

Trading Conduct Report

Market Monitoring Weekly Report

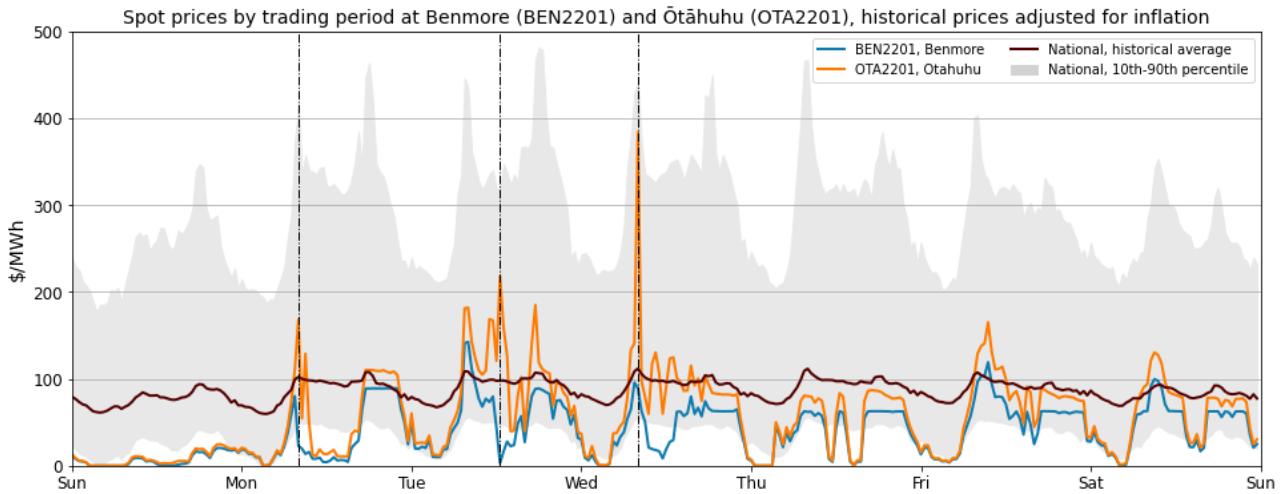
1. Overview for the week of 6-12 November

- 1.1. Wholesale spot prices between 6-12 November 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 Ōtāhuhu nodes exceed their historical 90th percentiles. Note, vertical lines this week signify North Island price spikes, which are below the 90th percentile, but have occurred during price separation.
- 2.2. Between 6-12 November wholesale spot prices across all nodes averaged \$49/MWh, with 95 per cent of prices falling between \$0.02/MWh and \$136/MWh.
- 2.3. Figure 1 shows spot prices at Benmore and Ōtāhuhu alongside their historic median and historic 10th- 90th percentiles adjusted for inflation.
- 2.4. Spot prices increased slightly this week, with more off-peak prices hovering around \$70/MWh, and more instances of prices over \$100/MWh.
- 2.5. Price separation arose this week, with the largest separations occurring between Benmore and Ōtāhuhu on Monday at 8:00 am, Tuesday at 12:30 pm and Wednesday at 8:00 am.
- 2.6. The highest price at Ōtāhuhu occurred on Wednesday morning and reached ~\$380/MWh. All prices this week, however, were below the 90th historic percentile.
- 2.7. This increase in average price and the price separation was due to tighter energy and reserve markets in the North Island, especially when the HVDC was ferrying high volumes northwards and wind generation was below 300 MW. This tight NI market is likely being exacerbated by the E3P outage.

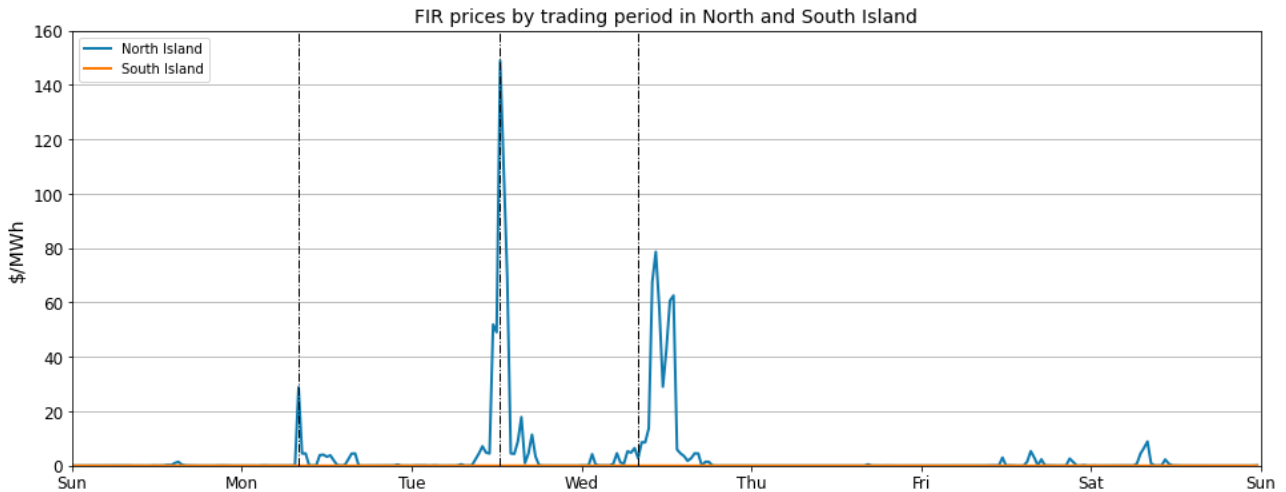
Figure 1: Wholesale Spot Prices



3. Reserve Prices

3.1. Fast instantaneous reserve (FIR) prices for the North and South Island are shown below in Figure 2. All South Island FIR prices were \$5/MWh this week. North Island prices, however, were above \$20/MWh during times on Monday, Tuesday and Wednesday – with the largest of these occurring on Tuesday at 12:30 pm. The Monday and Tuesday price spikes coincided with North Island spot price spikes, low wind generation, and occurred while the HVDC was transferring high load northwards.

