

Trading Conduct Report

Market Monitoring Weekly Report

1. Overview for the week of 8-14 January 2023

- 1.1. Wholesale spot prices between 8-14 January 2023 appear to be consistent with market conditions.

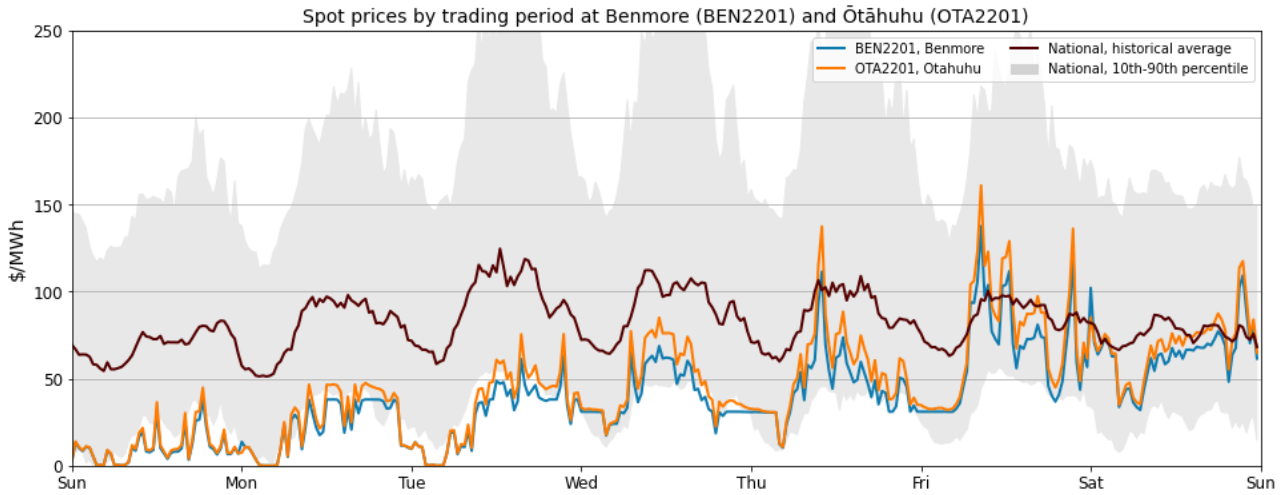
2. Spot Prices

- 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 any node exceeds its historical 90th percentiles.
- 2.2. Between 8-14 January 2023:
- (a) The average wholesale spot price across all nodes was \$42.3/MWh.
 - (b) 95 per cent of prices fell between \$0.2/MWh and \$109.5/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. Peak and off-peak prices stayed mostly below \$50/MWh on Sunday and Monday. Off-peak prices increased from Tuesday evening onwards, to around \$30/MWh. There were some higher peak prices, and more price volatility, from Thursday onwards.
- 2.5. The highest price occurred on Friday 13 January, at 8:30 am. The price at Otahuhu was \$160/MWh and the price at Benmore was \$137/MWh. No prices this week breached the 90th percentile of historic prices.
- 2.6. Higher peak and off-peak prices alongside increased price volatility occurred from mid-week onwards as South Island hydro offers increased, as lake Te Anau and Manapōuri continued to decline, and North Island wind generation decreased.
- 2.7. Note, on Wednesday and Thursday there were negative final prices at ARI1102 and ROX1101. The negative prices at ROX1101 were unrelated to the negative prices experienced at ARI1102 that were the subject of a pricing error claim.¹ The negative prices at ROX1101 were due to a spring washer² while Invercargill-Roxburgh circuit 1 was on outage.

¹ [News | WITS \(electricityinfo.co.nz\)](#)

² More information can be found here [Learning centre | Transpower](#)

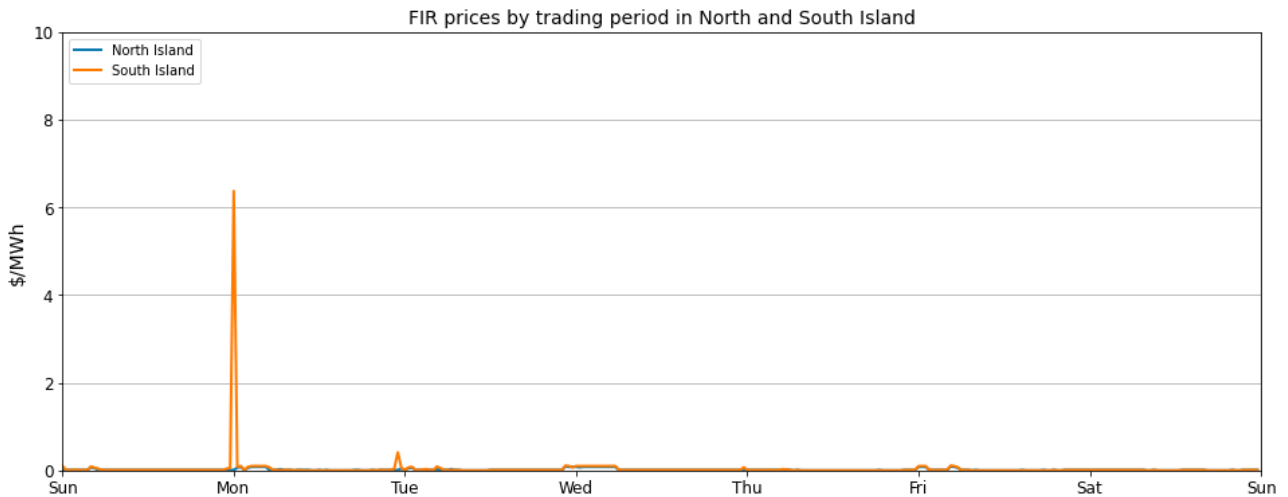
Figure 1: Wholesale Spot Prices between 8-14 January 2023



3. Reserve Prices

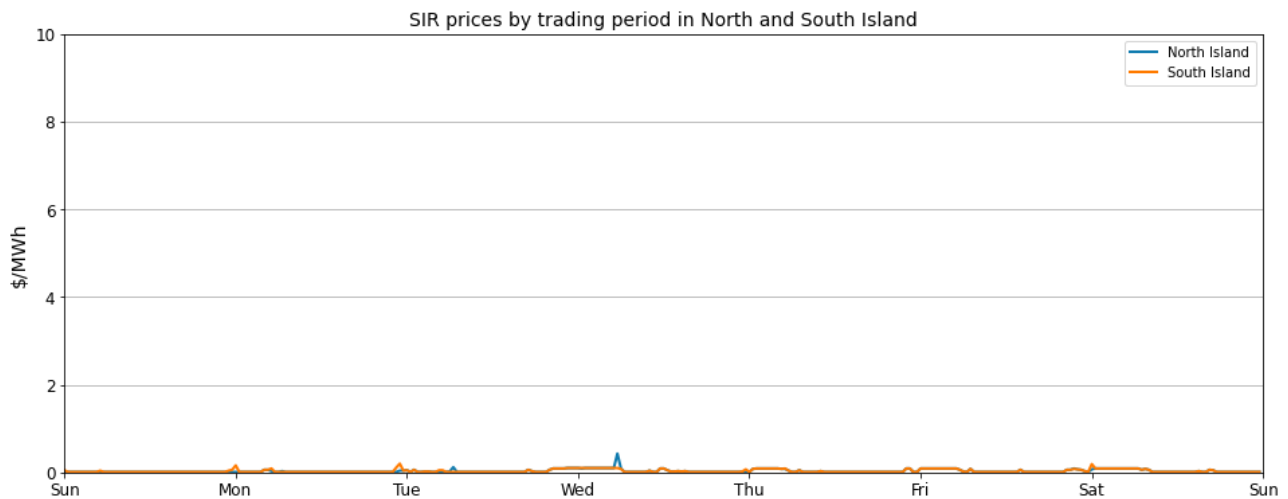
3.1. Fast instantaneous reserve (FIR) prices for the North and South Island are shown below in Figure 2. Most FIR prices between 8-14 January 2023 were below \$1/MWh with one small price spike to just over \$6/MWh.

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 between 8-14 January 2023 were below \$1/MWh.

