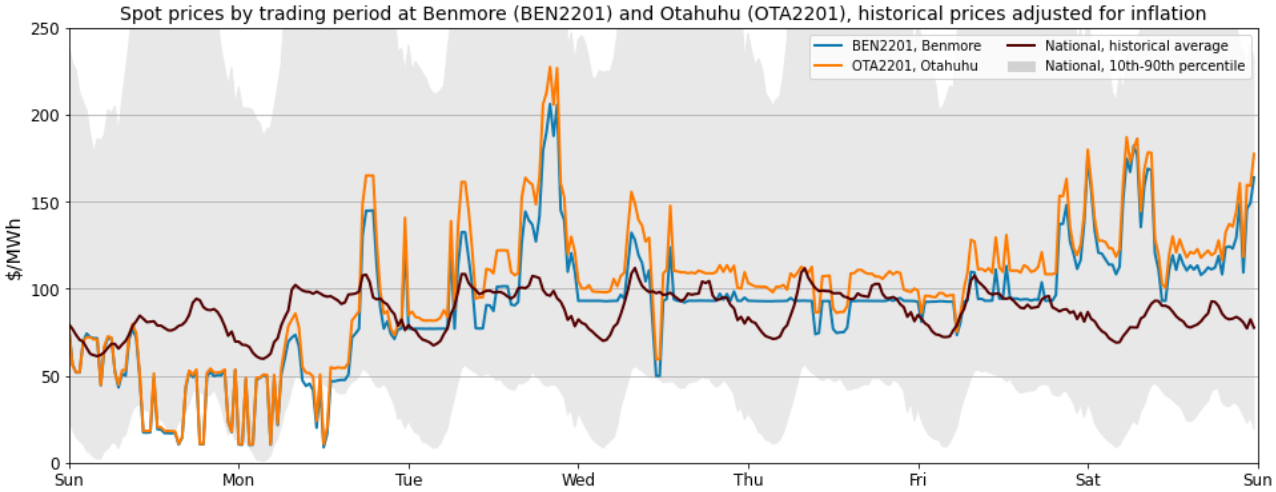
2.2. Between 16-22 October wholesale spot prices across all nodes the averaged $96/MWh, with 95 per cent of prices falling between $12/MWh and $180/MWh.

2.3. Figure 1 shows spot prices at Benmore and Otahuhu alongside their historic median and historic $10^{th}$- $90^{th}$ percentiles adjusted for inflation.

2.4. The spot price during off-peak/overnight increased this week, from between $5-20/MWh to $90-120/MWh. Spot prices rose above $150/MWh multiple times throughout the week, with the largest spike reaching around $230/MWh at Otahuhu on Tuesday evening.

2.5. This increase in average price, and slightly more price volatility, has been due a portion of hydro generation offers being shifted into higher priced tranches as lake levels decline.