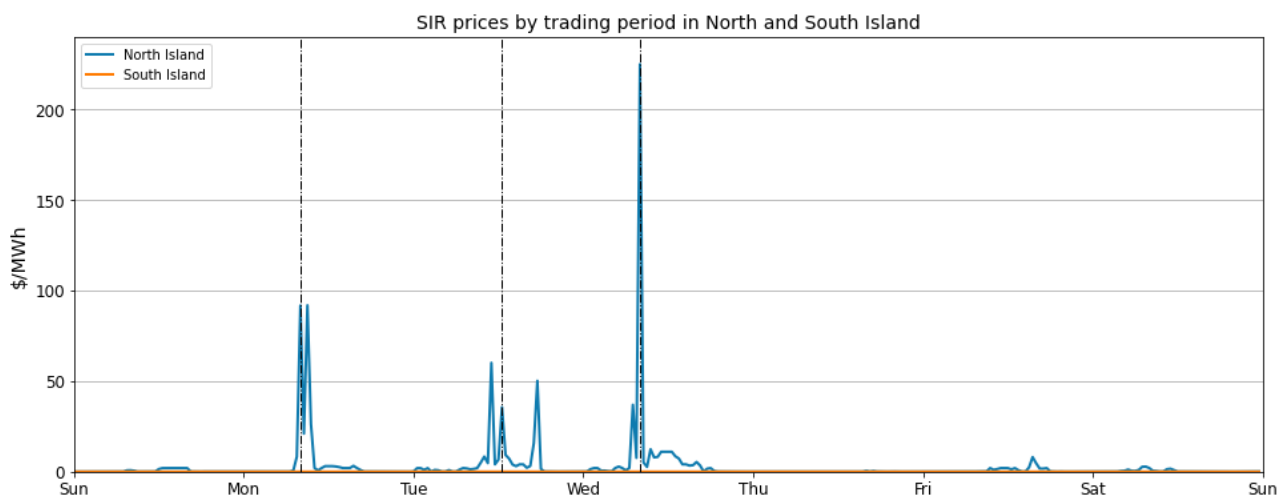
Figure 2: FIR prices by trading period and Island



3.2. Sustained instantaneous reserve (SIR) prices for the North and South Island are shown below in Figure 3. All South Island SIR prices this week remained below \$5/MWh. Again, North Island SIR prices spiked on Monday, Tuesday, and Wednesday, with the largest spike at over \$200/MWh. This price spike coincided with the \$380/MWh North Island spot price, North-South Island price separation, low wind generation, and while the HVDC was transferring high load northward.

3.3. These high FIR and SIR prices were likely due to a tight supply of reserves, resulting from thermal outages, high HVDC transfer increasing reserve demand, and SPD co-optimisation, with North Island reserves being dispatched instead of higher priced energy offers.

Figure 3: SIR prices by trading period and Island

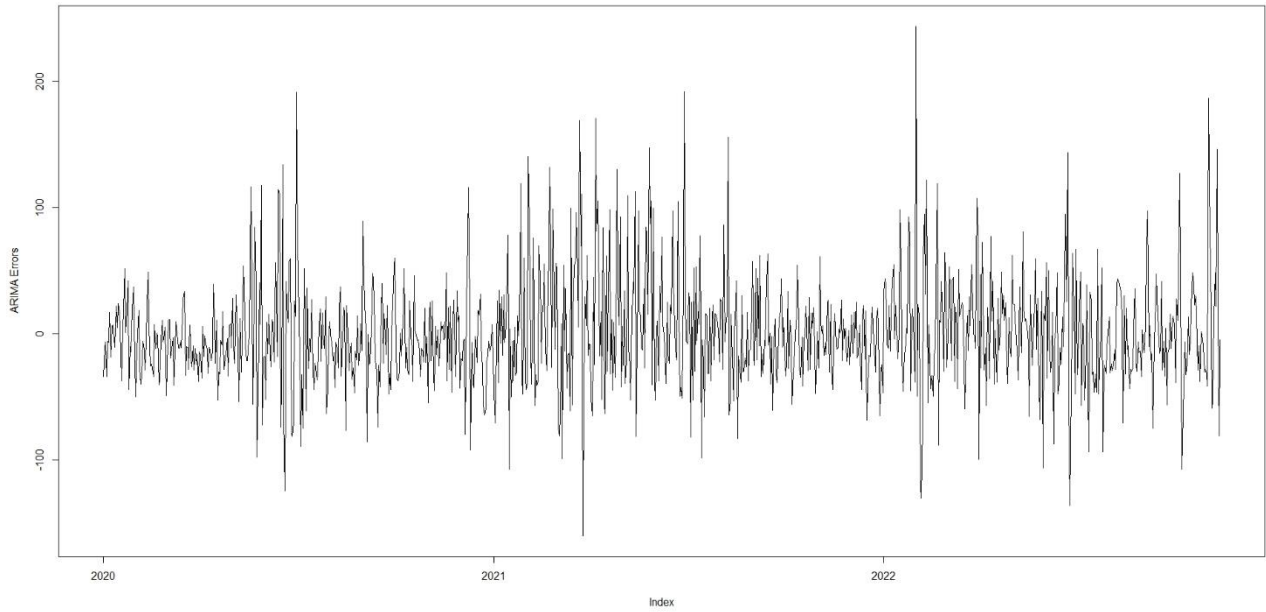


4. Regression Residuals

- 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 6-12 November were large on some days. The residuals for Wednesday show the model was underestimating price, while on Friday the model overestimated the price. The remaining days had small residuals suggesting that prices on those dates appear to be aligned with market conditions. Some of these under and overestimates may be due to pricing changing due to RTP and will be looked into further.

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

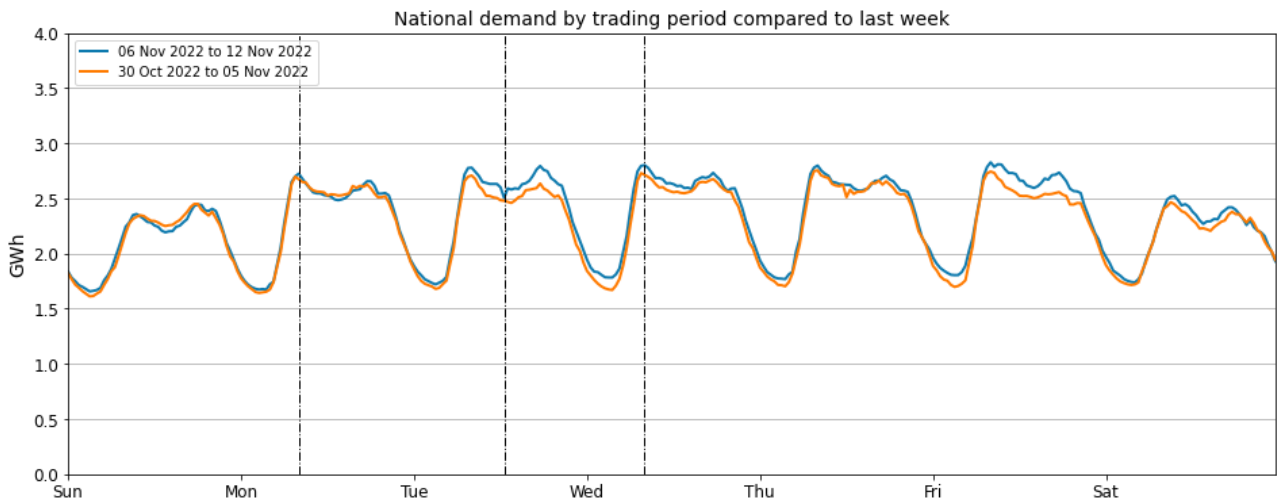
Figure 4: Residual plot of estimated daily average spot prices