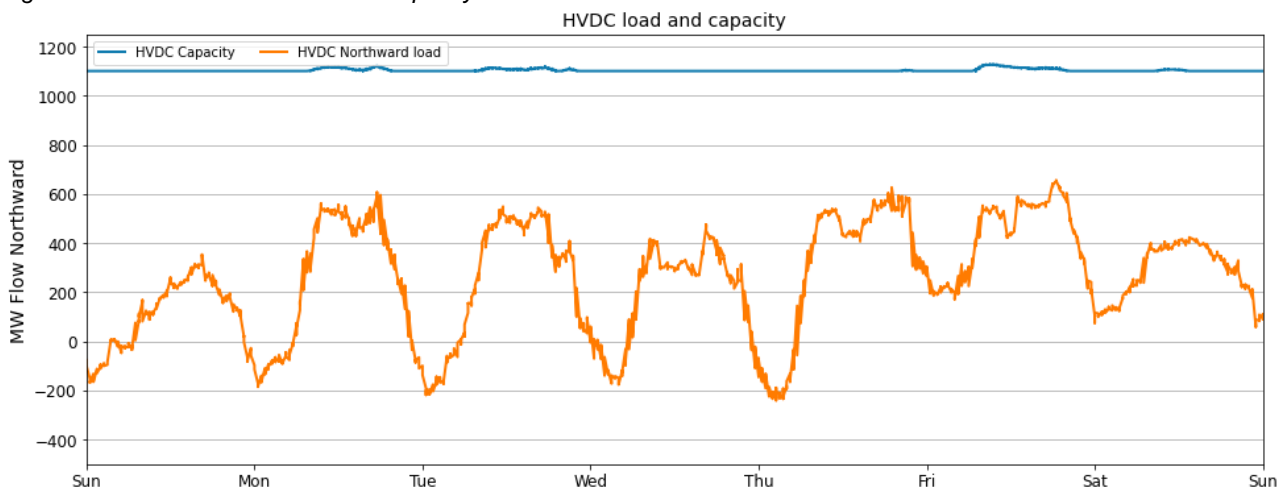
Figure 3: SIR prices by trading period and Island



4. HVDC

- 4.1. Figure 4 shows northward HVDC flow between 8-14 January 2023. Between Sunday and Wednesday HVDC flow was northward during the day, peaking at roughly 600 MW, and South overnight, reflecting the high North Island wind generation. From Friday onwards, all flow was Northward.

Figure 4: HVDC northward flow and capacity



5. Regression Residuals

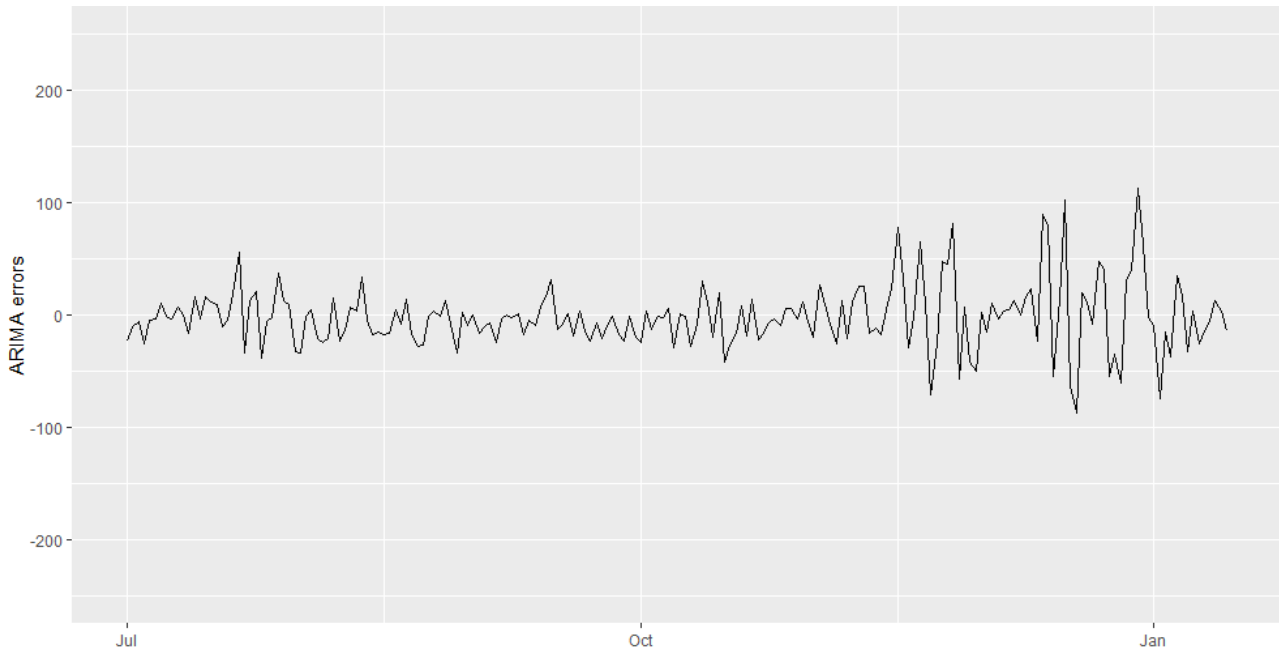
- 5.1. The Authority's monitoring team uses a regression model to model spot price. The residuals show how close the predicted prices were to actual prices. Large residuals may indicate that prices do not reflect underlying supply and demand conditions. Details on the regression model and residuals can be found in Appendix A³ on the trading conduct webpage.
- 5.2. Figure 5 shows the residuals of autoregressive moving average (ARMA) errors from the daily model. Residuals for 8-14 January were large on some days, being overestimated on the Wednesday and underestimated on the Friday.
- 5.3. The underestimation is likely due to the model not capturing the full impact of falling lake levels at Te Anau and Manapōuri (see figure 12), which contributed to higher off-peak

³ <https://www.ea.govt.nz/assets/dms-assets/29/Appendix-A-Regression-Analysis.pdf>

prices Wednesday onwards. The overestimation on Friday was likely due to the Stratford peakers running with low priced tranches.

- 5.4. The magnitude of residuals has increased since November 2022, and the monitoring team is undertaking further analysis regarding this.

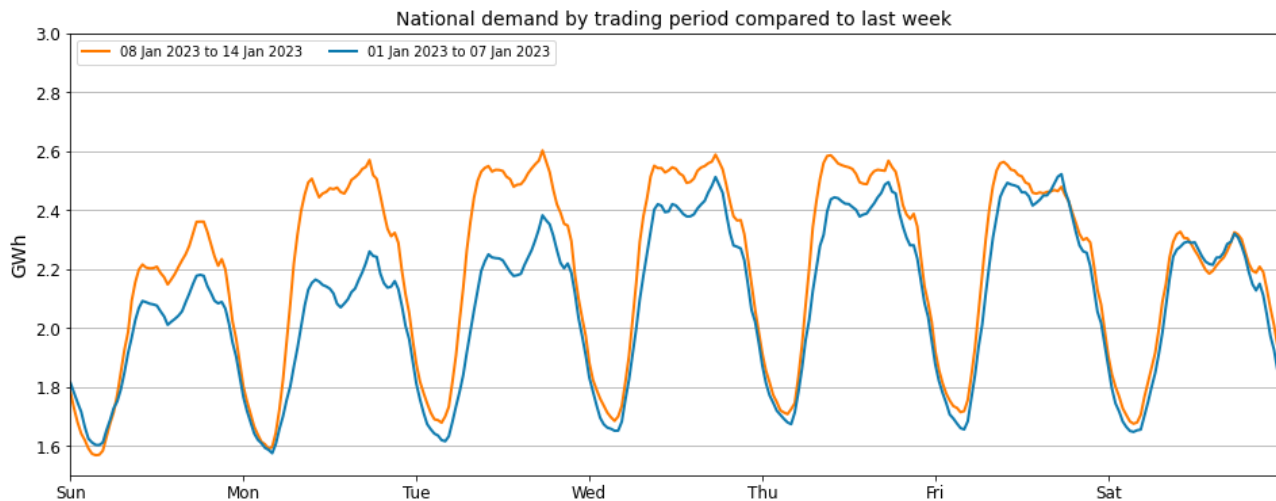
Figure 5: Residual plot of estimated daily average spot prices from 1 July 2022 – 14 January 2023



6. Demand

- 6.1. Figure 6 shows national grid demand between 8-14 January 2023, compared to the previous week. Daily demand increased this week as the holiday period ended. Daily demand peaked in the evenings between Sunday and Wednesday, and then in the mornings on Thursday and Friday.