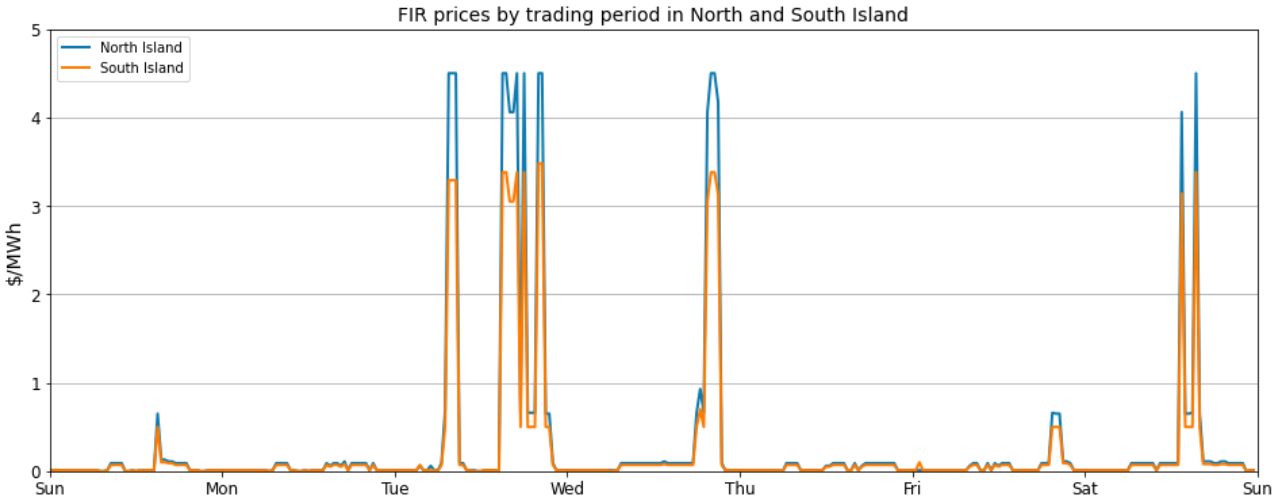
*Figure 1: Wholesale Spot Prices*




# 3. Reserve Prices

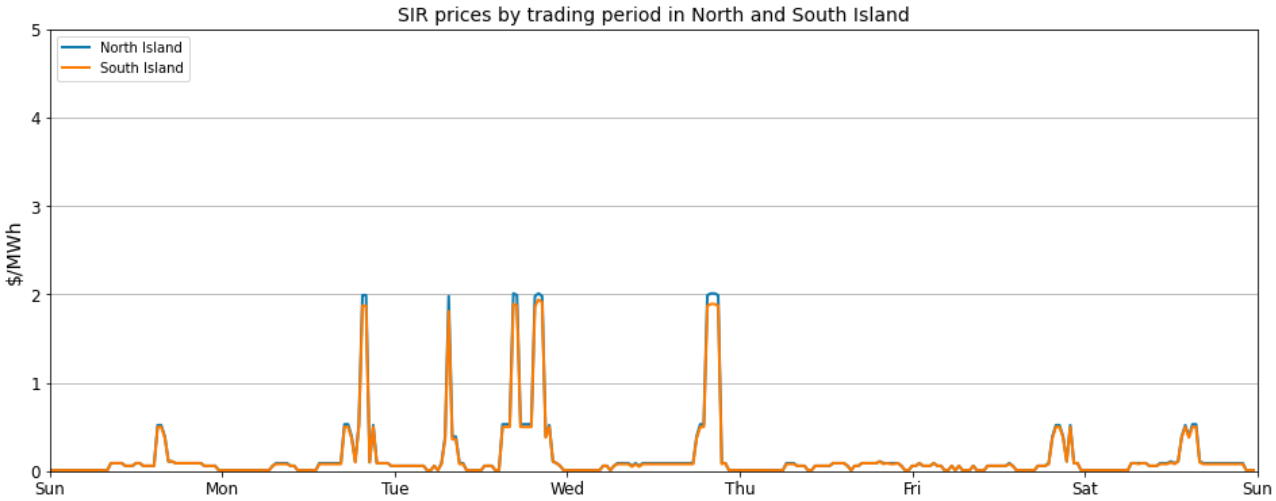
3.1. Fast instantaneous reserve (FIR) prices for the North and South Island are shown below in Figure 2. All FIR prices were low this week, with all trading periods below $5/MWh.

*Figure 2: FIR prices by trading period and Island*




3.2. Sustained instantaneous reserve (SIR) prices for the North and South Island are shown below in Figure 3. All SIR prices this week remained below $2/MWh.

*Figure 3: SIR prices by trading period and Island*



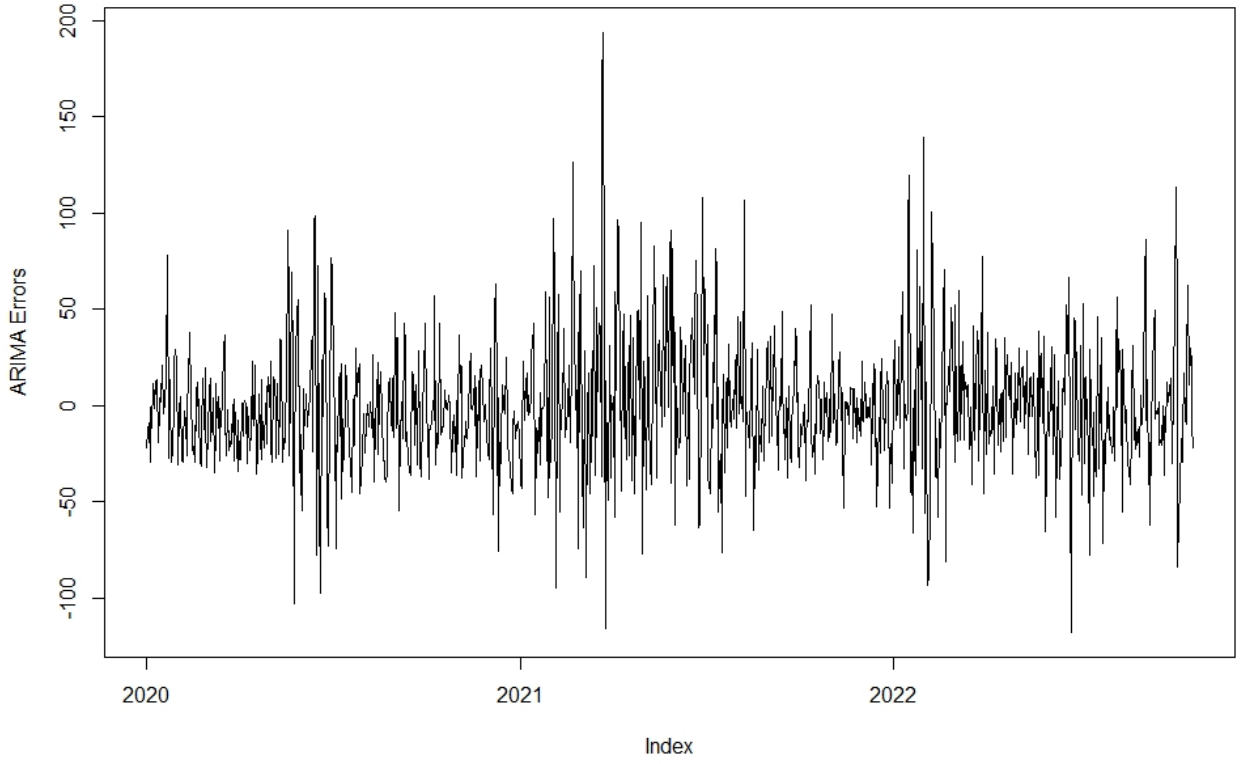

# 4. Regression Residuals

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 A[1] on the trading conduct webpage.