5. Demand

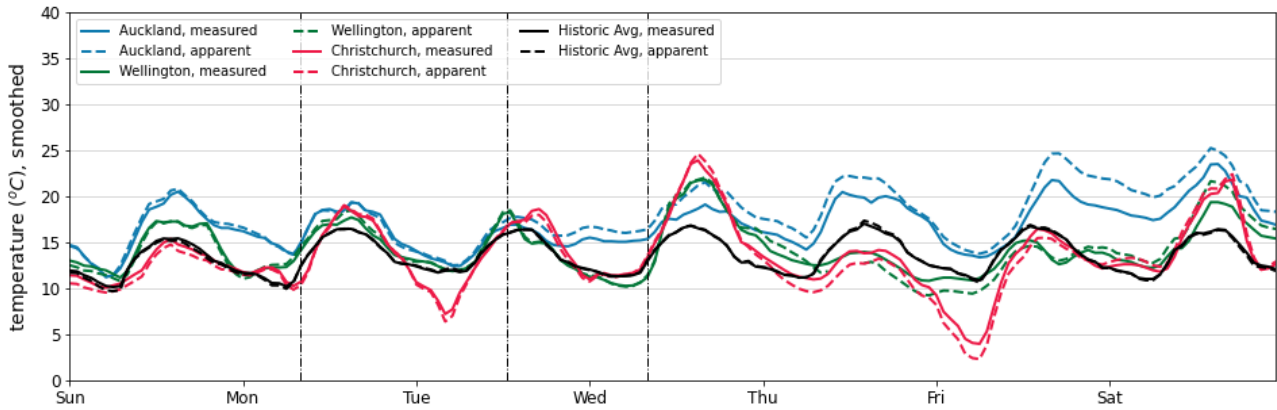
- 5.1. Figure 5 shows this week's national grid demand compared to the previous week. Demand between 6-12 November was similar to, or slightly higher than, the previous week, due to the continued warmer temperatures, which generally reduces demand.

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 were mostly above average this week across Auckland, and Wellington and Christchurch. Auckland and Wellington were mostly between ~10 and ~25 degrees throughout the week. Christchurch experienced more volatility, with temperatures between ~3 and ~25 degrees.

Figure 6: Temperatures across main centres



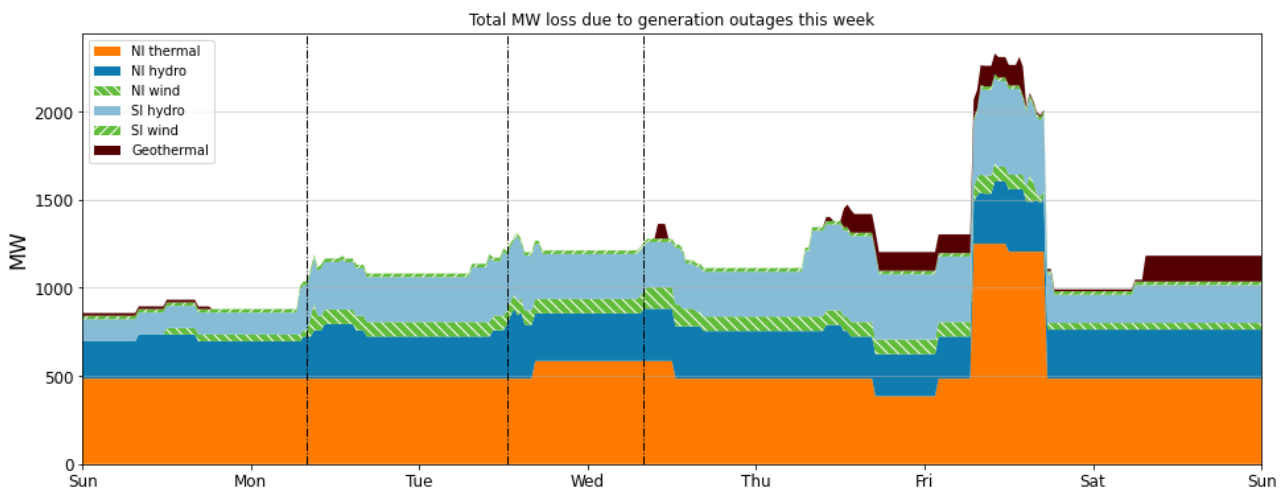
6. Outages

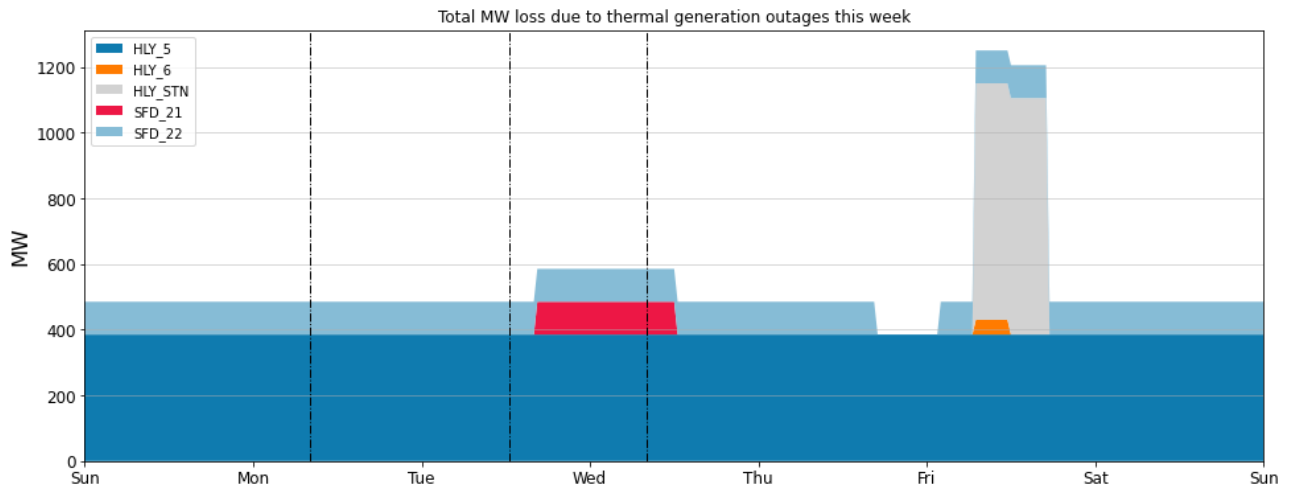
6.1. Figure 7 shows generation capacity on outage. Total capacity on outage ranged between ~800 – 1,500 MW between Sunday and Thursday. Outages increased to over 2,000MW on Friday as a significant amount of thermal generation went on outage. Outages stepped back down to ~1,200 on Saturday.

6.2. Outages of note include:

- The second Stratford peaker remains on outage but began testing.
- The first Stratford peaker went on outage overnight between Wednesday and Thursday. Huntly 5 remains on outage.
- Huntly 6 briefly went on outage on Friday.
- Huntly units 1,2 and 4 were on a simultaneous outage on Friday.
- Over 100 MW of geothermal generation was on outage for times on Thursday, Friday, and Saturday.