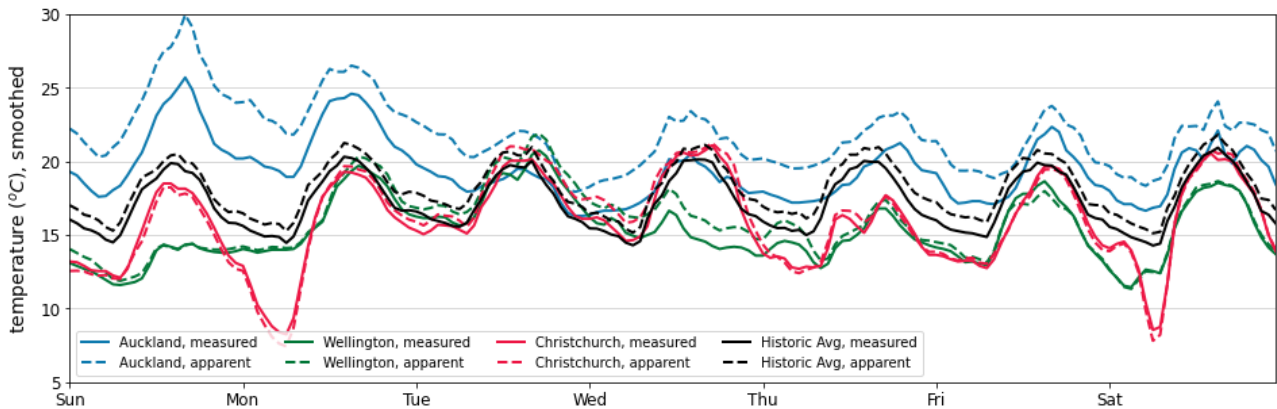
Figure 6: National demand by trading period compared to the previous week



- 6.2. Figure 7 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.

6.3. Between 8-14 January, Auckland temperatures were above the historic average, at between 15-25 degrees. Temperatures in Wellington ranged between 13-20 degrees, and Christchurch swung between 5-20 degrees.

Figure 7: Temperatures across main centres



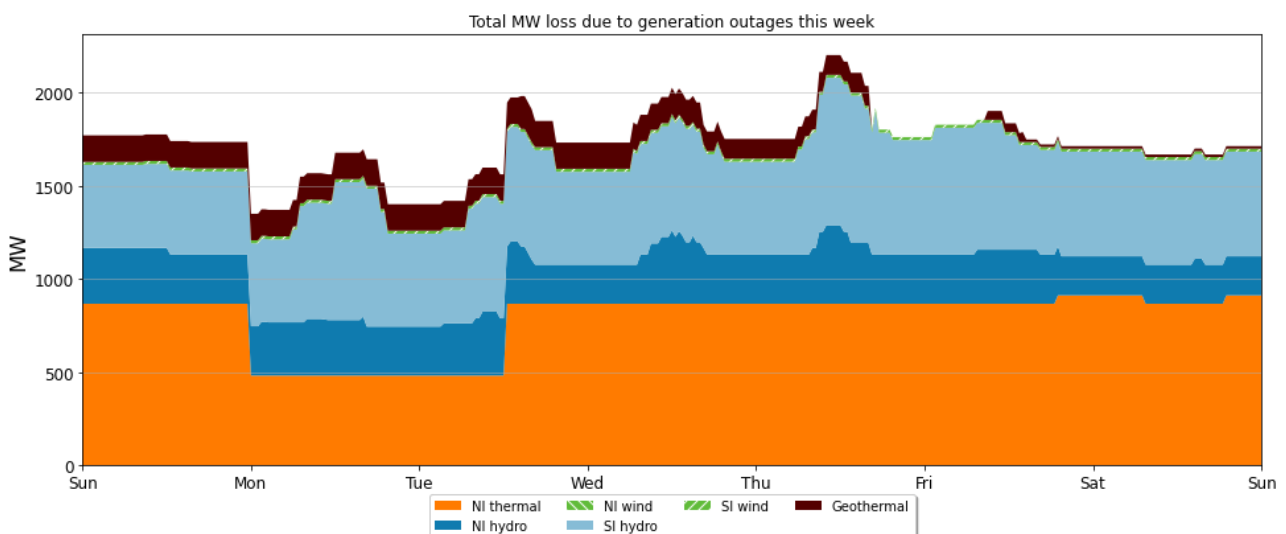
7. Outages

7.1. Figure 8 shows generation capacity on outage. Total capacity on outage between 8-14 January 2023 ranged between ~1,250 – 2,100 MW. Outages stepped down from ~1,750 MW on Sunday, to range between ~1,300-1700, as outages increased from Tuesday onwards as more North Island thermal went on outage. Periodic North and South Island hydro outages during the day and geothermal outages decreased from Friday onwards.

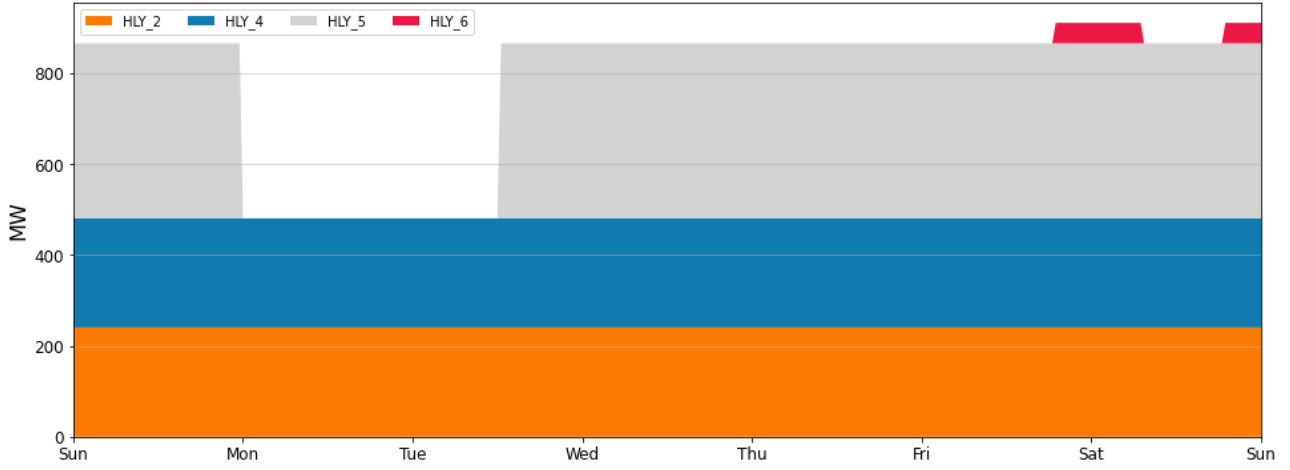
7.2. Notable outages include:

- (a) Huntly 5 ended an outage on Sunday, and another begin on Tuesday.
- (b) Huntly 2 and 4 remain on outage.
- (c) Multiple Manapōuri units went on outage this week.
- (d) Multiple Clyde units went on outage this week.
- (e) 130 MW of geothermal was on outage between Sunday and Thursday.