4.2. Figure 4 shows the residuals of autoregressive moving average (ARMA) errors from the daily model. Residuals for 16 to 22 October were generally small, suggesting that prices on those dates appear to be aligned with market conditions. However, the residual for Tuesday was slightly higher, indicating that the increase in prices on Tuesday was higher than expected based solely on the market conditions. Further analysis found a change in offer behaviour on Tuesday (see 10.2 and 10.3) caused a step change in prices, which causes higher residuals.

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

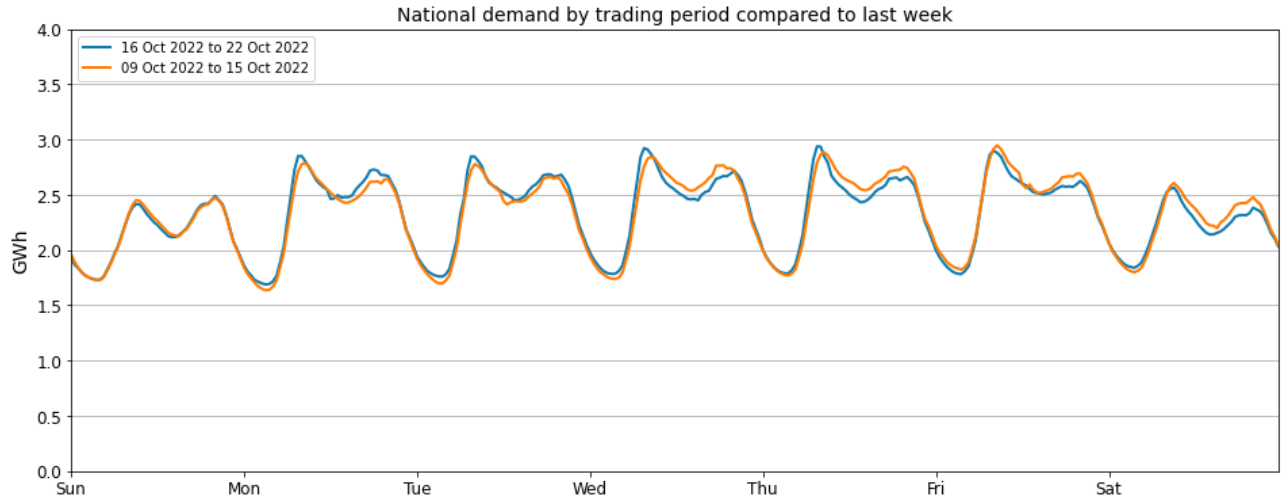
*Figure 4: Residual plot of estimated daily average spot prices*




# 5. Demand

5.1. Figure 5 shows this week's national grid demand compared to the previous week. Demand between 16 and 22 October was similar to the previous week, due to the continued warmer temperatures.

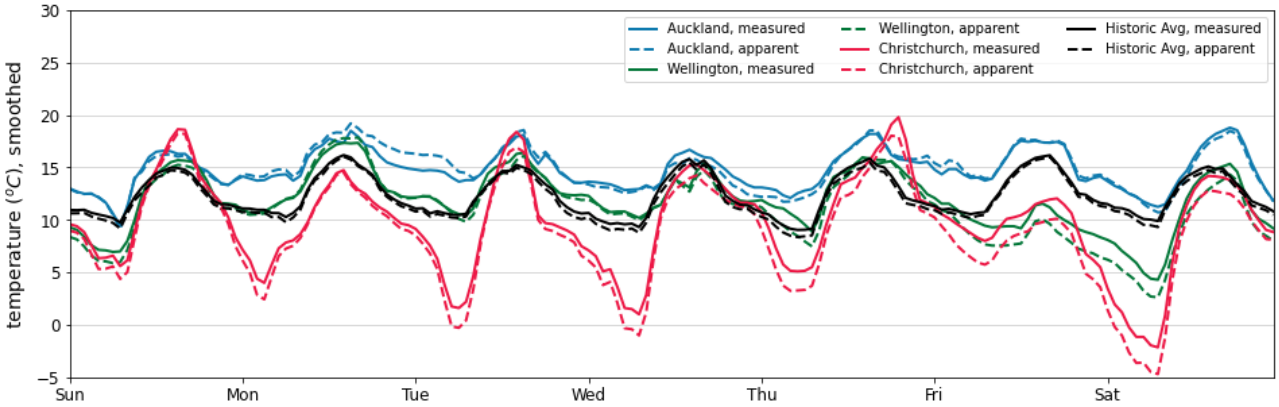
*Figure 5: National demand by trading period compared to the previous week*



5.2. 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.

