

Trading Conduct Report

Market Monitoring Weekly Report

1. Overview for the week of 20-26 November

- 1.1. Most wholesale spot prices between 20-26 November appear to be consistent with market conditions. Further analysis of five trading periods is underway.

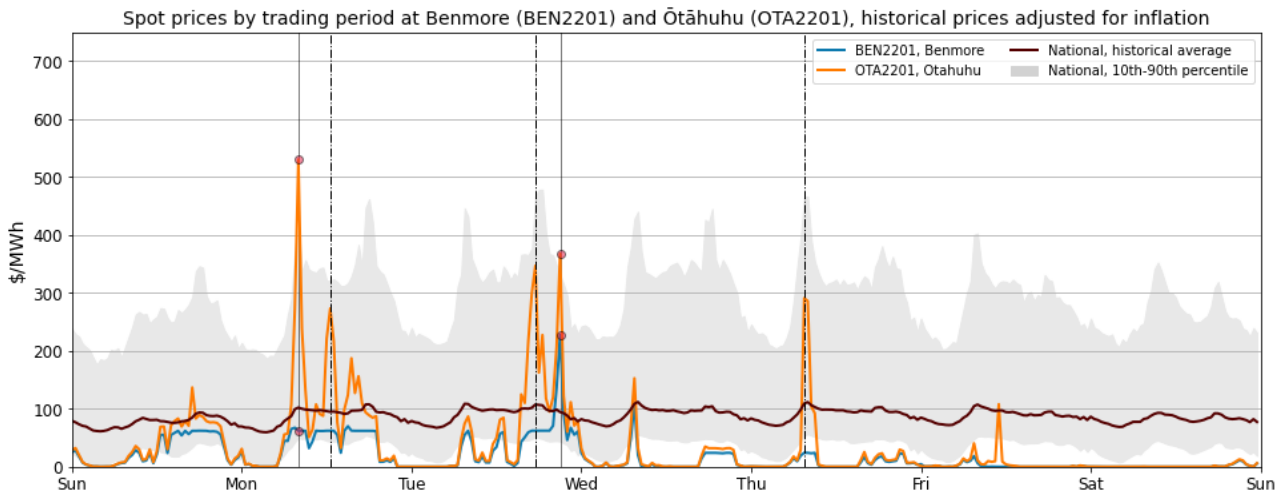
2. Spot Prices

- 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.
- 2.2. Between 20-26 November:
- (a) The average wholesale spot price across all nodes was \$35/MWh.
 - (b) 95 per cent of prices fell between \$0.02/MWh and \$222/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. Average spot prices decreased this week, with frequent instances of very low off-peak prices in both Islands throughout the week – with prices largely flat from Friday onwards. There were, however, some price spikes between Monday and Thursday, and continued periods of price separation.
- 2.5. Multiple spot prices over \$200/MWh occurred this week, mostly in the North, with two price spikes over the 90th historic percentile. These occurred on:
- I. Monday at 8:00 am, with a \$530/MWh price at Ōtāhuhu and \$67/MWh price at Benmore.
 - II. Tuesday at 9:00 pm, with a \$367/MWh price at Ōtāhuhu and \$277/MWh price at Benmore.
- 2.6. Price separation continued this week, occurring between Monday – Thursday. Monday had the most trading periods with price separation, and the largest difference in price occurred on Monday at 8:00 am.
- 2.7. Other high spot prices¹, which didn't reach the 90th percentile, occurred on:
- I. Monday at 12:30 pm, with a \$273/MWh price at Ōtāhuhu and \$62/MWh price at Benmore.

¹ Note these are denoted by the dotted lines in the figures

- II. Tuesday at 5:30 pm, with a \$346/MWh price at Ōtāhuhu and \$62/MWh price at Benmore.
 - III. Thursday at 7:30 am and 8:00 am, with a \$290/MWh price at Ōtāhuhu and \$24/MWh price at Benmore.
- 2.8. The instances of high North Island spot prices and price separation were due to a tighter energy market in the North Island, especially when the HVDC was transferring high volumes northwards, setting the risk, and requiring more North Island reserves. There were also periods when HVDC round power was disabled. The North Island market was also tight due to the partial E3P outage and geothermal outages. Otherwise, high hydro and wind generation generally acted to depress prices this week, especially during off-peak.