Figure 8: Total MW loss due to generation outages



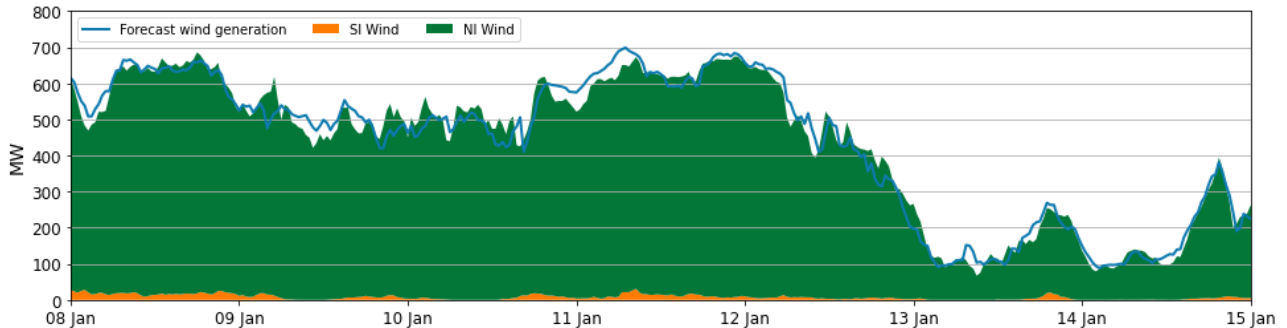
Total MW loss due to thermal generation outages this week



8. Generation

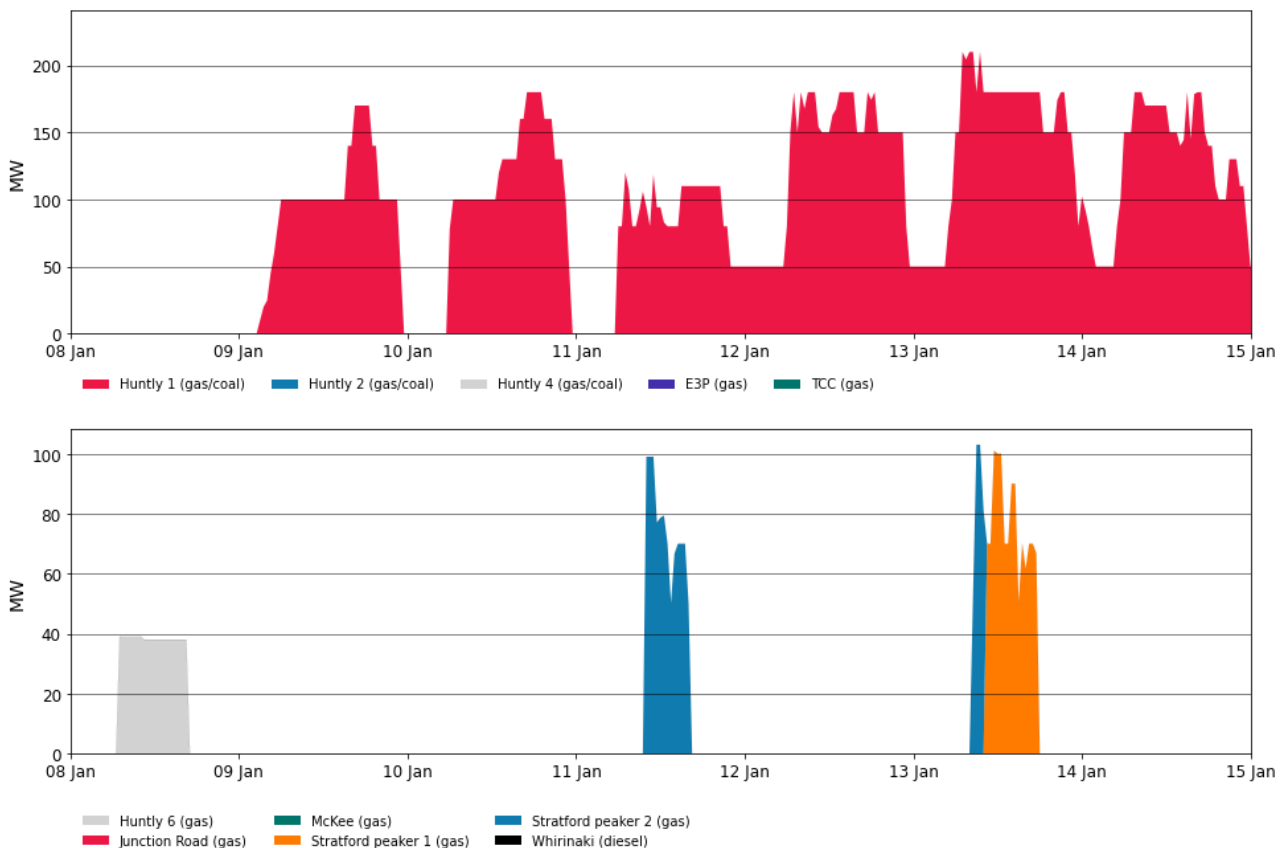
8.1. Wind generation, between 8-14 January 2023, varied between ~100 and 700 MW. Wind generation was high, at consistently over 400 MW between Sunday and Wednesday, as cyclone Hale passed over the country. On Thursday wind generation began dropping, with wind hovering mostly between 100-200 MW on Friday, and 100-400 MW on Saturday.

Figure 9: Wind Generation and forecast



8.2. Figure 10 shows generation of thermal baseload and thermal peaker plants between 8-14 January 2023. Huntly 1 ran during the day on Monday and Tuesday, cover baseload, with it ramping up during peak periods. From Wednesday onwards it stayed on overnight.

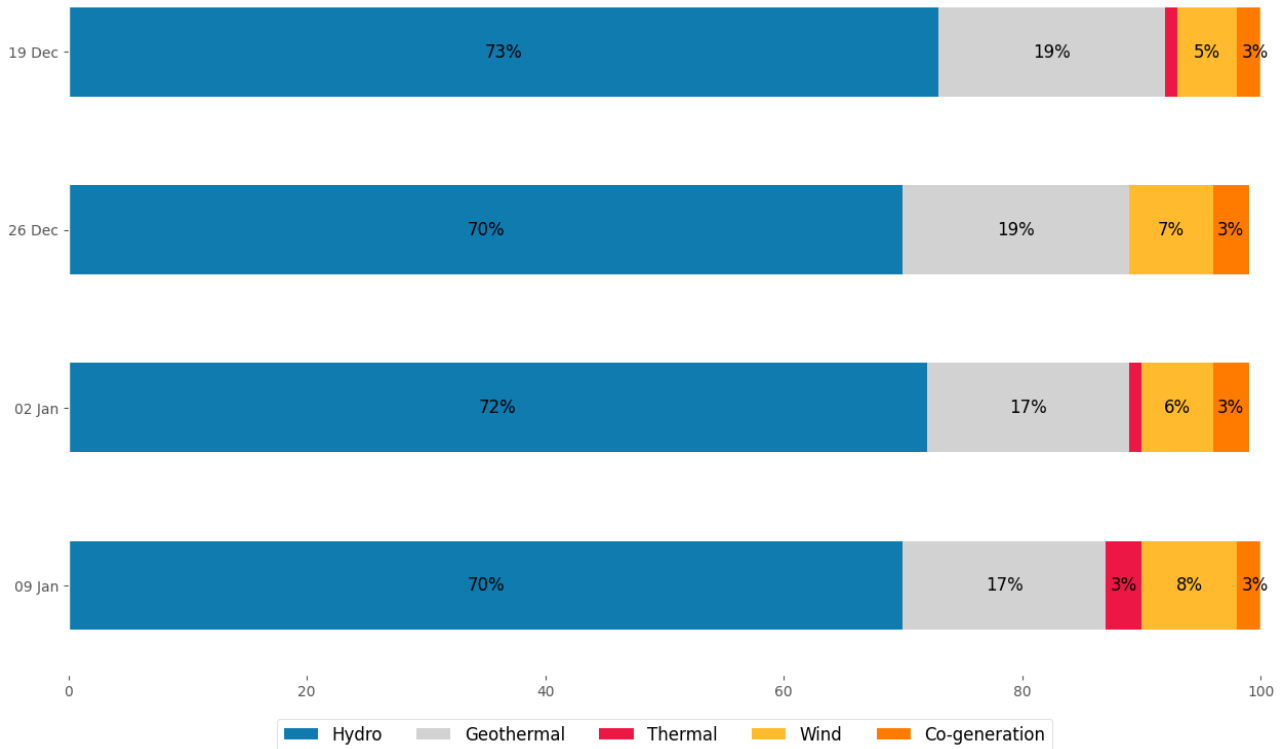
Figure 10: Thermal Generation



8.3. Huntly 6 ran during the day on Sunday. Stratford peaker 2 ran on Wednesday and Friday, and the other peaker aslo ran on Friday.

8.4. As a percentage of total generation, between 9-15 Janaury, total weekly hydro generation totalled 69.7 percent, geothermal 16.7 percent, thermal 2.8 percent, wind 7.7 percent, and co-generation 3.2 percent.