5.3. Temperatures in Auckland, and Wellington were mostly between 10 and 20 degrees throughout the week. Christchurch experienced more volatility, with temperatures between -3 and 20 degrees.

*Figure 6: Temperatures across main centres*

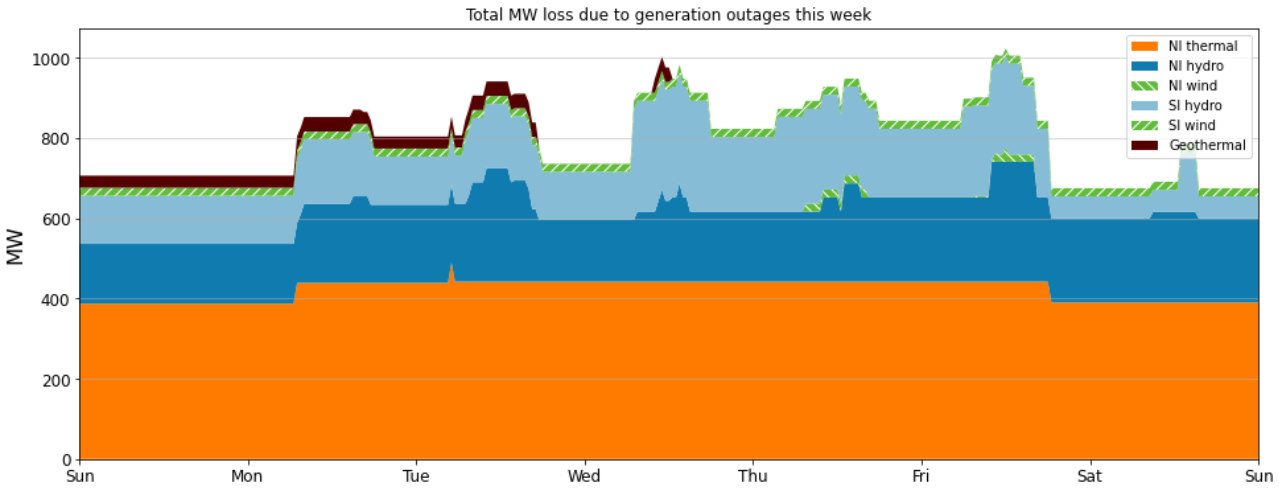


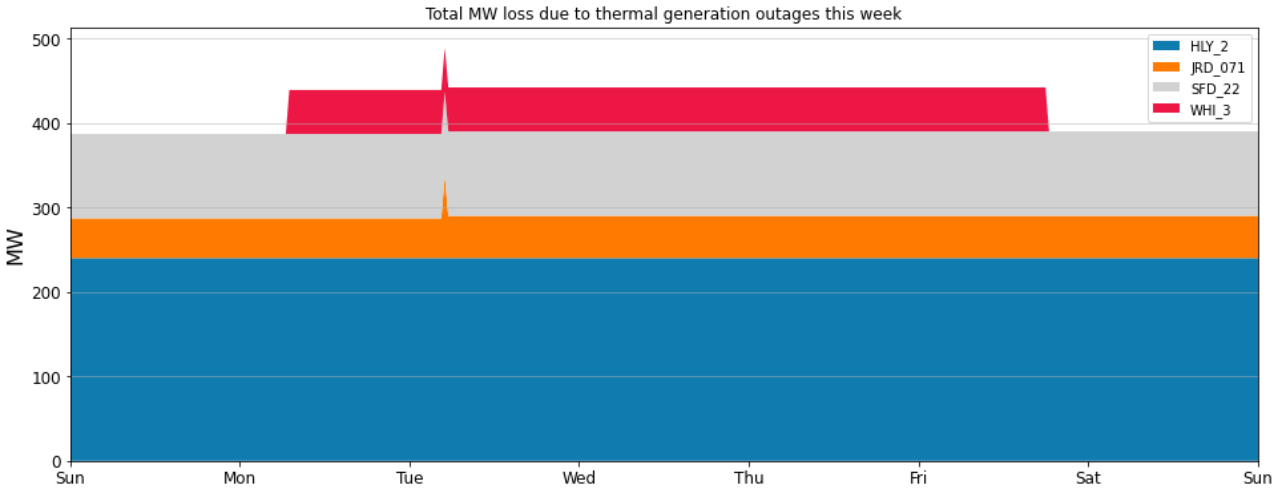

# 6. Outages

6.1. Figure 7 shows generation capacity on outage. Total capacity on outage ranged between 700 – 1,000 MW throughout the week. This is an increase on the previous week.