Figure 7: Total MW loss due to generation outages

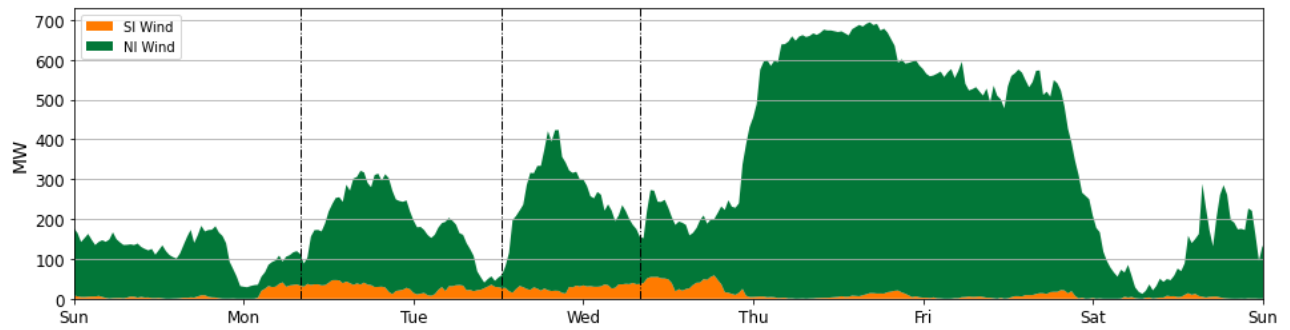




7. Generation

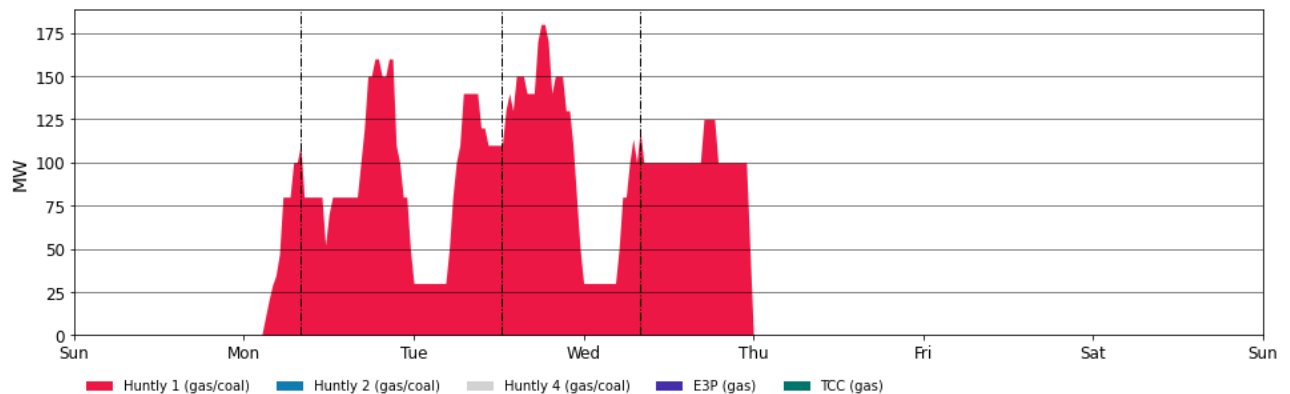
7.1. This week wind generation varied between ~20 and 700 MW, as seen in Figure 8. Wind generation was mostly below 300 MW between Sunday and Tuesday, with the Monday and Tuesday price separation and North Island price spikes aligning with wind generation below 100 MW. Wind generation increased on Tuesday afternoon but was below 200 MW during the Wednesday morning North Island price spike. Wind generation then dramatically increased to over 500 MW for most of Thursday and Friday, before falling on Saturday.

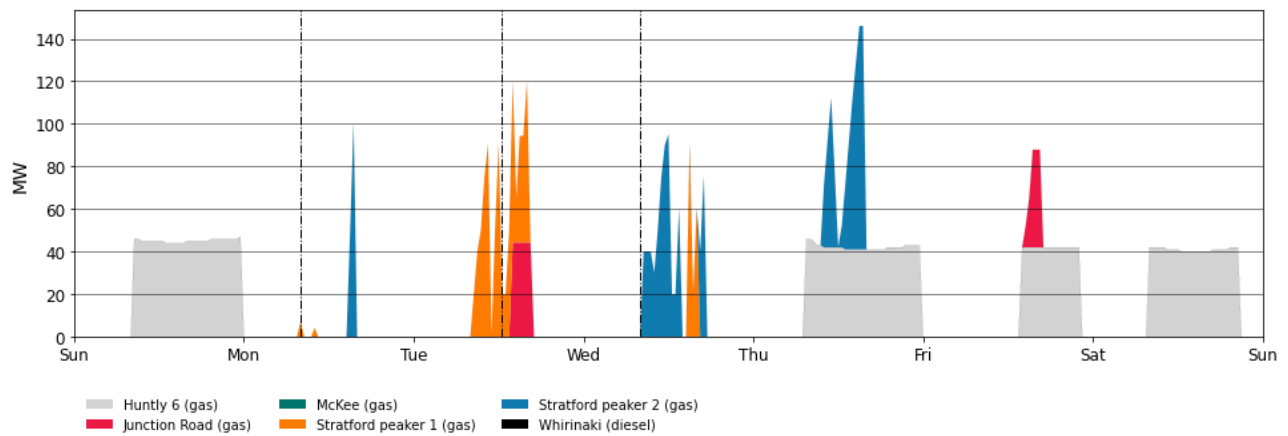
Figure 8: Wind Generation



7.2. Figure 9 shows generation of thermal baseload and thermal peaker plants between 6 -12 November. Huntly 1 ran during the day as baseload between Monday and Wednesday after which it was switched off, likely due to high winds and low demand.

