

# Trading Conduct Report

## Market Monitoring Weekly Report

### 1. Overview for the week of 22-28 January 2023

- 1.1. Most spot prices between 22-28 January 2023 appear to be consistent with market conditions, however, further analysis of hydro offers 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 any node exceeds its historical 90th percentiles. Note that this week, prices above the historic 90<sup>th</sup> percentile are highlighted with a translucent green line, and the time of the Huntly 5 trip is highlighted using a black dotted line.
- 2.2. Between 22-28 January 2023:
  - (a) The average wholesale spot price across all nodes was \$220/MWh.
  - (b) 95 per cent of prices fell between \$44.50/MWh and \$338/MWh.
- 2.3. Figure 1 shows spot prices at Benmore and Ōtāhuhu alongside their historic median and historic 10<sup>th</sup>- 90<sup>th</sup> percentiles adjusted for inflation.
- 2.4. Both peak and off-peak prices increased again this week, with most prices above the 90<sup>th</sup> historic percentile<sup>1</sup> between Sunday and Friday. These are the highest spot prices seen in recent months.
- 2.5. On Tuesday at 3:49 pm Huntly Unit 5 tripped, causing a frequency excursion and an Under Frequency Event<sup>2</sup> (UFE). It appears that there was a spring washer constraint north of Whakamaru shortly afterwards (there were transmission outages in the area at the time), with the maximum cleared energy priced at Te Rapa co-generation of \$5100. Prices reached an average of \$5,763/MWh in the Upper North Island, \$1,592/MWh in the Lower North Island, and \$602/MWh in Central North Island. Prices were approximately \$350-\$400/MWh at the time in the South Island. These prices are shown in Figure 2.
- 2.6. This week's increased peak and off-peak prices occurred as high temperatures likely increased air-conditioning load, there has been low rainfall/declining lake levels and increased load from irrigation. Furthermore, generation from wind was low, and hydro generation has ramped back, in order to conserve water for a potentially dry summer and autumn (and especially to conserve North Island water for the February HVDC outage).

<sup>1</sup> For historic January prices (excluding the first 14 days)

<sup>2</sup> [Unit 5 fault triggered Huntly UFE | Energy News](#)

Generation from Manapōuri particularly has reduced as lake levels there continue to fall. Thermal generation subsequently increased to its highest level in recent months.