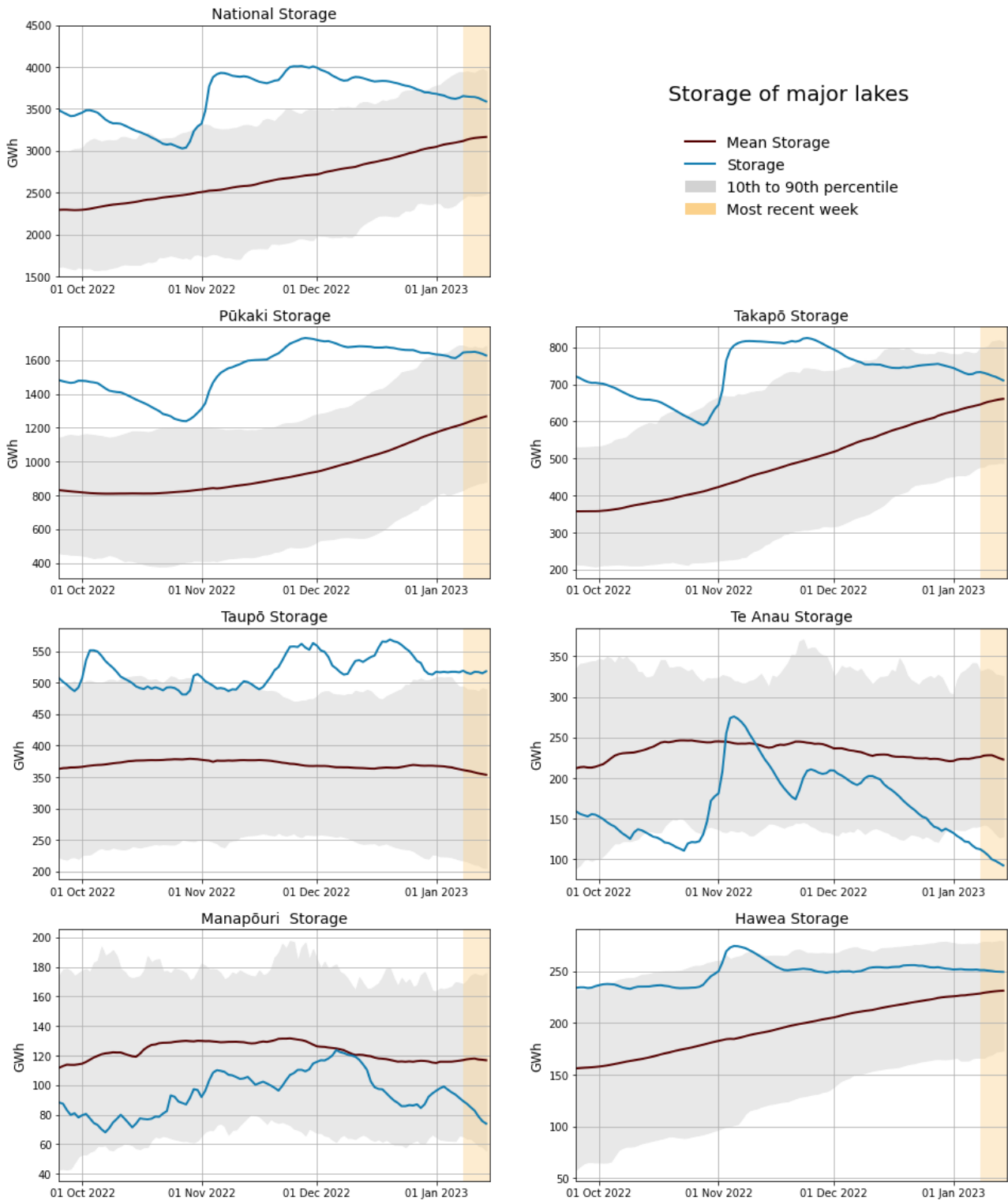
Figure 11: Total generation as a percentage each week between 21 November 2022 and 8 January 2023



9. Storage/Fuel Supply

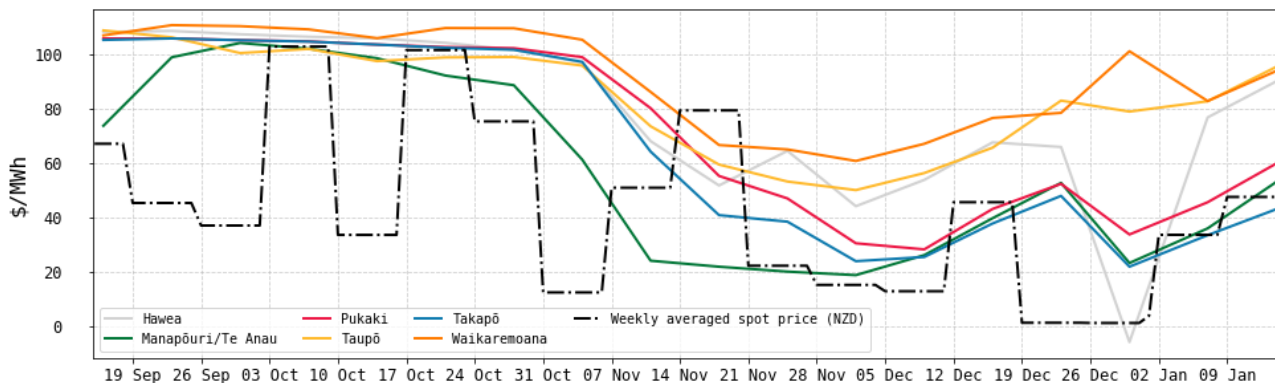
- 9.1. Figure 12 shows total controlled national hydro storage as well as the storage of major catchment lakes including their historical mean and 10th to 90th percentiles.
- 9.2. National hydro storage levels have decreased over the holiday period and this week, but is still around 88.2 per cent of nominal full.
- 9.3. All lakes, bar Taupō, are below their 90th percentile. Storage at Lake Te Anau has continued to decline, and is now well below its 10th percentile. Storage at Manapōuri has declined also, and its close to its 10th percentile.

Figure 12: Hydro Storage



10. JADE Water Values

Figure 13: JADE water values across various reservoirs between 15 September 2022 and 14 January 2023



- 10.1. The JADE⁴ model gives a consistent measure of the opportunity cost of water, by seeking to minimise the expected fuel cost of thermal generation and the value of lost load and provides an estimate of water values at a range of storage levels. Figure 13 shows the national water values between 15 September 2022 and 14 January 2023 using values obtained from JADE. These values are used to estimate the marginal water value at the actual storage level. More details on how water values are calculated can be found in Appendix B⁵ on the trading conduct webpage.
- 10.2. Towards the end of 2022 water values were falling, reaching a low in mid to late November, when national storage was high. Over the last couple of weeks, the water values at most reservoirs have been mostly increasing, with a small dip for most lakes in late December. North Island water values continue to be higher than South Island water values.