Figure 9: Thermal Generation



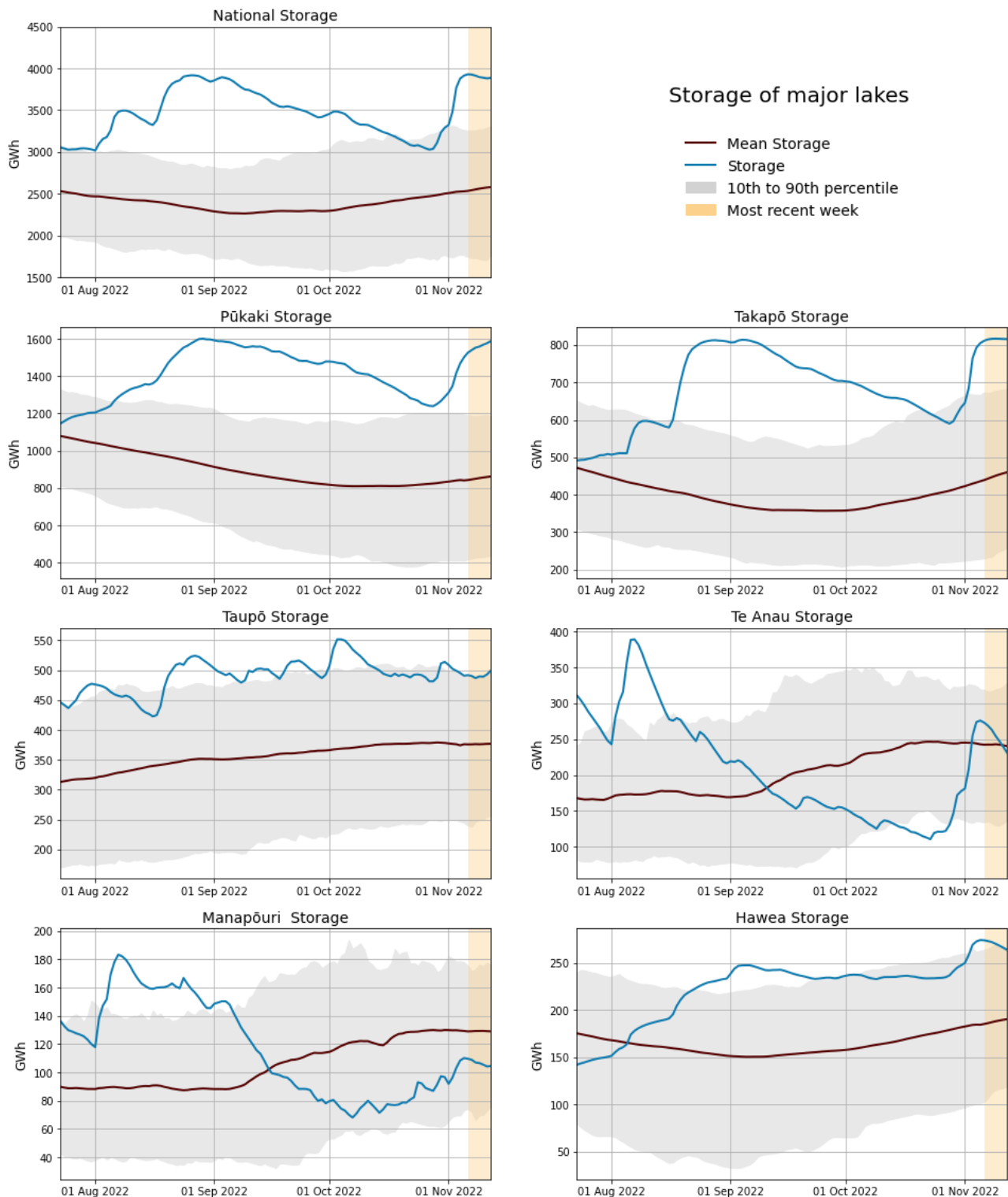


- 7.3. Huntly 6 ran for longer stints on Sunday, Thursday, Friday and Saturday, likely to cover baseload throughout the day. Stratford 1 was constrained on for reserves on Monday morning, and seems to have run a testing procedure over Tuesday and Wednesday. Stratford 2 also ran testing last week. Junction Road ran on Tuesday and Friday afternoon.
- 7.4. As a percentage of total generation, between 7-13 November, hydro totalled 74.2 percent, geothermal 16.6 percent, thermal 1.2 percent and wind 6.1 percent.

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. National hydro storage levels increased due to heavy rainfall last week, and is now around 93 per cent of nominal full.
- 8.3. Lakes Hawea, Takapō and Pūkaki all remain well above their 90th percentiles this week. Lake Te Anau fell below its historic mean, while Manapōuri remains below its historic mean. Storage at Lake Taupō increased slightly this week.
- 8.4. The flow of the HVDC was northward all week.

Figure 10: Hydro Storage

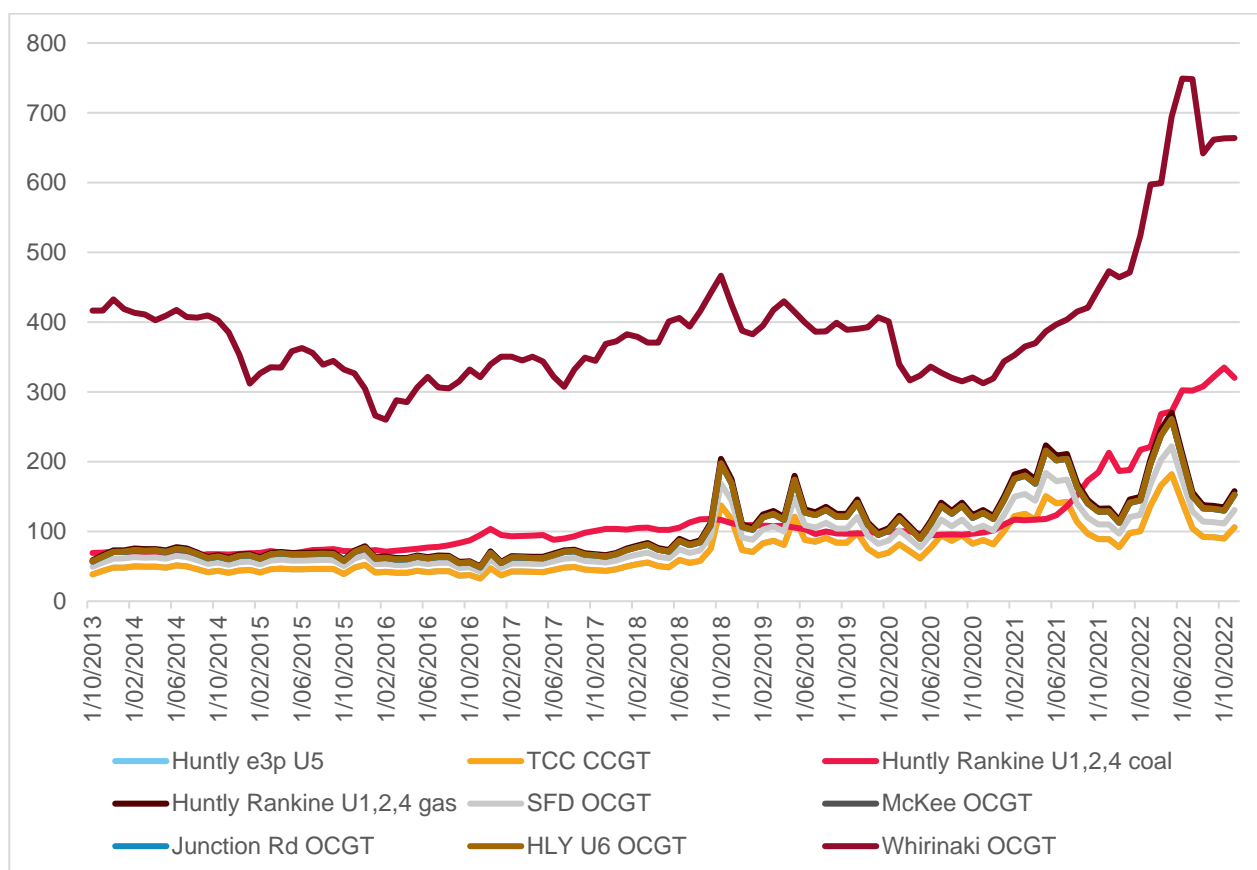


9. Price versus estimated costs

- 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 November 2022. The SRMC of gas fuelled plants has increased, the SRMC of diesel remains below its June peak, while the SRMC of coal has fallen.
- 9.4. In early November Indonesian coal was around ~\$560/tonne putting the latest SRMC of coal fuelled Huntly generation at ~\$320/MWh. The SRMC of Whirinaki has stayed constant at ~\$660/MWh. Both are likely reactions to a slight easing of international demand.
- 9.5. The SRMC of gas run thermal plants increased slightly to between \$105/MWh and \$160/MWh, likely due to the decrease in gas fuel availability in the market with Kupe on outage in November.
- 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