6.2. With regards to thermal outages, the second Stratford peaker remains on outage. Huntly 2 and Junction Road were on outage all week. Whirinaki (unit three) was on outage between Monday and Friday. Note that the spike from Junction Road on Tuesday is due to the outage rolling over to a separate POCP notice.

*Figure 7: Total MW loss due to generation outages*

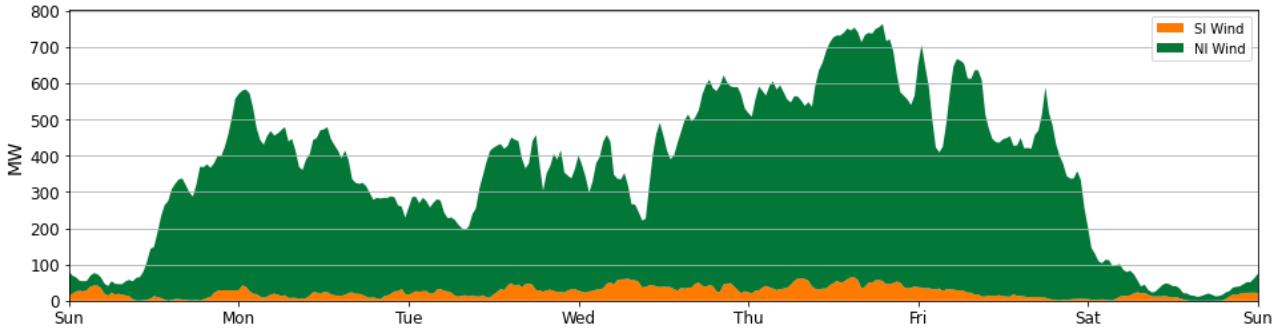





# 7. Generation

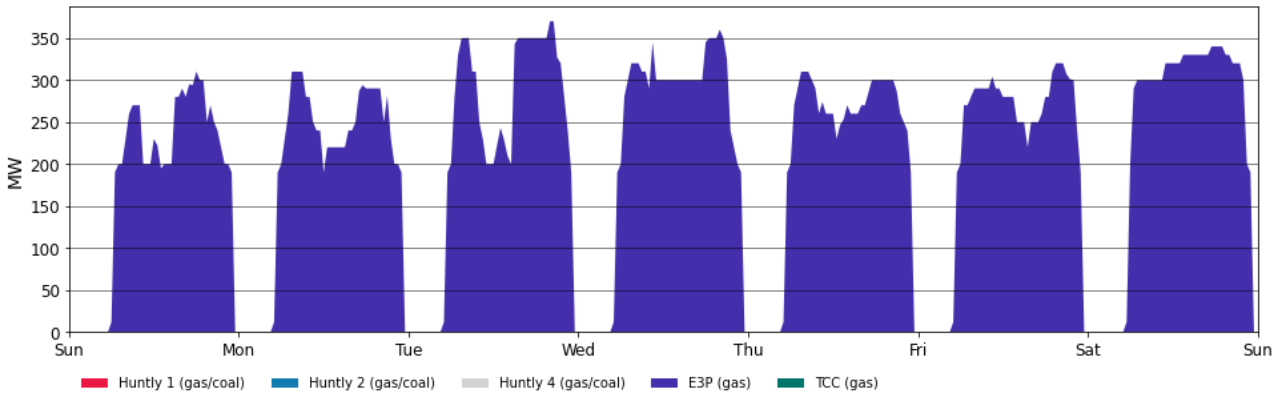
7.1. This week wind generation varied between 20 and 750 MW, as seen in Figure 8. Wind increased from around 50MW on Sunday morning to 600MW by Monday. Wind generation oscillated between 200MW and 700 MW until Friday. Wind dropped off on Friday evening and was below 100MW throughout Saturday. This low wind likely contributed to higher prices that day.

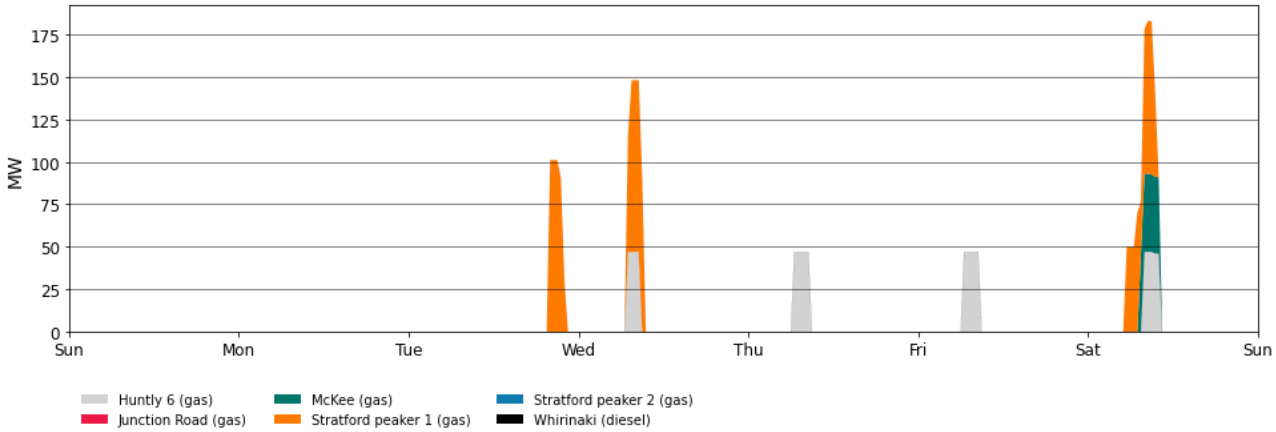
*Figure 8: Wind Generation*




7.2. Figure 9 shows generation of thermal baseload and thermal peaker plants between and 16-22 October. Only E3P ran during the day as baseload this week with higher generation from Tuesday onwards.