11. Price versus estimated costs

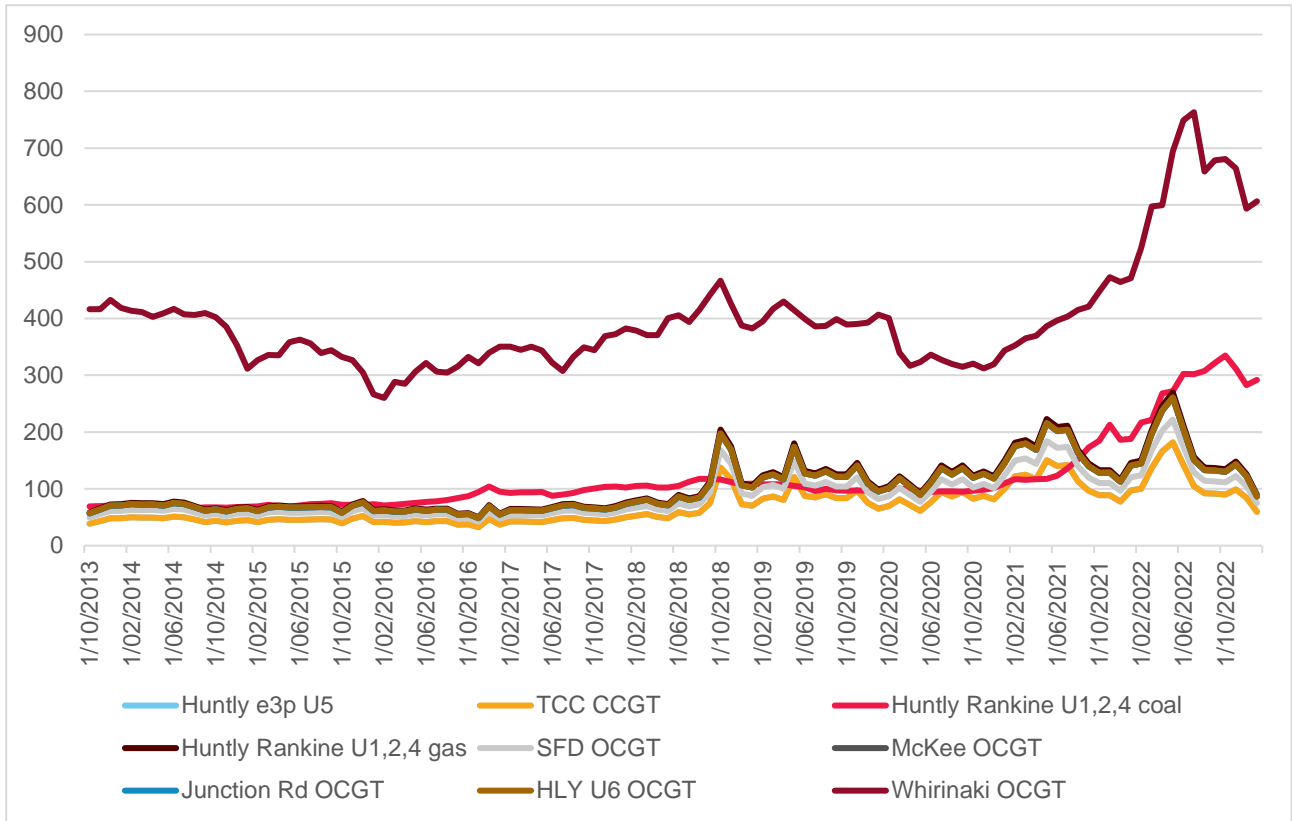
- 11.1. In a competitive market, prices should be close to (but not necessarily at) the short run marginal cost (SRMC) of the marginal generator (where SRMC includes opportunity cost).
- 11.2. The SRMC (excluding opportunity cost of storage) for thermal fuels is estimated using gas and coal prices, and 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 14 shows an estimate of thermal SRMCs as a monthly average up to 1 January 2023. The SRMC of gas fuelled plants has decreased, the SRMC of diesel has ticked up slightly, and the SRMC of coal has also increased.
- 11.4. In early January Indonesian coal was around ~\$470/tonne putting the latest SRMC of coal fuelled Huntly generation at ~\$290/MWh. The SRMC of Whirinaki has increased slightly to ~\$610/MWh. Both are likely reactions to the changing value of the New Zealand dollar and or increasing global demand.
- 11.5. The SRMC of gas run thermal plants decreased to between \$60/MWh and \$90/MWh, likely due to the reduced demand for gas fired generation during summer.
- 11.6. More information on how the SRMC of thermal plants is calculated can be found in Appendix C⁶ on the trading conduct webpage.

⁴ JADE (Just Another DOASA Environment) is an implementation of the Stochastic Dual Dynamic Programming (SDDP) algorithm of Pereira and Pinto. JADE was developed by researchers at the Electric Power Optimisation Centre (EPOC) for the New Zealand electricity market.

⁵ <https://www.ea.govt.nz/assets/dms-assets/29/Appendix-B-JADE-water-value-model.pdf>

⁶ <https://www.ea.govt.nz/assets/dms-assets/30/Appendix-C-Calculating-thermal-SRMCs.pdf>

Figure 14: Estimated monthly SRMC for thermal fuels



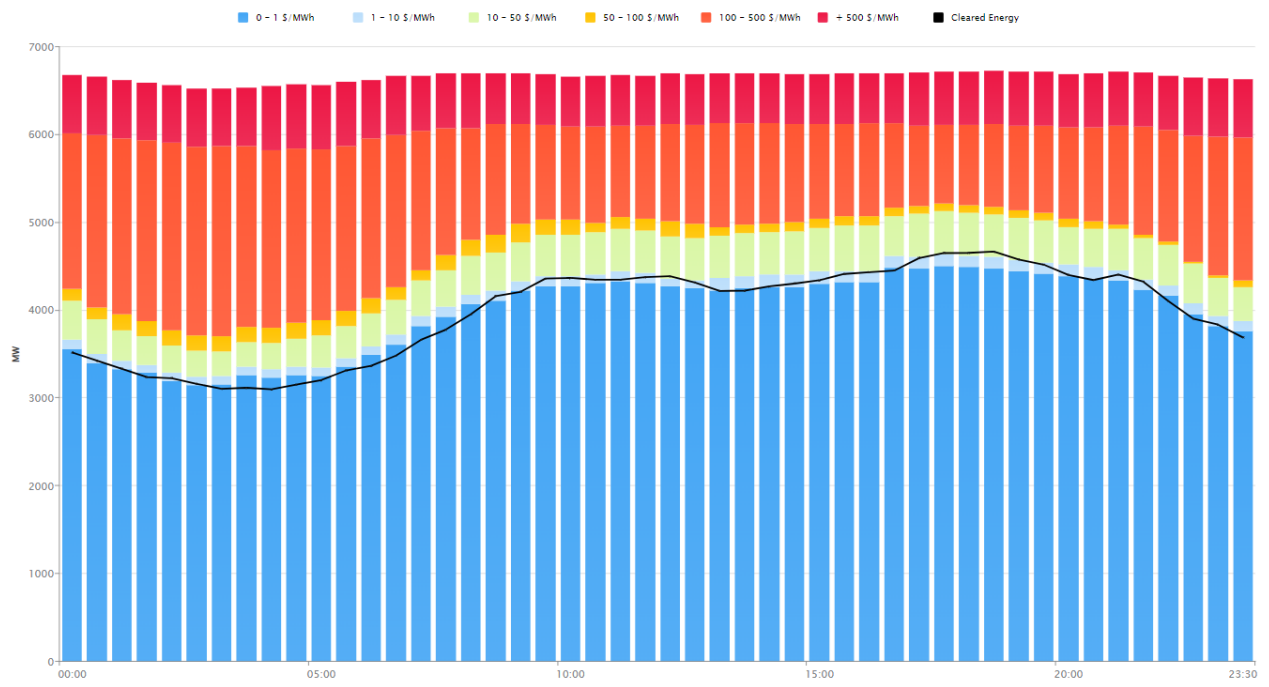
12. Offer Behaviour

- 12.1. Figure 15 shows this week’s national daily offer stacks from WITS⁷. The black line shows cleared energy, indicating the range of the average final price. The majority of energy, between Sunday and Wednesday, was cleared in the \$1-10/MWh or \$10-50/MWh bands. From Thursday onwards, however, most energy was cleared in the \$10-50/MWh or \$50-100/MWh bands.