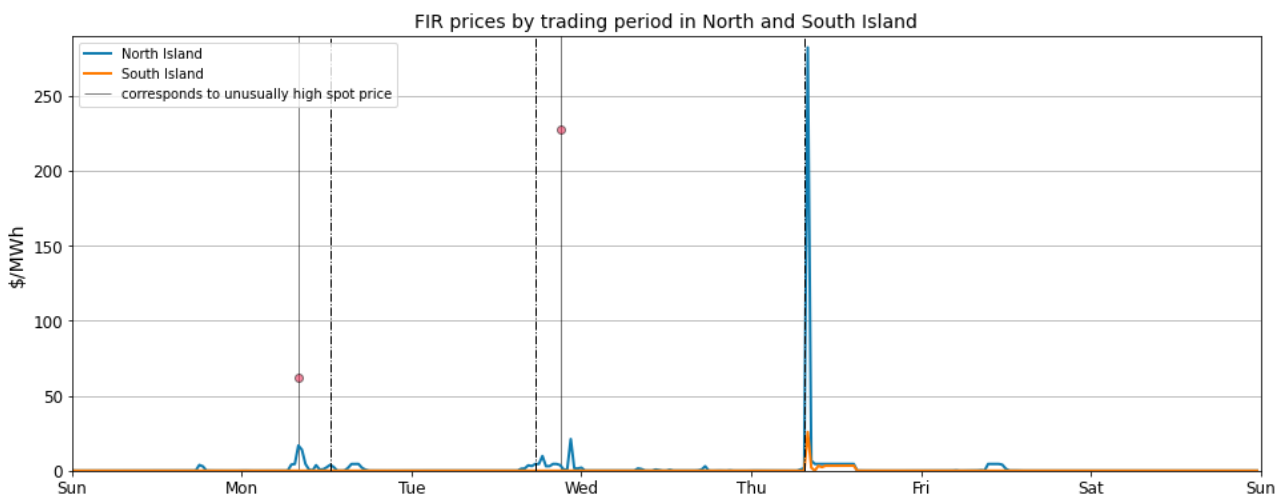
Figure 1: Wholesale Spot Prices



3. Reserve Prices

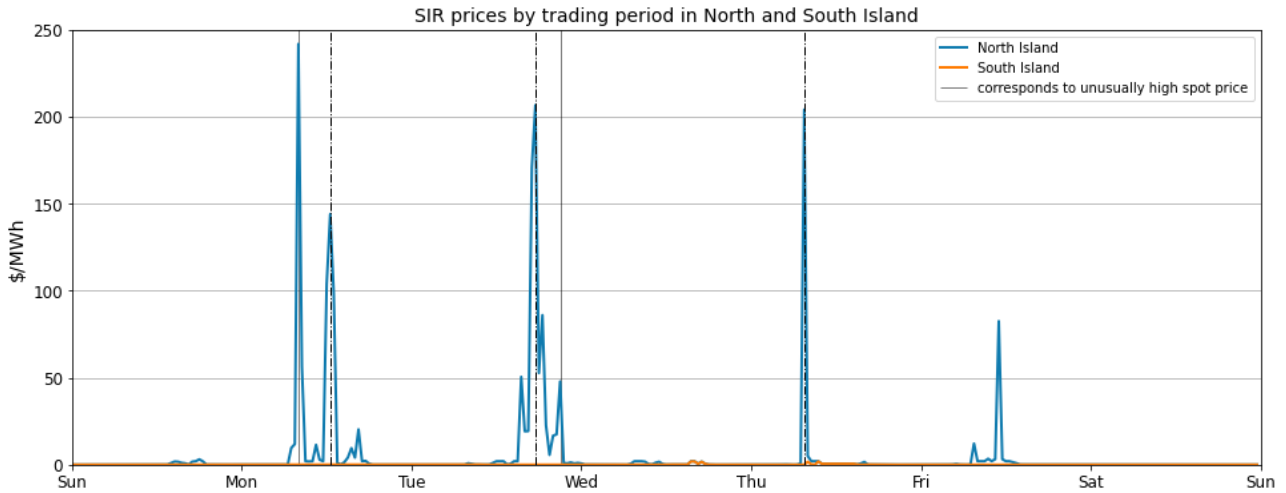
- 3.1. Fast instantaneous reserve (FIR) prices for the North and South Island are shown below in Figure 2. Most trading periods had FIR prices below \$5/MWh, except for two on Thursday. At 7:30 am and 8:00 am North Island FIR prices reached \$282/MWh and South Island FIR prices reached \$25/MWh. These two trading periods align with the Thursday spot price spike.

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. North Island SIR prices spiked on Monday, Tuesday, Thursday and Friday. The largest spike at over ~\$240/MWh. All SIR price spike coincided with North Island spot price spikes, North-South Island price separation, high HVDC northward transfer and the HVDC setting the risk, which requires more North Island reserves.

Figure 3: SIR prices by trading period and Island

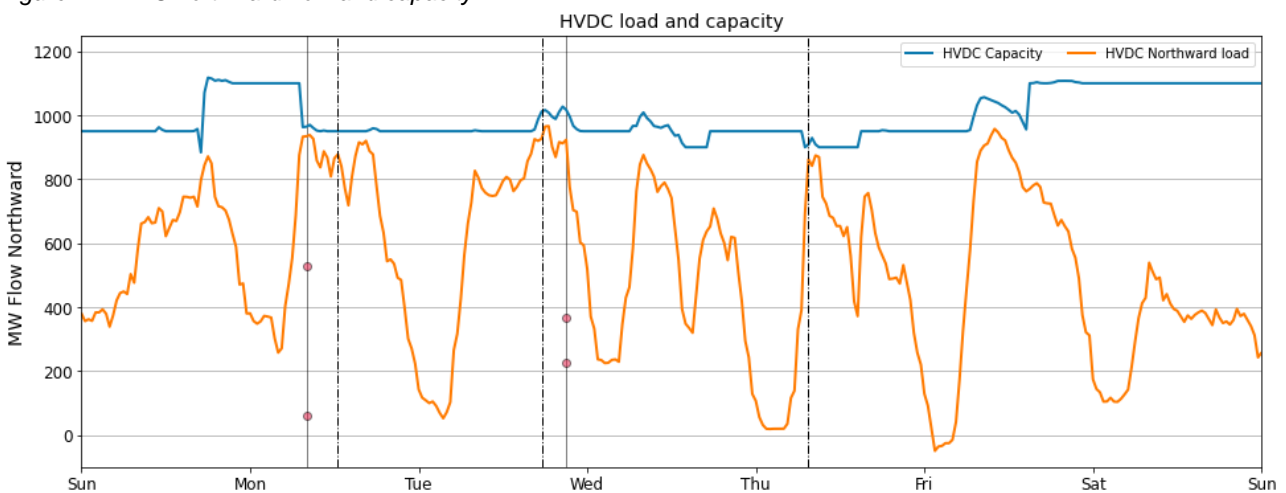


4. HVDC

4.1. Figure 4 shows northward HVDC flow between 20-26 November. Northward HVDC flow was high this week, especially during the trading periods with high North Island spot prices. Note, Northward capacity was also reduced below 1,000 MW between Sunday and Friday. Further analysis found the HVDC was setting the risk during the Monday and Tuesday price spikes, with Huntly 5 setting the FIR risk and the HVDC setting the SIR risk during the Thursday price spike.

4.2. When the HVDC is setting the risk in the North Island, a greater quantity of reserves is required, which results in high reserve prices. As more spinning reserves are dispatched, there is less capacity available for energy. This tends to raise the prices of both energy and reserves. Currently, with abundant hydro storage and low South Island prices this is resulting in price separation.

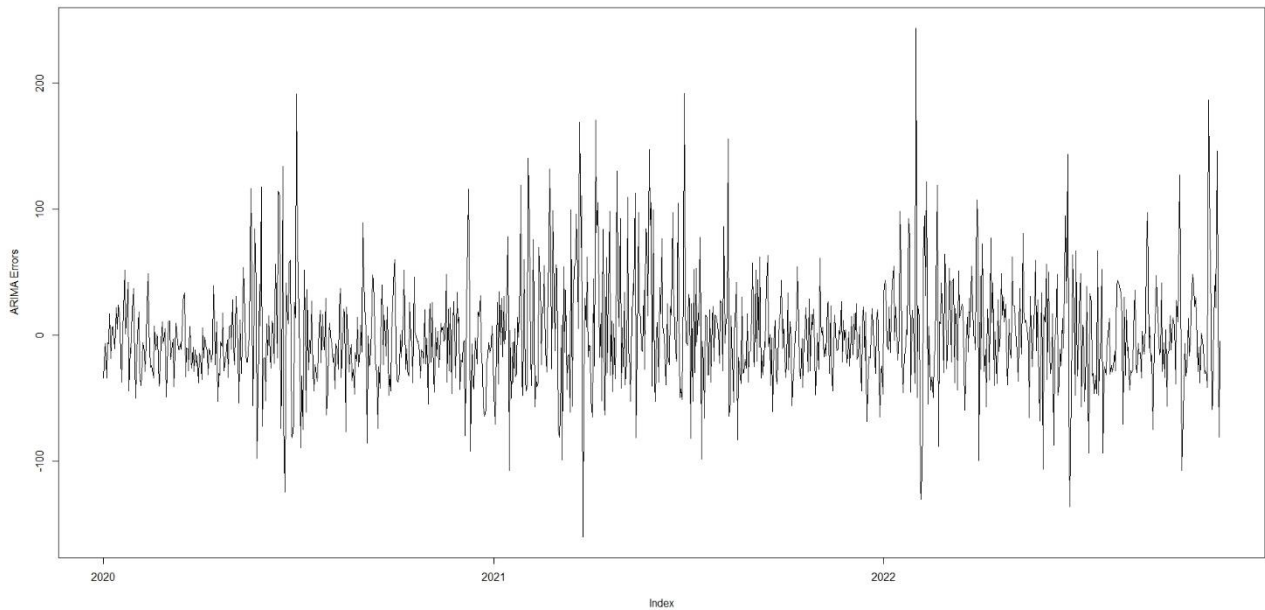
Figure 4: HVDC northward flow and capacity



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 A² on the trading conduct webpage.
- 5.2. Figure 5 shows the residuals of autoregressive moving average (ARMA) errors from the daily model. Residuals for 20-26 November were large on some days. The residuals for Sunday and Wednesday show the model overestimated the price. The remaining days had small residuals suggesting that prices on those dates appear to be aligned with market conditions.