*Figure 9: Thermal Generation*






7.3. There was also lower generation from thermal peakers this week. Huntly 6, Stratford Peaker 1, and McKee dispatched during peak times between Tuesday and Saturday, with the Saturday morning peak aligned with low wind generation.

7.4. As a percentage of total generation, between 17 and 23 October, hydro generation totalled 68.5 per cent, geothermal 17.7 per cent, thermal 4.7 per cent and wind 7.8 per cent.

# 8. Storage/Fuel Supplyards overnight on the Monday and Friday.

8.1. Figure 10 shows total controlled national hydro storage as well as the storage of major catchment lakes including their historical mean and 10$^{th}$ to 90$^{th}$ percentiles.

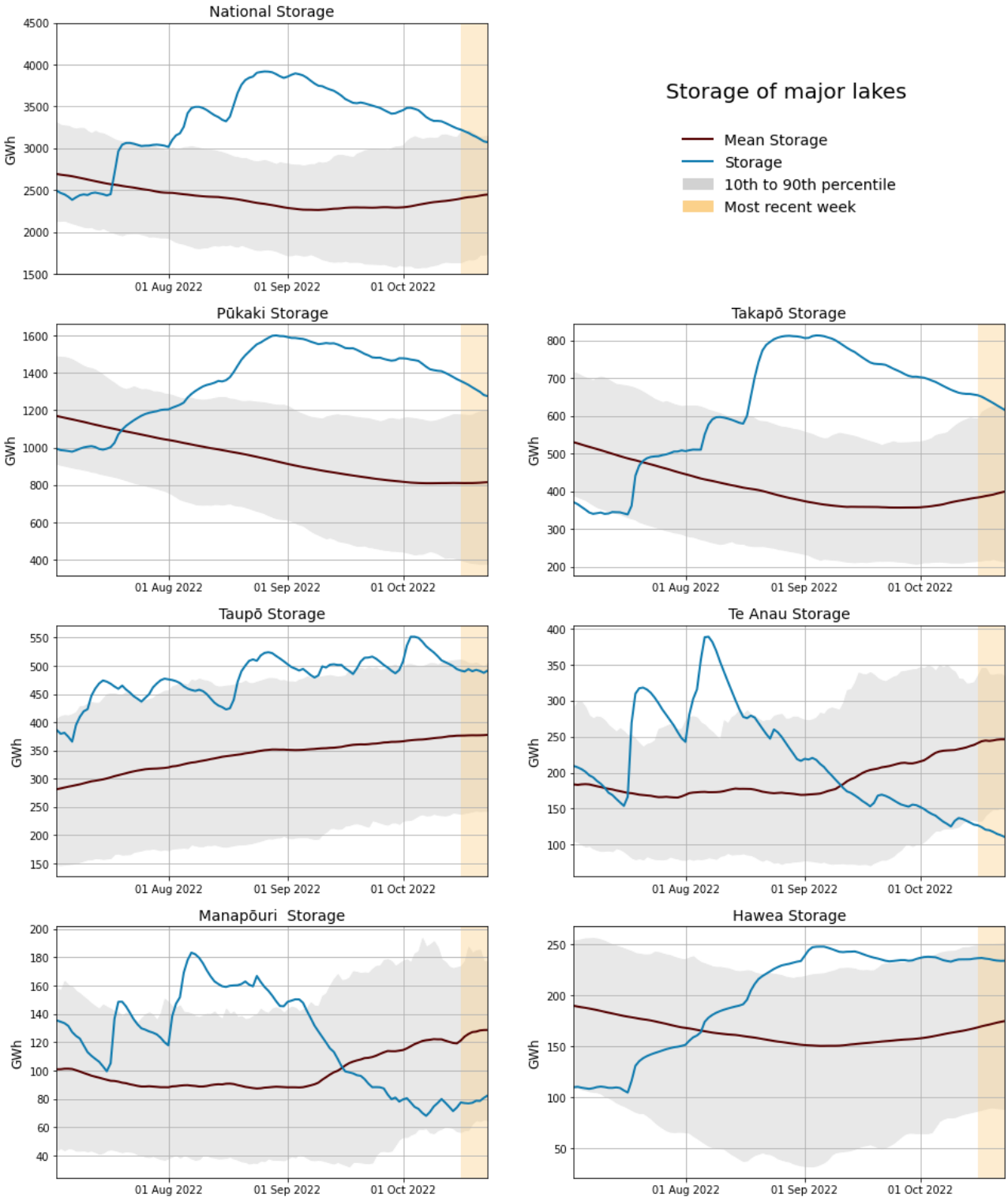
8.2. Hydro storage levels continue to remain above usual for this time of year at around 77 per cent of nominally full. However, lake levels continue declining, as hydro generation is high and inflows have reduced.