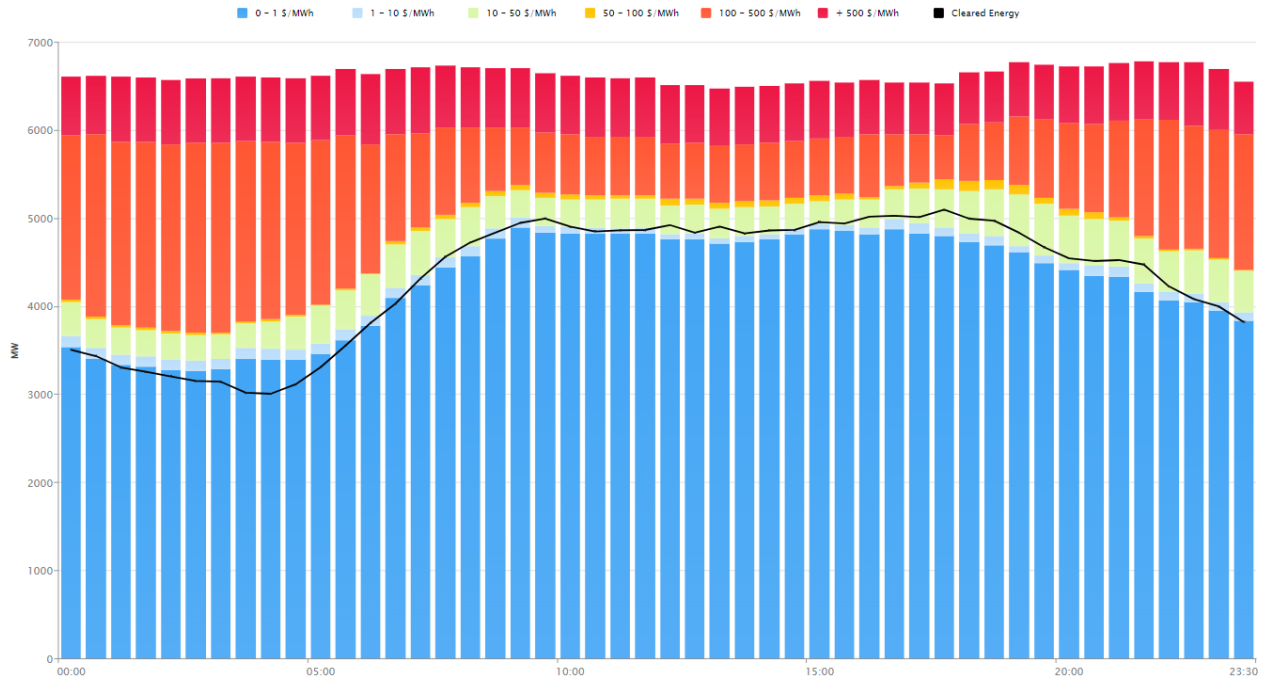
⁷ Cleared Energy Stack | WITS (electricityinfo.co.nz)