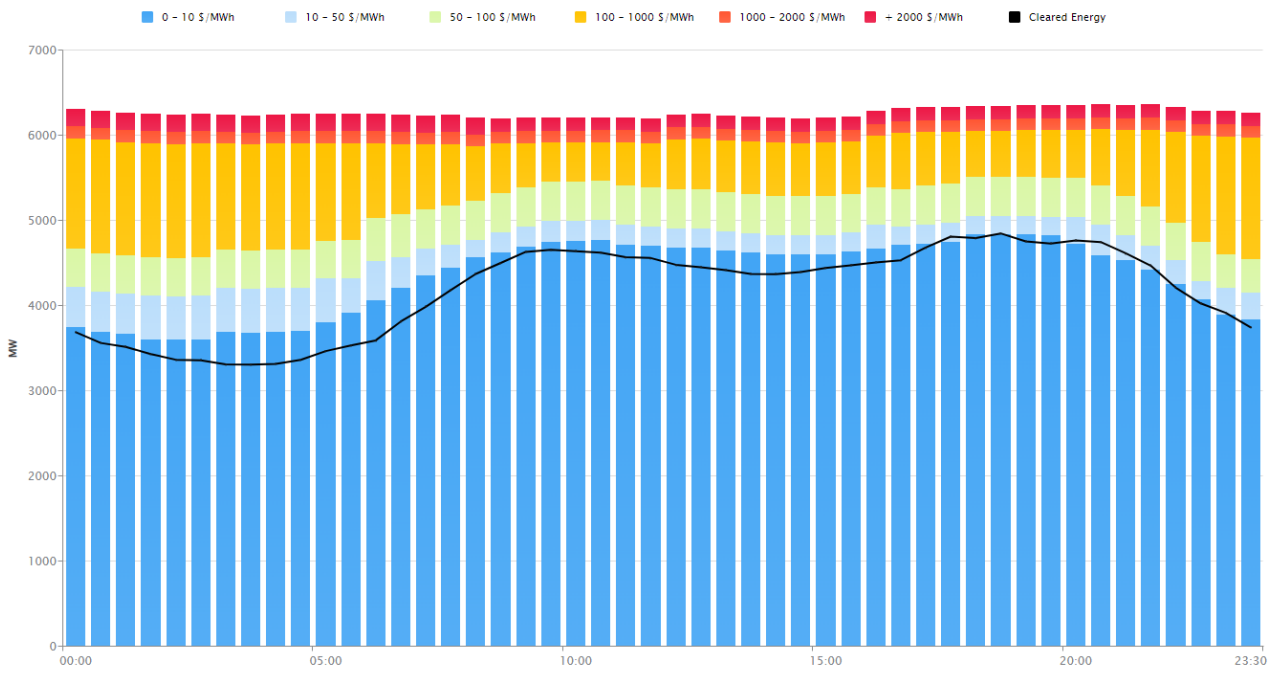
- 10.1. Figure 12 shows this week's daily offer stacks from WITS³. The black line shows cleared energy, indicating the range of the average final price.
- 10.2. The majority of cleared energy this week fell in either the \$0-10/MWh or \$10-50/MWh bands on Sunday and Monday. From Tuesday onwards, however, most energy cleared in the \$50-100/MWh band. This jump in clearing price reflects the tighter supply of energy in the North Island this week, especially during times of low wind, and with peakers being dispatched to cover baseload, due to the E3P outage.

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

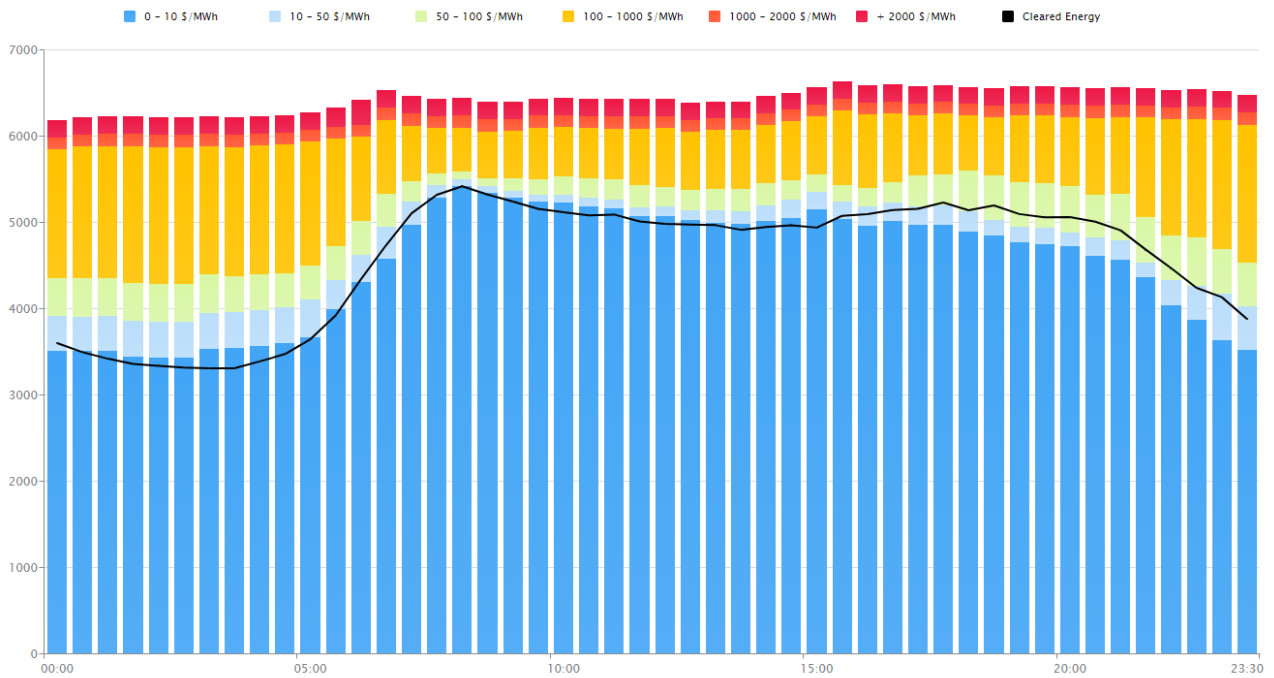
³ [Cleared Energy Stack | WITS \(electricityinfo.co.nz\)](https://www.electricityinfo.co.nz/cleared-energy-stack-wits)