Figure 5: Residual plot of estimated daily average spot prices

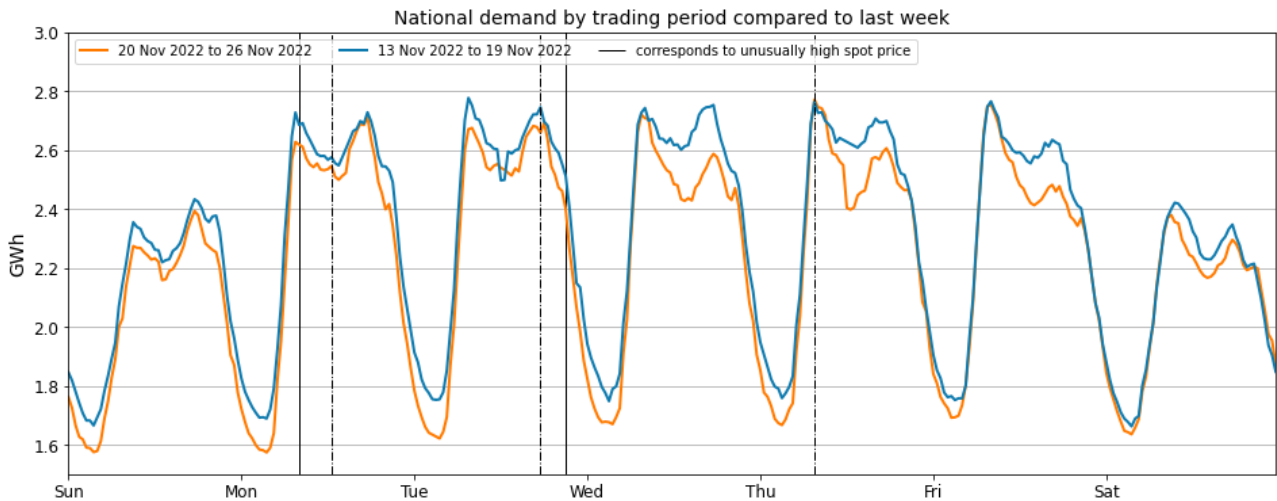


² <https://www.ea.govt.nz/assets/dms-assets/29/Appendix-A-Regression-Analysis.pdf>

6. Demand

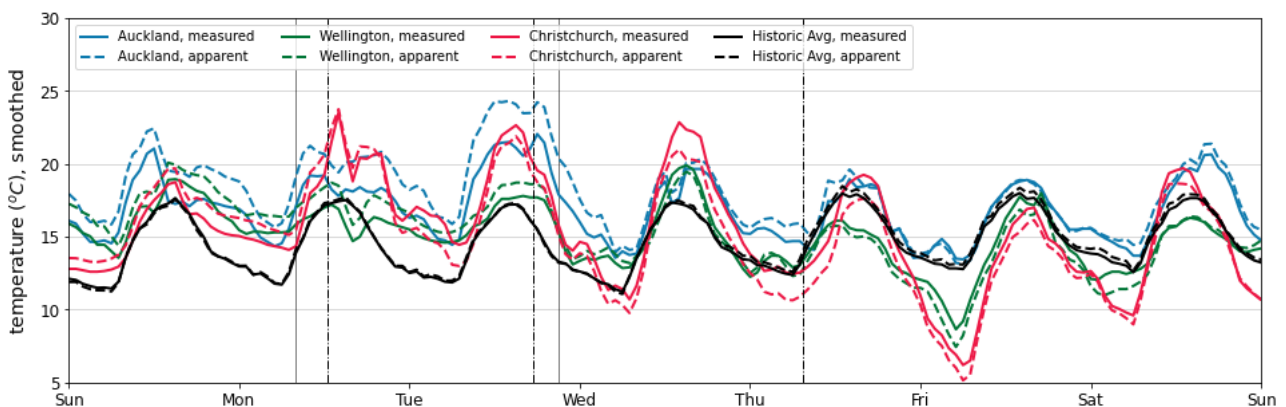
- 6.1. Figure 6 shows this week's national grid demand compared to the previous week. Demand between 20-26 November was similar to, or slightly less than, the previous week due to the continued warmer temperatures, which generally reduces demand.

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. Temperatures were mostly above average this week across Auckland, and Wellington and Christchurch between Sunday and Wednesday, with temperatures between 10 and 24 degrees throughout the week. From Thursday onwards temperatures across all three centres decreased, and hovered around the historical average, with Wellington and Christchurch temperatures below 10 degrees on Friday morning.