8.3. Lakes Hawea, Takapō and Taupō dipped below their 90th percentile this week. Lake Te Anau has fallen below its 10th percentile, while Manapōuri remains close to its 10th percentile. Pūkaki is the only lake still above its 90th percentile.

8.4. The overall decline has caused national storage to also sink below its 90$^{th}$ percentile.

8.5. The flow at the HVDC has been primarily northwards during the day, but southwards overnight on the Monday and Friday.

*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 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.

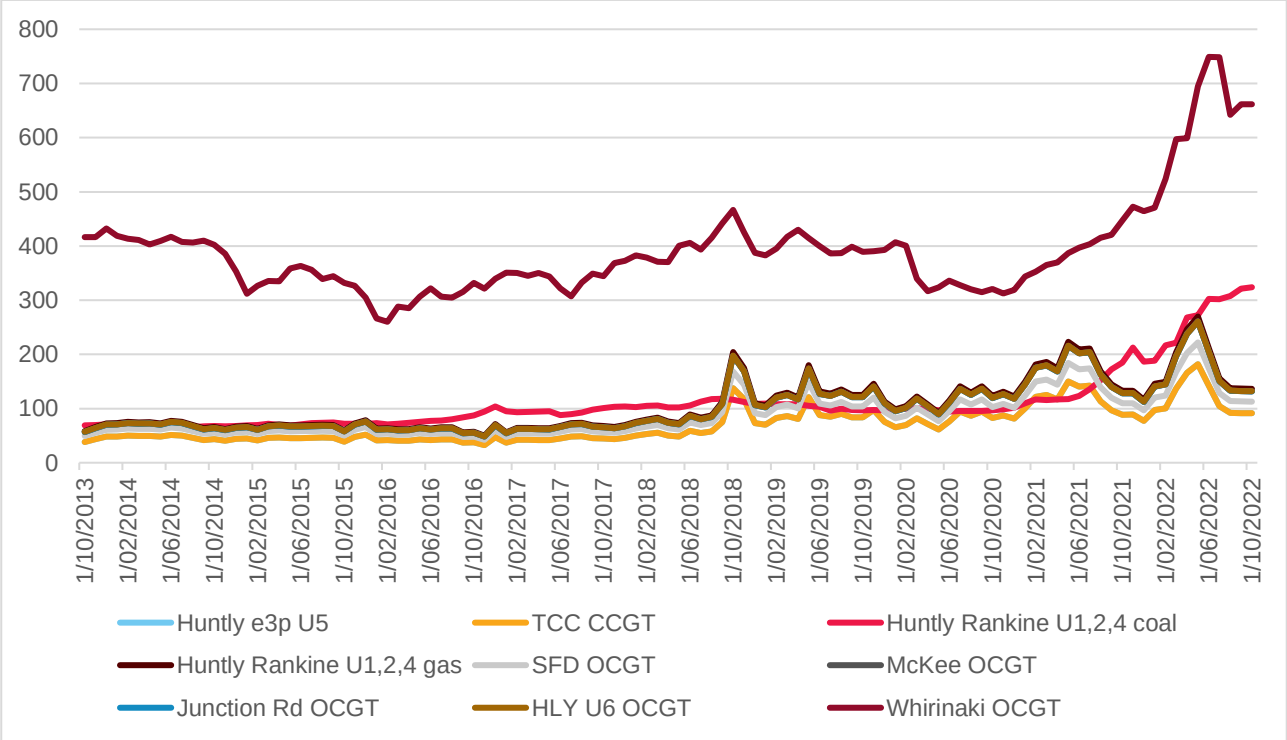
9.3. Figure 11 shows an estimate of thermal SRMCs as a monthly average up to 1 October 2022. The SRMC of gas fuelled plants continues to remain steady, the SRMC of diesel has decreased since June, while the SRMC of coal continues to increase.

9.4. In early October Indonesian coal was around $570/tonne putting the latest SRMC of coal fuelled Huntly generation at ~$320/MWh. The SRMC of Whirinaki has decreased to ~$660/MWh.

9.5. SRMCs of gas run thermal plants decreased to between $91/MWh and $136/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 C[2] on the trading conduct webpage.