Figure 12: National daily offer stack from WITS

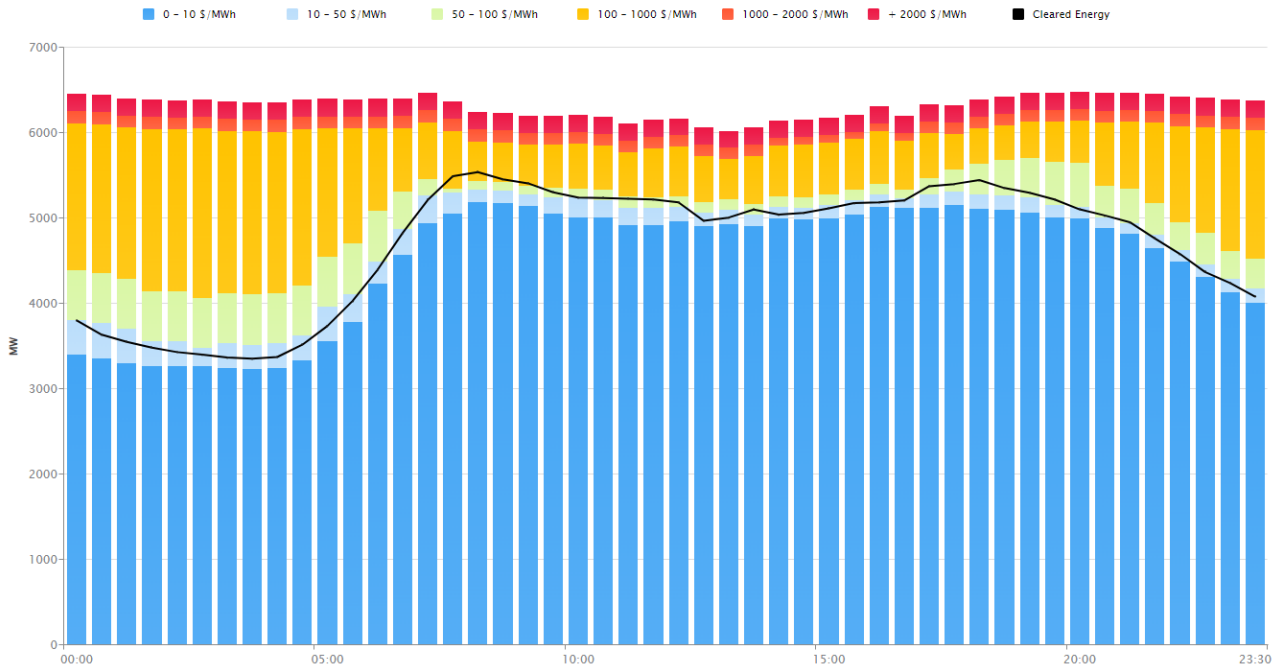
Sunday 6 November



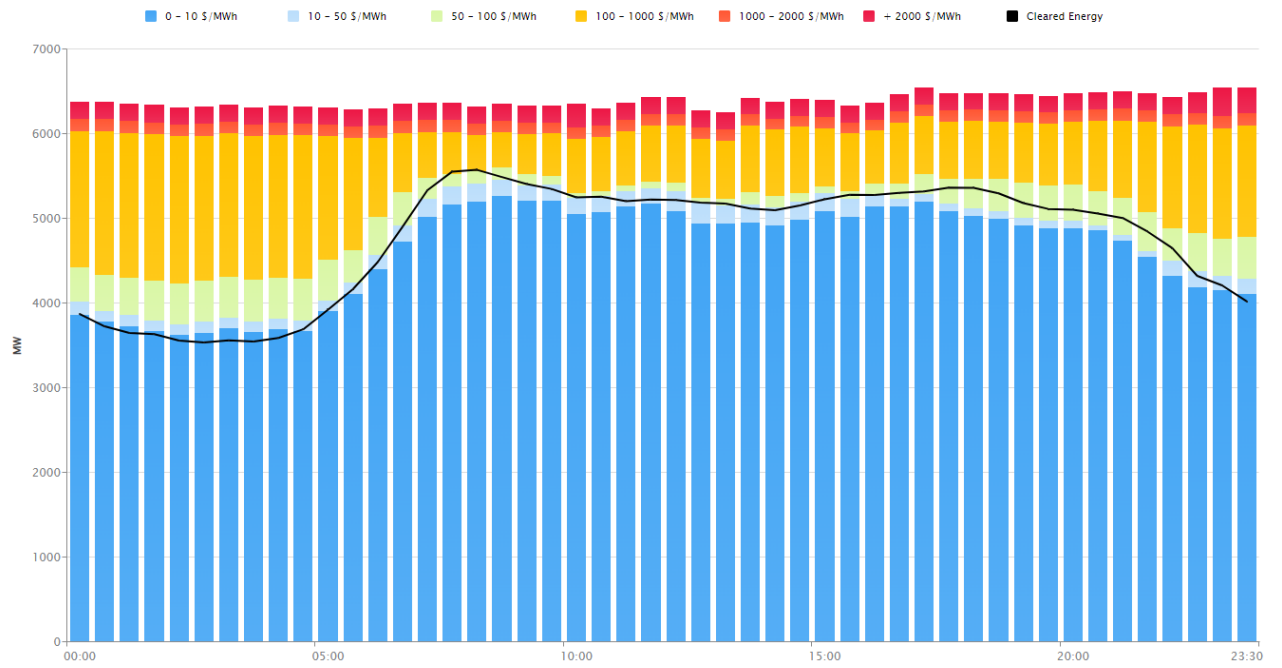
Monday 7 November



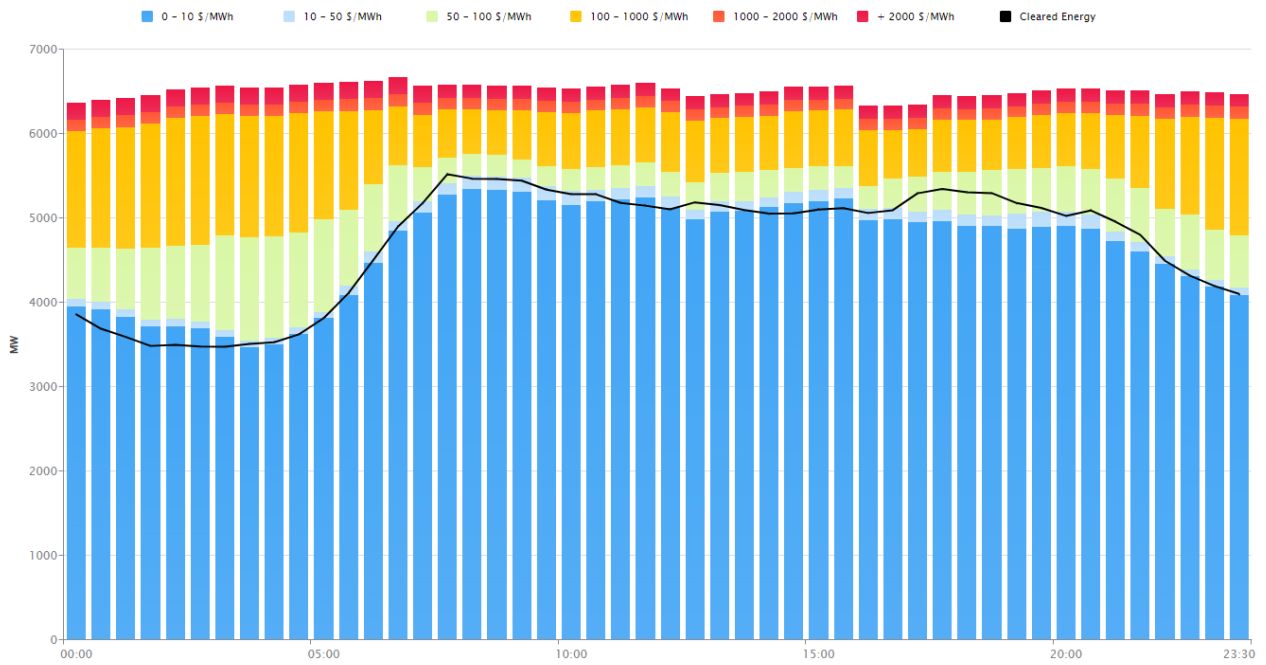
Tuesday 8 November