Figure 7: Temperatures across main centres



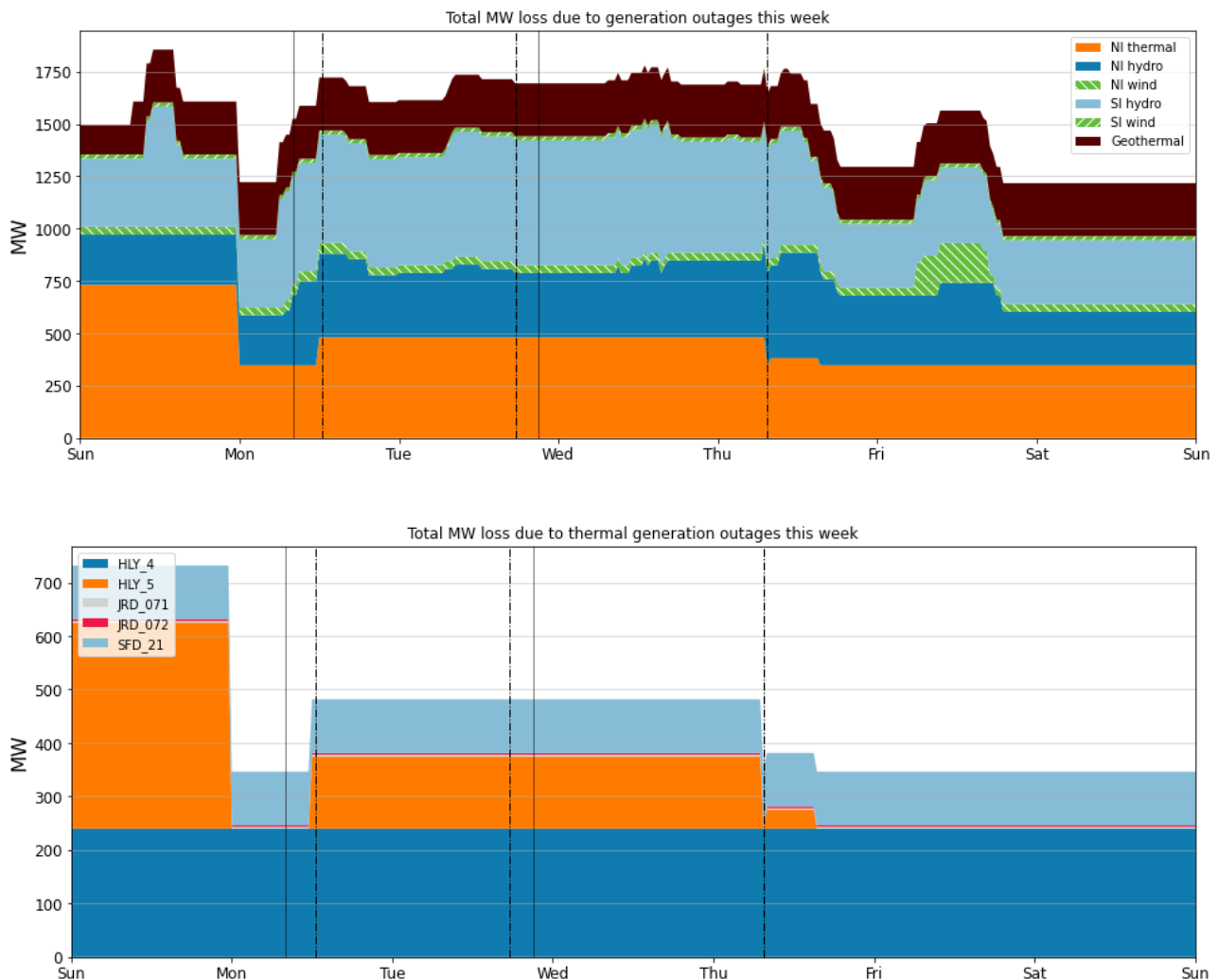
7. Outages

7.1. Figure 8 shows generation capacity on outage. Total capacity on outage ranged between ~1,250 – 1,750 MW over the week. Outages hovered between ~1,600 MW and ~1,750MW between Monday and Thursday as large amounts of North Island thermal, geothermal and South Island hydro went on outage. Outages stepped down to roughly 1250 MW from Saturday onwards.

7.2. Outages of note include:

- One Stratford peaker remained on outage.
- The outage of Huntly 5 ended on Sunday, with a partial outage occurring between Monday and Thursday.
- Huntly 4 remained on outage.
- Over 200 MW of geothermal generation was on outage throughout the week.

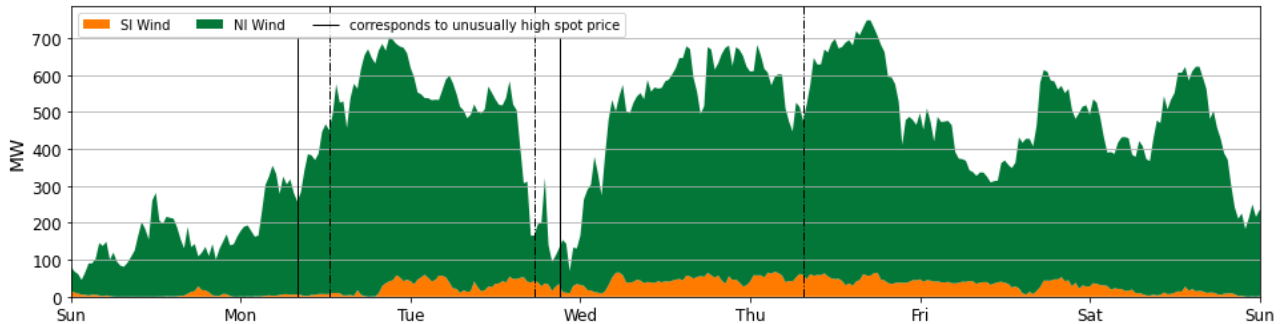
Figure 8: Total MW loss due to generation outages



8. Generation

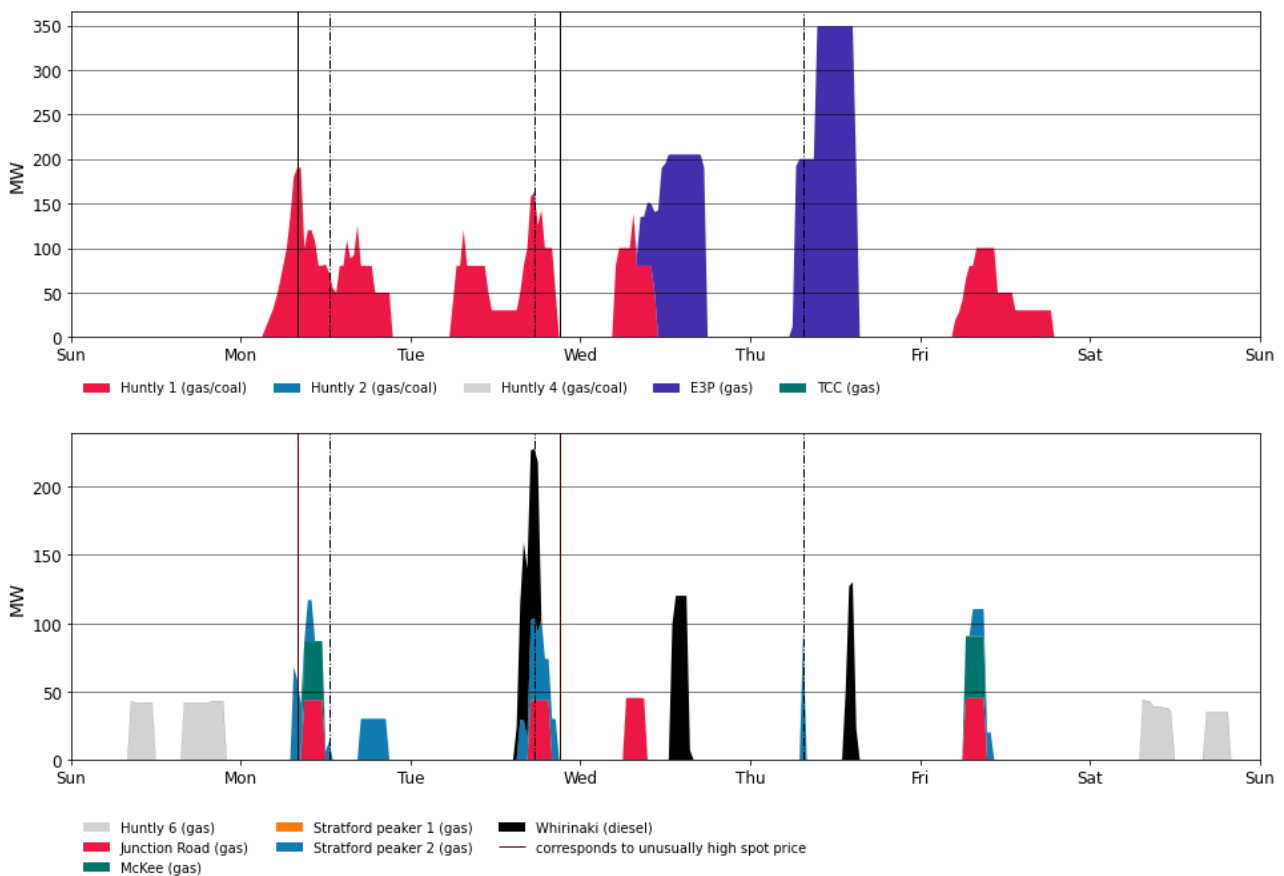
8.1. This week wind generation varied between ~50 and 750 MW, as seen in Figure 9 – an increase on the previous week. Wind generation was mostly below 300 MW on Sunday. It then increased throughout Monday to over 500 MW. Wind dramatically dipped on Tuesday afternoon with low wind aligned with the two price spikes that evening. Wind then increased on Wednesday and stayed mostly between 300-700 MW for the remainder of the week.