Figure 15: Daily offer stack from WITS

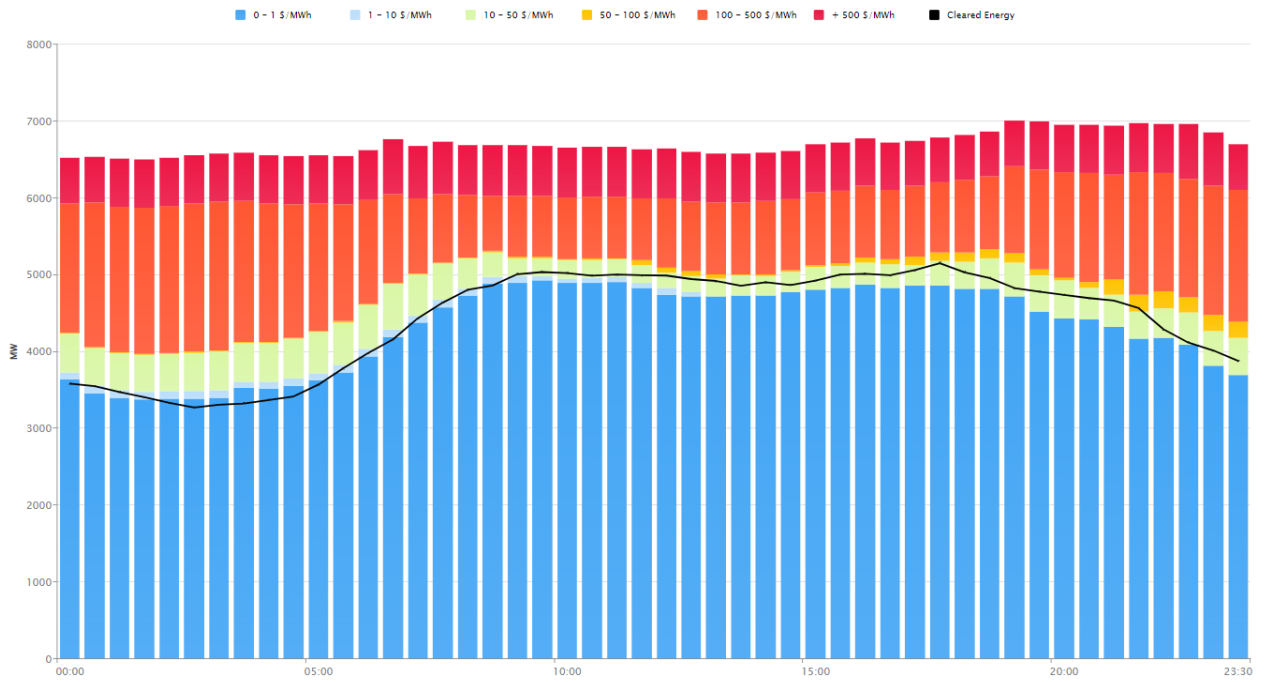
Sunday 8 January



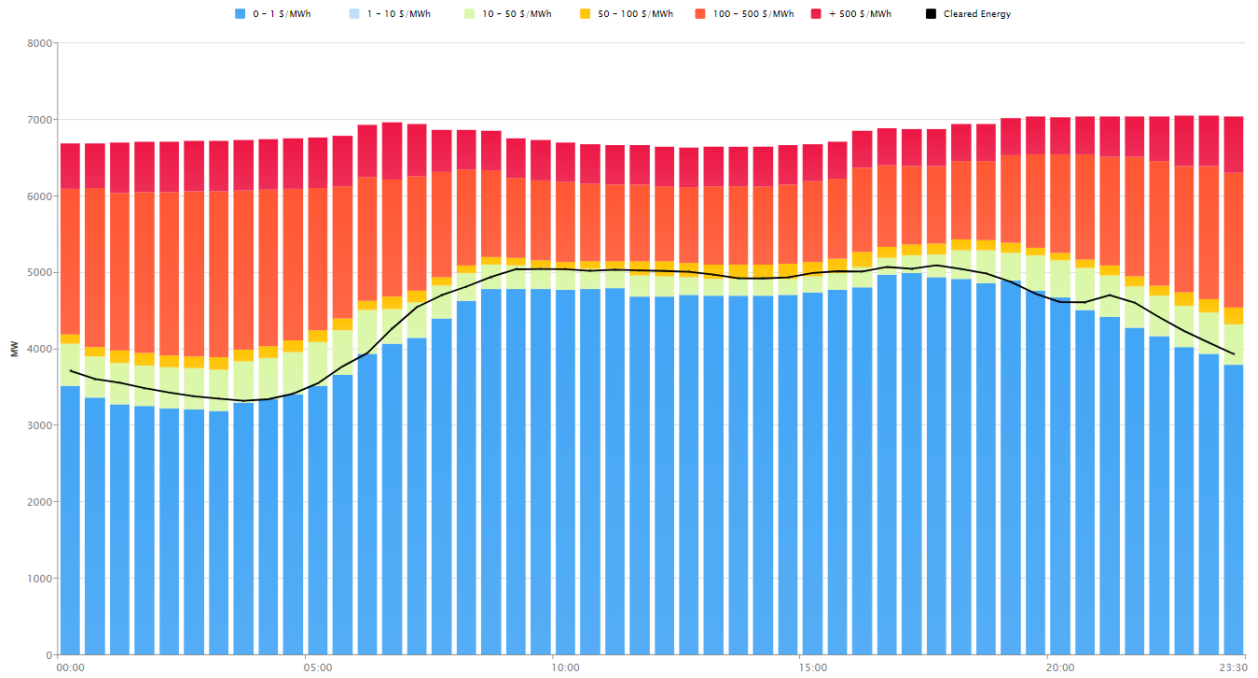
Monday 9 January



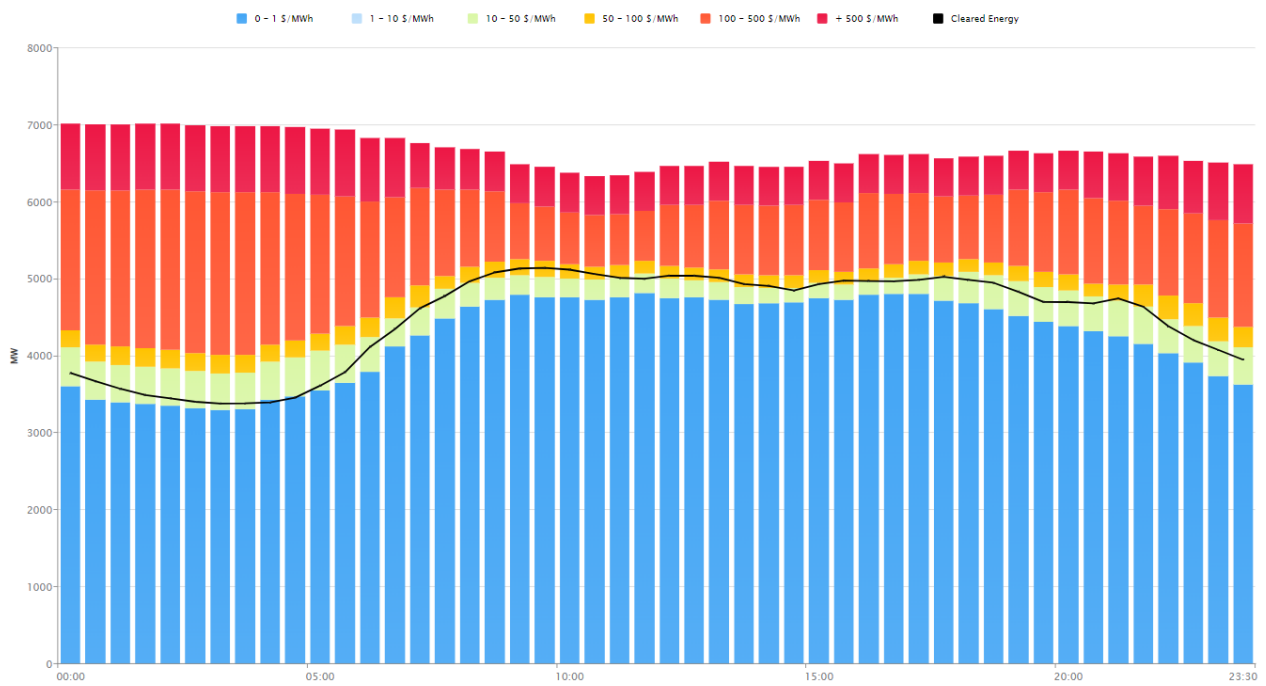
Tuesday 10 January



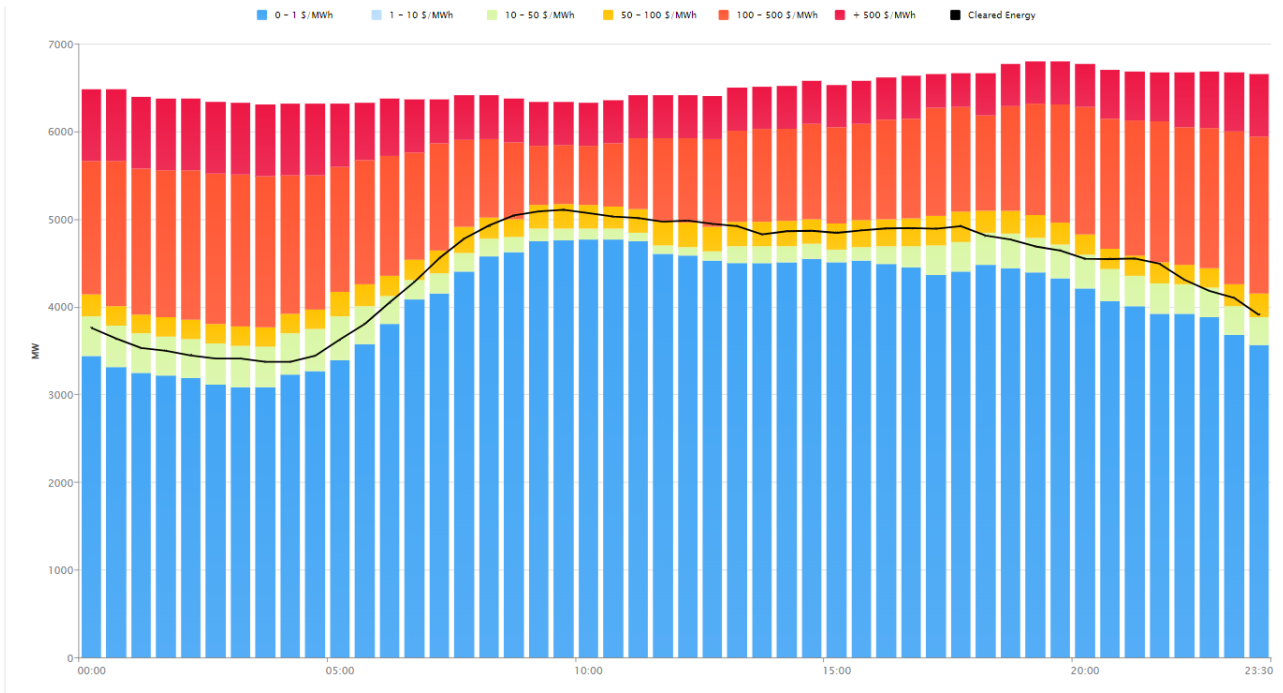
Wednesday 11 January



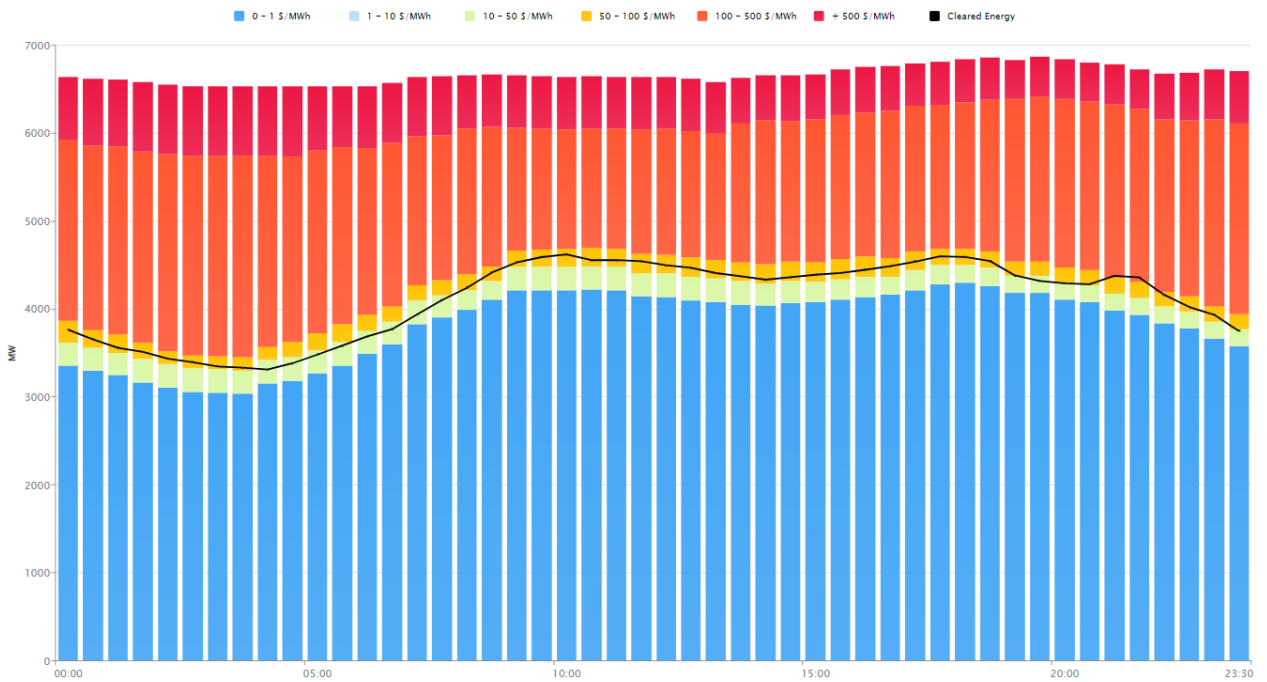
Thursday 12 January



Friday 13 January



Saturday 14 December



13. Ongoing Work in Trading Conduct

- 13.1. This week, all prices appeared to be consistent with supply and demand conditions, however a few trading periods from 2022 are undergoing further analysis.
- 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	TP	Status	Notes
19/02/2022-24/02/2022	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.
07/10/2022	15-16	Further analysis	The Monitoring team is making enquires with Genesis regarding offers changes to final tranche prices at Huntly 5 for trading period 15-16.
15/11/2022 – 24/11/2022	Several	Further analysis	The Authority will continue analysis into the high energy prices.
13/12/2022-16/12/2022	Several	Further analysis	The Authority will continue analysis into the high energy prices.