*Figure 11: Estimated monthly SRMC for thermal fuels*



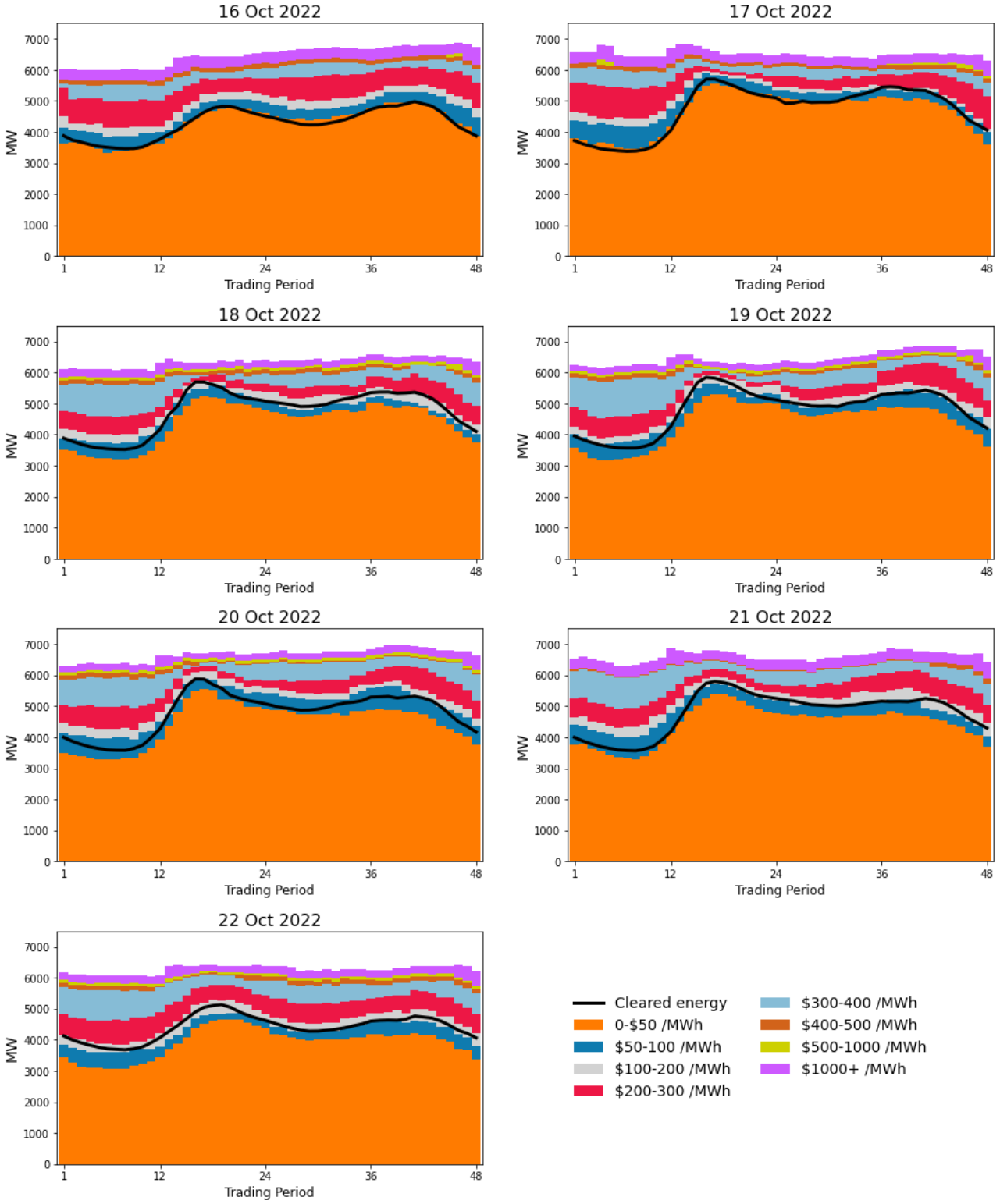

## 10. Offer Behaviour

10.1. Figure 12 shows this week's daily offer stacks, adjusted to take into account wind generation, transmission constraints, reserves and frequency keeping[3]. The black line shows cleared energy, indicating the range of the average final price.

10.2. The majority of cleared energy this week fell in either the $50-100/MWh or $100-200/MWh bands. In previous weeks, the unusual abundance of hydro caused the offer stack to have less mid-priced generation offers and lower priced generation offers. Now, however, with all lakes declining, more hydro generation has been shifted into higher priced tranches. This reflected in the higher average price, and higher off-peak prices.

[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: National daily offer stack*




10.3. Mercury's hydro offers had the most notable change this week, with a portion of their hydro generation moved from price tranches between \$0-70/MWh to between \$120/MWh-\$340/MWh. This reduced the quantity of offers below \$100/MWh and led to higher prices from Tuesday. Mercury had been drawing down Lake Taupo which was above the 90$^{th}$ percentile for that time of year, as shown in figure 10, likely to minimise the chance of spill. Now Lake Taupo is below the 90$^{th}$ percentile and the lake level has remained steady at just below 500GWh. This is likely to conserve water for higher priced periods given future prices for 2023 have reached over \$200/MWh.

# 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. |
| 07/10/22 | 15-16 | Further analysis | The Authority is making enquires with Genesis regarding offers changes to final tranche prices at Huntly 1,4 and 5 for trading period 15-16. |