Figure 9: Wind Generation



8.2. Figure 10 shows generation of thermal baseload and thermal peaker plants between 20-26 November. Huntly 1 ran during the day as baseload, and increased output during peak times, between Monday and Wednesday after which it was switched off as E3P came online. E3P was however turned off on Thursday, with Huntly 1 running on Friday, likely due to high winds and lower demand.

Figure 10: Thermal Generation

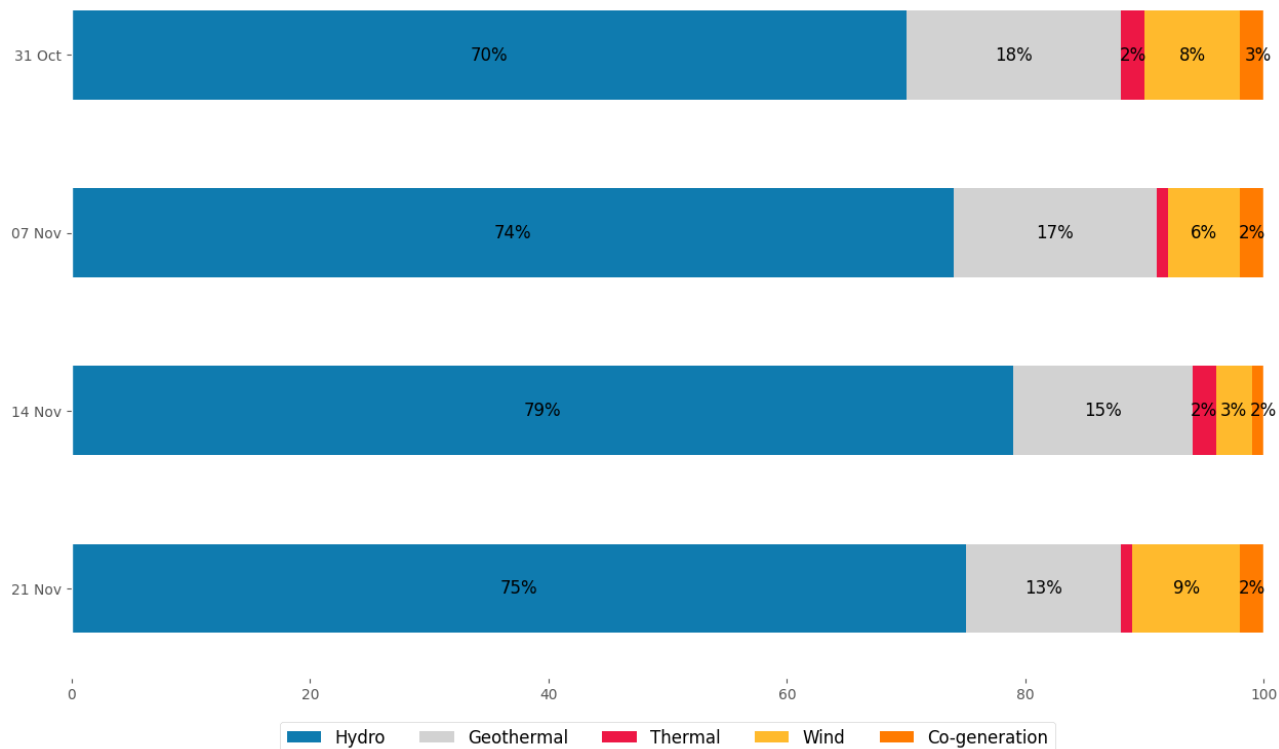


8.3. Huntly 6 ran during the day on Sunday and Saturday, likely to cover baseload while no other Huntly units were running. McKee, Junction road and Stratford peaker two ran

throughout Monday and Friday, covering peak periods. Whikrinaki also ran this week, not due to price, but, to cover the risk posed by electrical storms in the Hawkes Bay region.

8.4. As a percentage of total generation, between 21-27 November, hydro totalled 74.8 percent, geothermal 12.6 percent, thermal 1.4 percent, wind 8.9 percent and co-generation 2.2 percent.

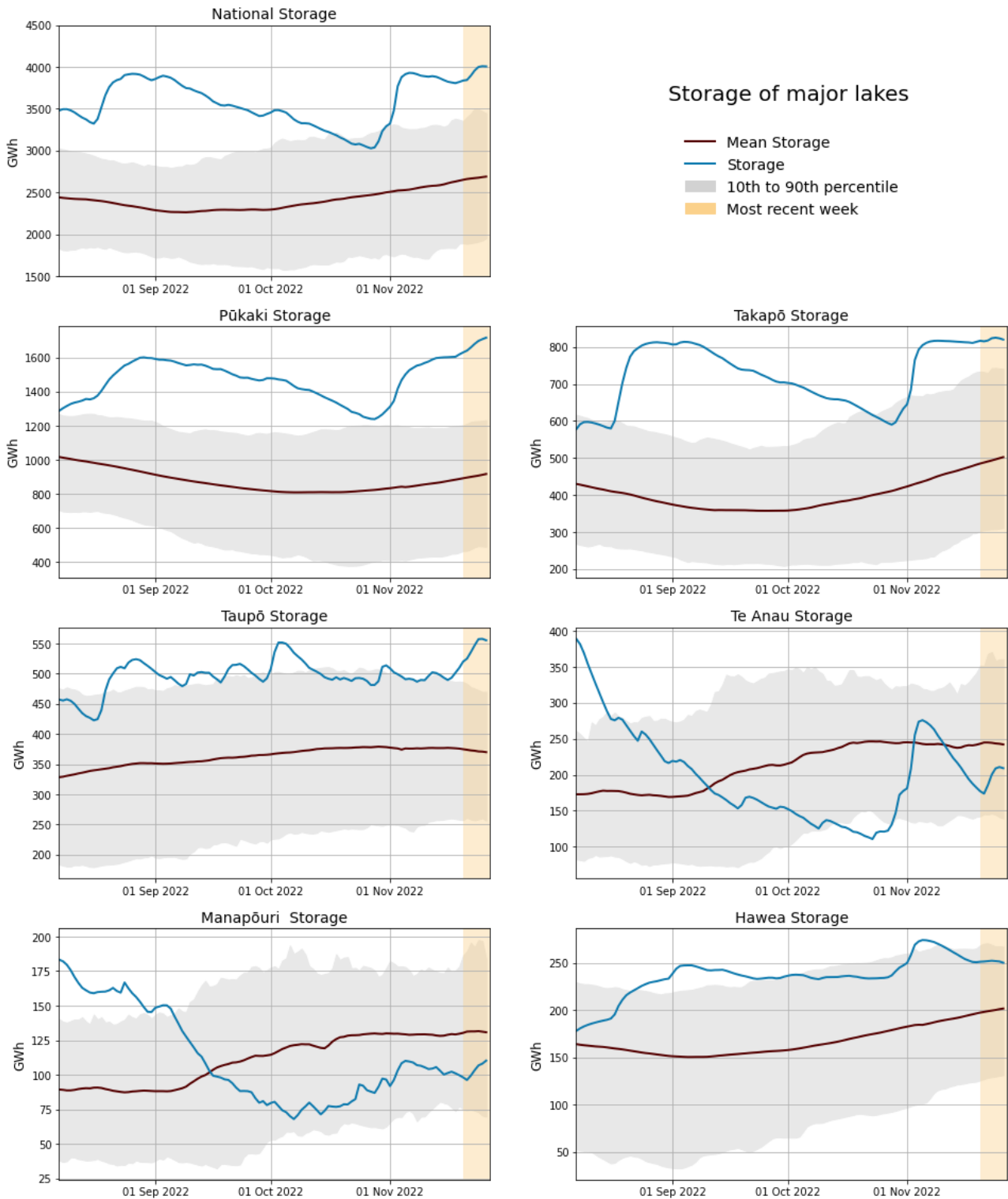
Figure 11: Total generation as a percentage each week between 31 October and 27 November



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 increased due to rainfall last week, and is now around 96.9 per cent of nominal full.
- 9.3. Lakes Hawea, Takapō and Pūkaki all remained well above their 90th percentiles this week. Storage at Lake Te Anau and Manapōuri increased last week, but both lakes remain below their respective historic means, while Manapōuri remains more steady below its historic mean. Storage at Lake Taupō increased this week.