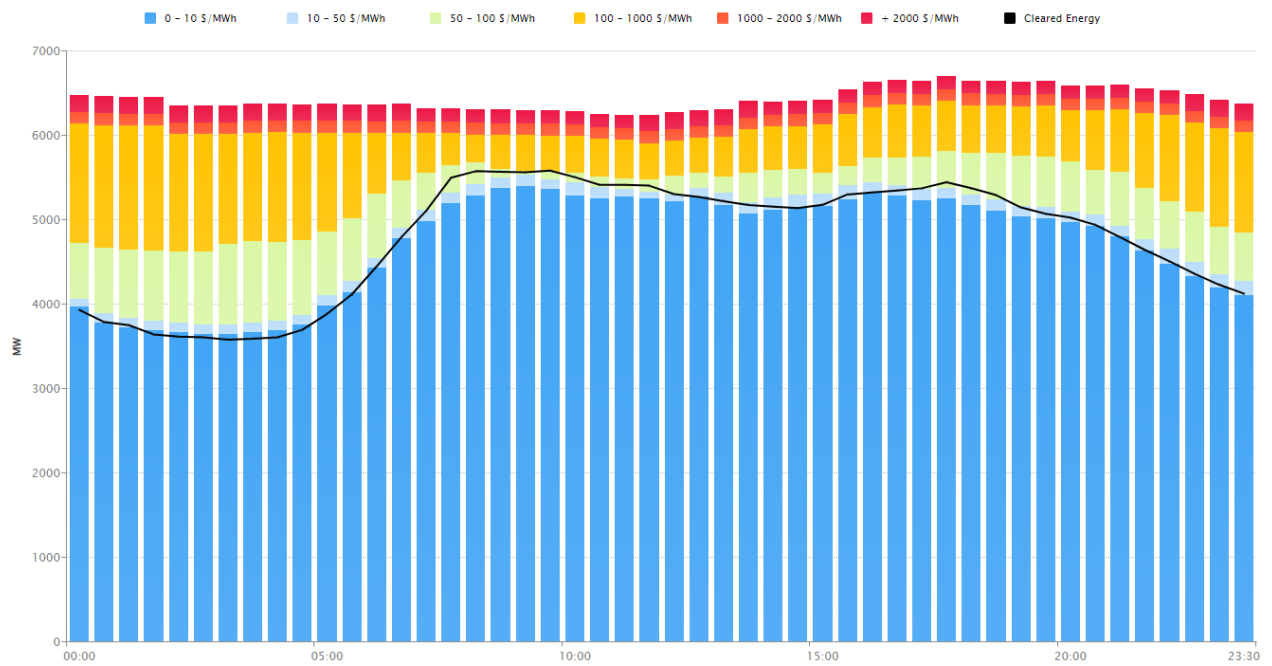
Wednesday 9 November



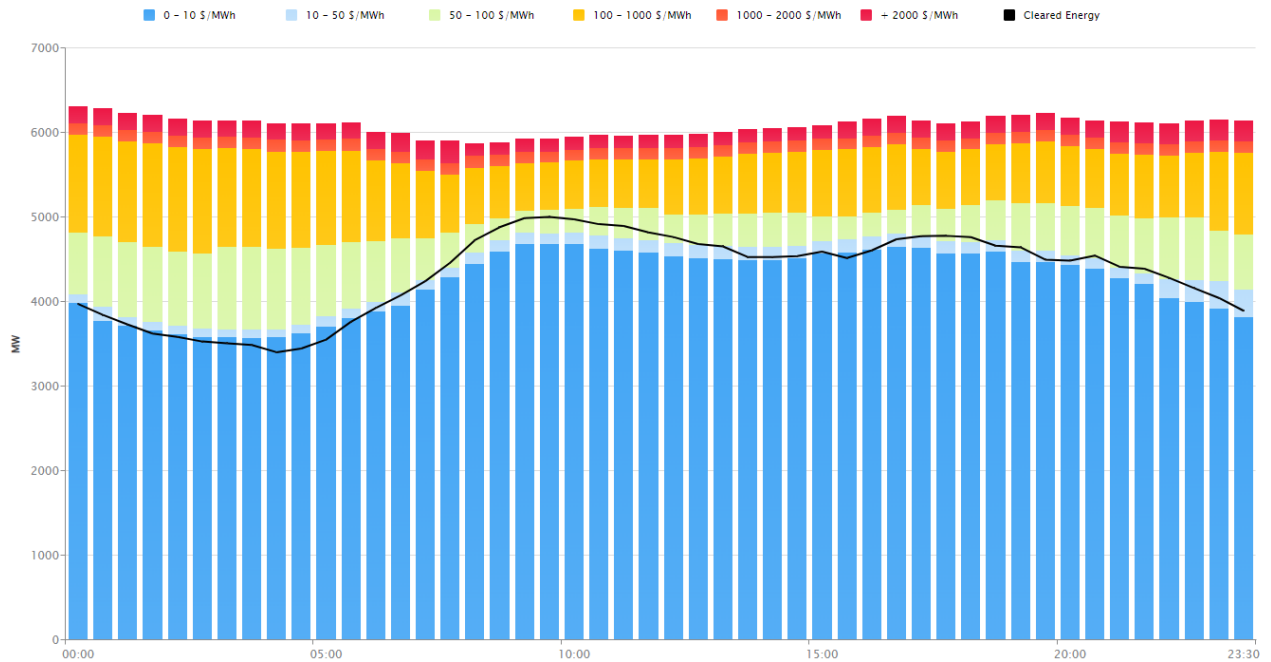
Thursday 10 November



Friday 11 November



Saturday 12 November



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.