Figure 1: Wholesale Spot Prices between 22-28 January 2023

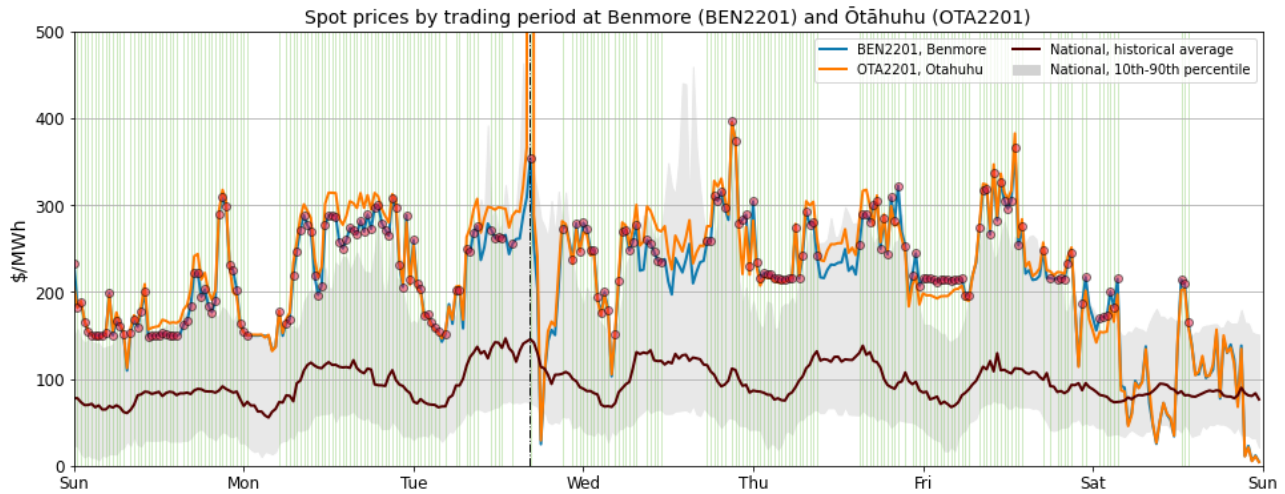


Figure 2: Prices across the country during the E3P trip

**MAXIMUM NODAL PRICE (\$/MWh)**

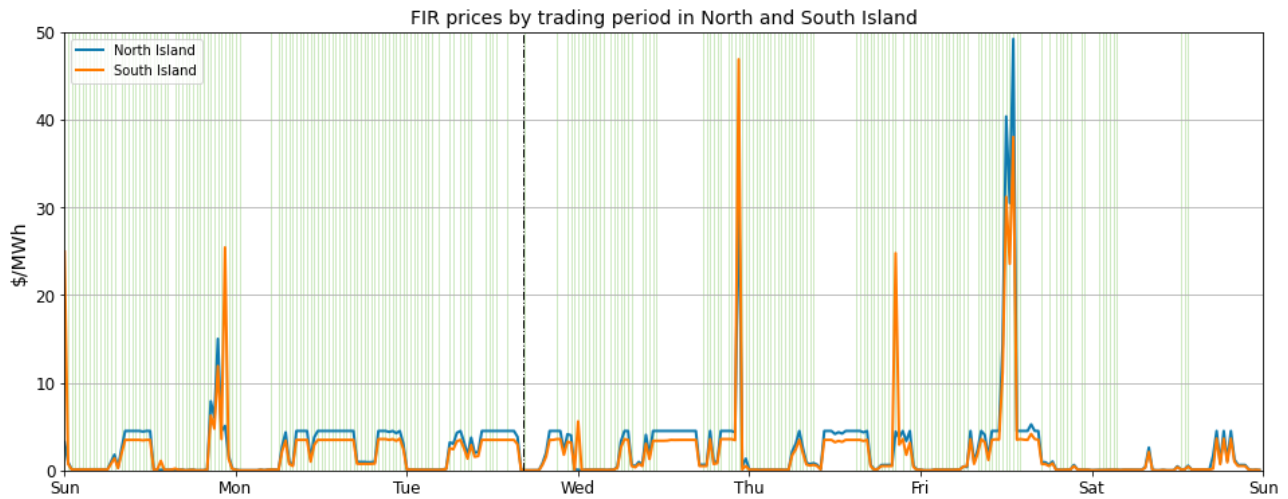
Maximum NZ Price \$6,011.47  
 MTO0331 at 16:30



### 3. Reserve Prices

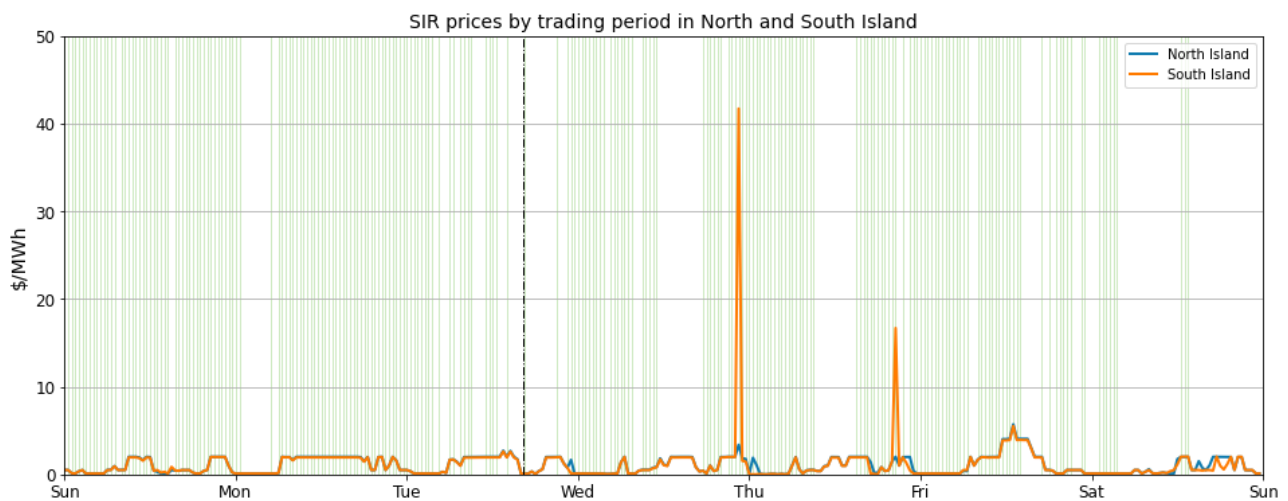
3.1. Fast instantaneous reserve (FIR) prices for the North and South Island are shown below in Figure 3. This week there were multiple times where both North and South Island FIR prices were above \$20/MWh, with the highest of these occurring on Friday in the North Island.