Figure 12: Hydro Storage

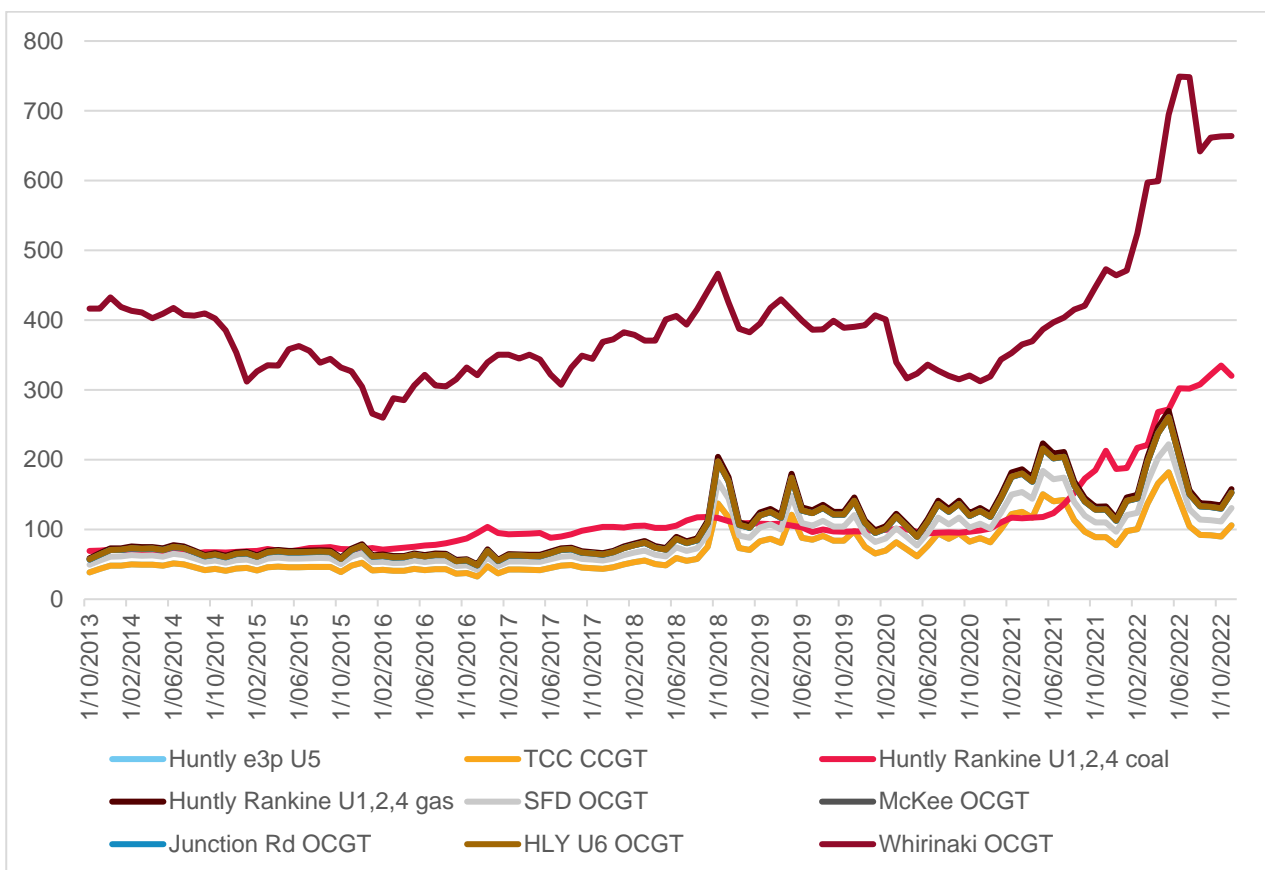


10. Price versus estimated costs

- 10.1. 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).
- 10.2. 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.

- 10.3. Figure 13 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.
- 10.4. 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.
- 10.5. 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.
- 10.6. More information on how the SRMC of thermal plants is calculated can be found in Appendix C³ on the trading conduct webpage.

Figure 13: Estimated monthly SRMC for thermal fuels



11. Offer Behaviour

- 11.1. Figure 14 shows this week's North Island⁴ daily offer stacks from WITS⁵. The black line shows cleared energy, indicating the range of the average final price. The majority of energy in the North Island was cleared in the \$0-1/MWh or \$1-100/MWh band - with jumps into the \$100-300/MWh band during the price spikes.
- 11.2. These jumps in clearing price reflects the tighter supply of energy in the North Island this week, especially during times of low wind, high HVDC flow, HVDC risk setting and high North Island reserve requirements. Also, ongoing geothermal and the E3P outages are requiring more peakers being dispatched to cover baseload.

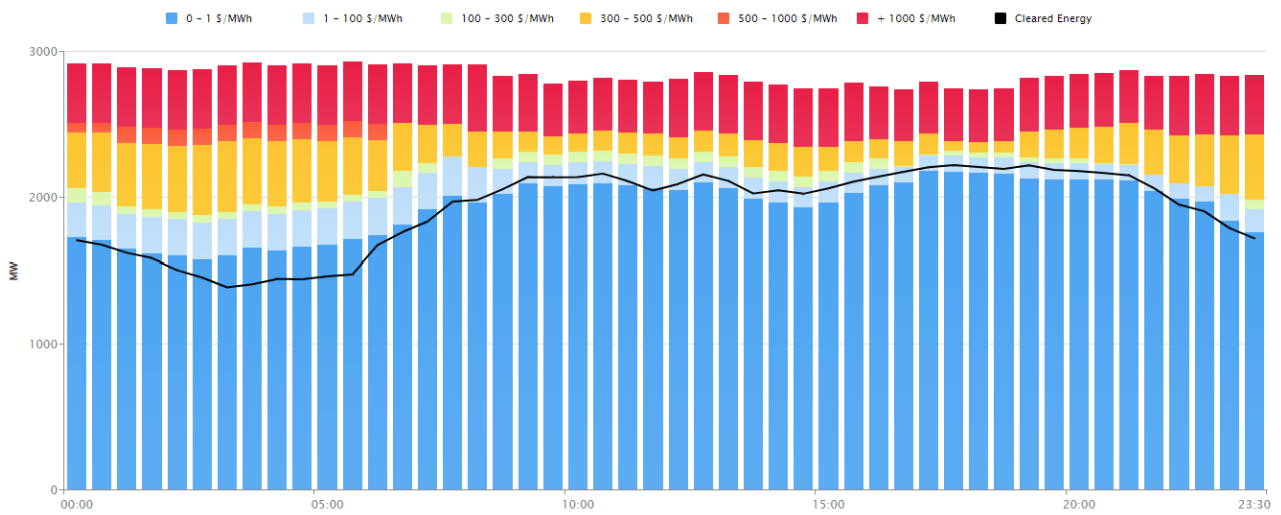
³ <https://www.ea.govt.nz/assets/dms-assets/30/Appendix-C-Calculating-thermal-SRMCs.pdf>

⁴ We focus on the North Island only this week as that's where the majority of high prices were

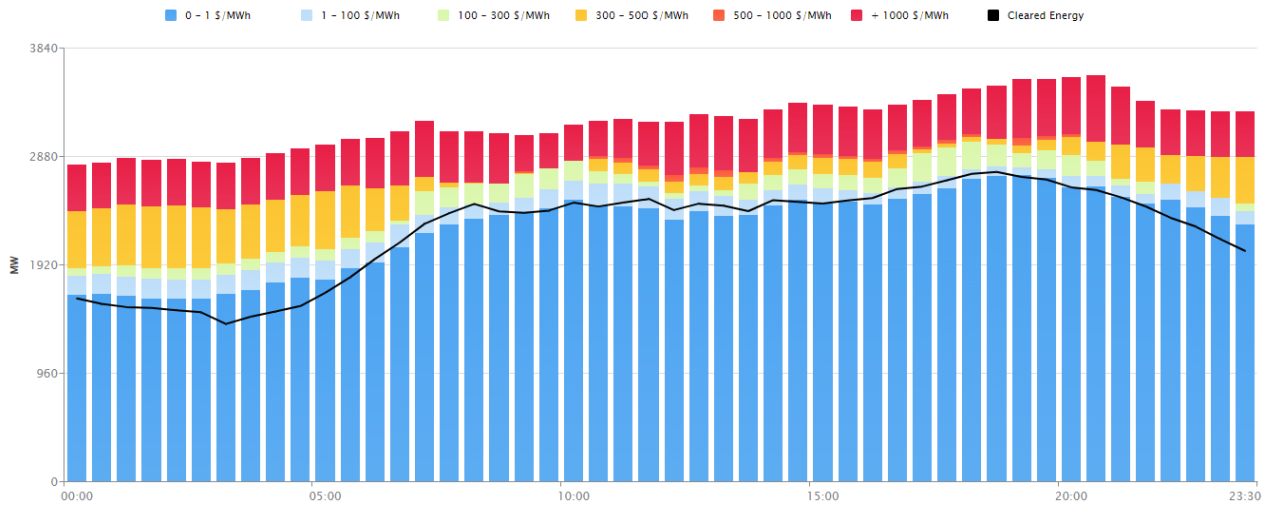
⁵ [Cleared Energy Stack | WITS \(electricityinfo.co.nz\)](https://www.electricityinfo.co.nz/cleared-energy-stack)

Figure 14: North Island daily offer stack from WITS

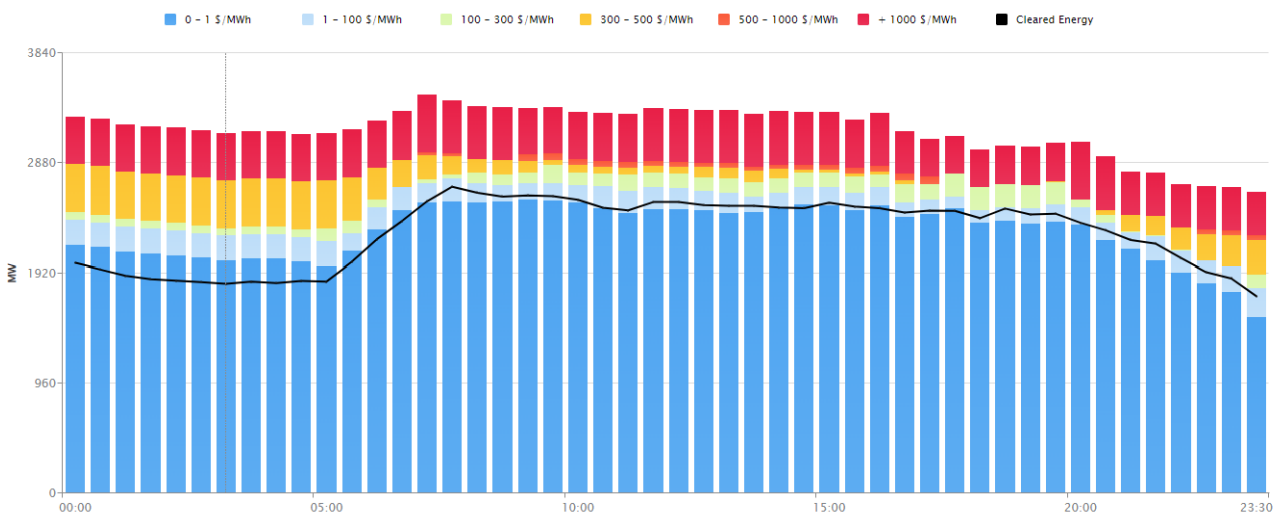
Sunday 20 November



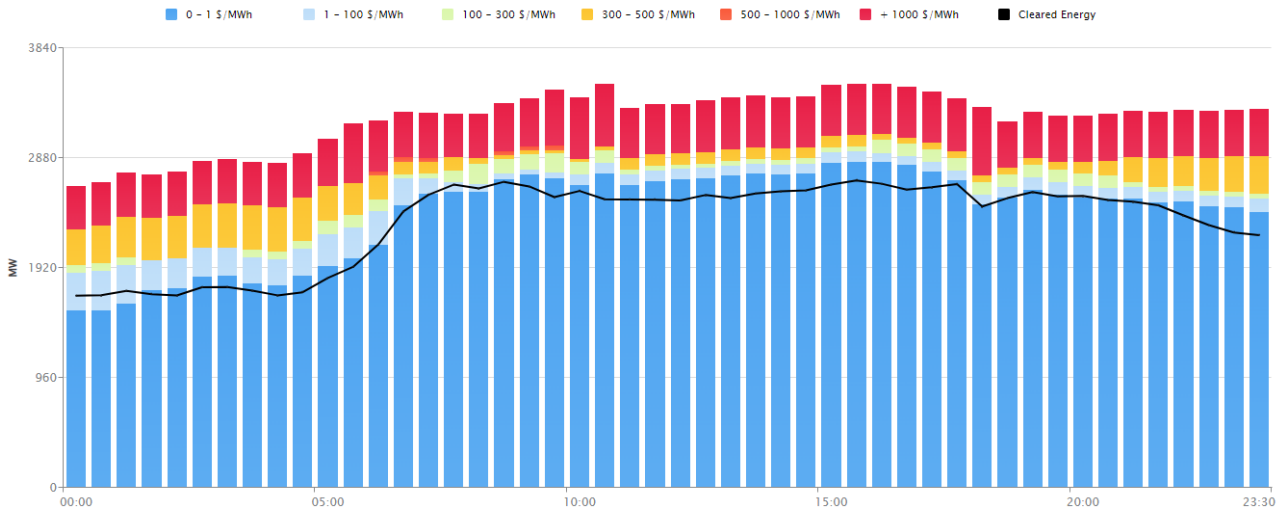
Monday 21 November



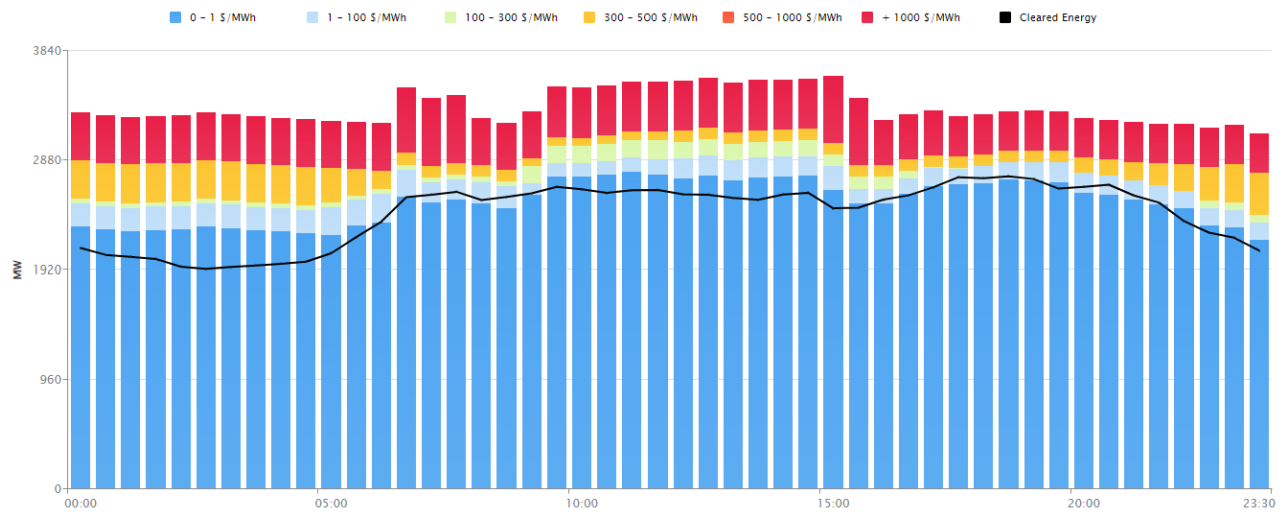
Tuesday 22 November



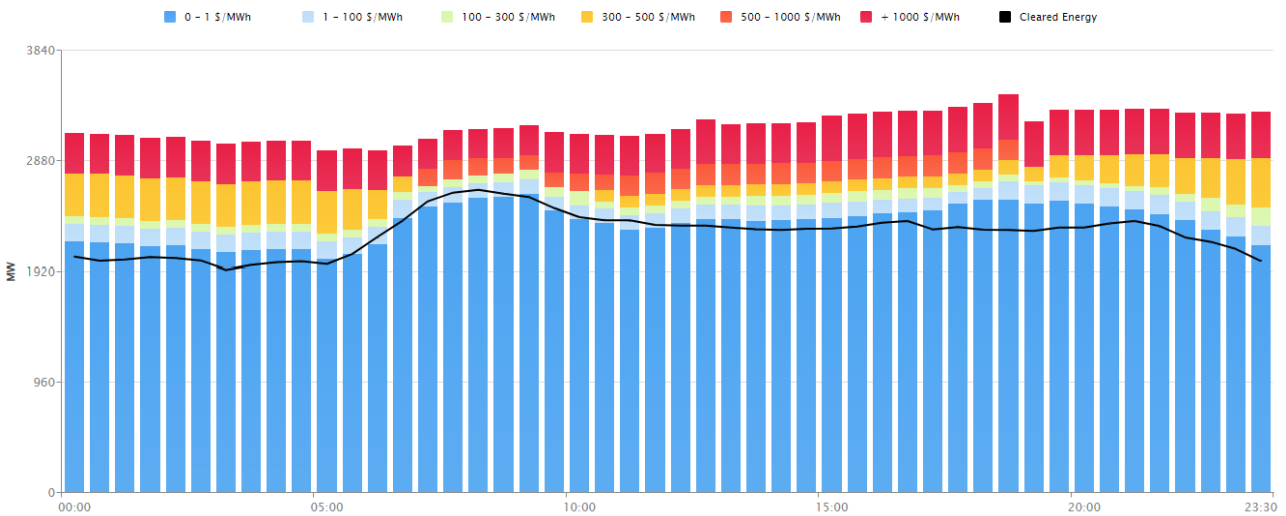
Wednesday 23 November



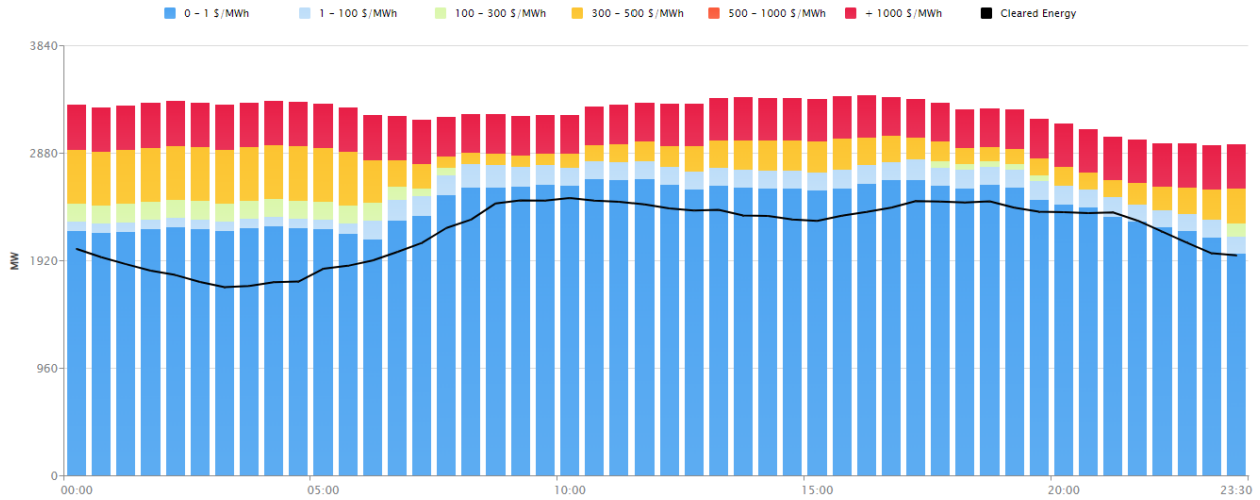
Thursday 24 November



Friday 25 November



Saturday 26 November



12. Ongoing Work in Trading Conduct

12.1. This week most prices appeared to be consistent with supply and demand conditions, however a few trading periods were identified for further analysis.

12.2. 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 Monitoring team is making enquires with Genesis regarding offers changes to final tranche prices at Huntly 1,4 and 5 for trading period 15-16.
15/11/2022	17	Further analysis	The Authority will continue analysis into the high energy price.
16/11/2022	37	Further analysis	The Authority will continue analysis into the high energy price.
17/11/2022	16 & 31	Further analysis	The Authority will continue analysis into high energy prices.
21/11/2022	17 & 26	Further analysis	The Authority will continue analysis into high energy prices.
22/11/2022	36 & 43	Further analysis	The Authority will continue analysis into high energy prices.
24/11/2022	16	Further analysis	The Authority will continue analysis into the high energy price.