Figure 3: FIR prices by trading period and Island



- 3.2. Sustained instantaneous reserve (SIR) prices for the North and South Island are shown in Figure 4. Some SIR prices were above \$20/MWh.
- 3.3. Instances of high SIR and FIR prices likely arose from E3P running in the North Island and which required higher amounts of reserves to cover the risk of an E3P trip.

Figure 4: SIR prices by trading period and Island

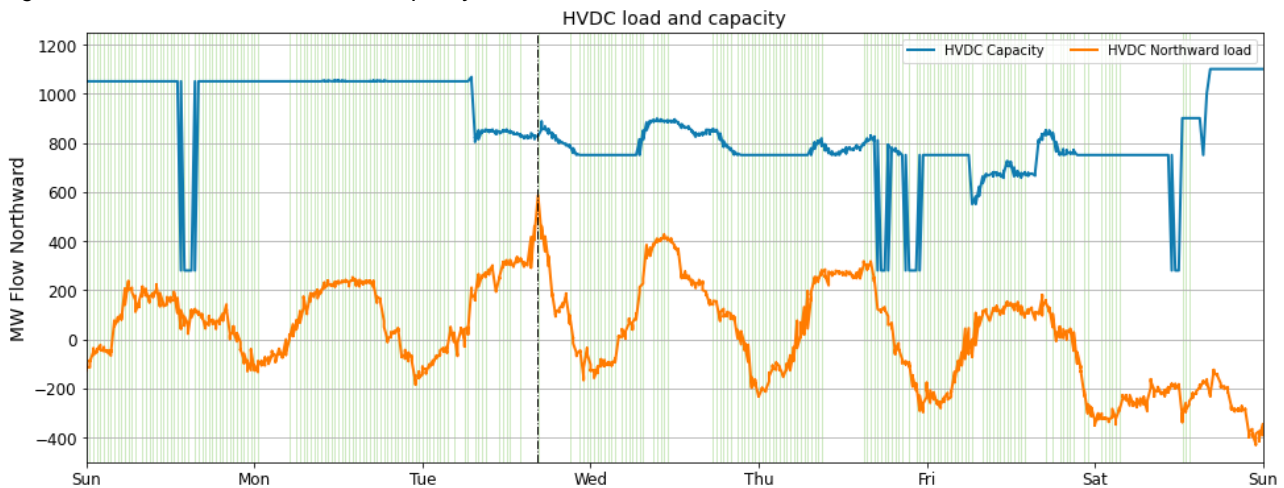


## 4. HVDC

- 4.1. Figure 5 shows northward HVDC flow between 22-28 January 2023. Lower HVDC flows continue as South Island hydro offer prices remain high. HVDC flow was mostly northward during the day, and southward overnight. On Saturday flow was southward all day,

reflecting the high amount of North Island wind. HVDC flow peaked during the Huntly 5 trip on Tuesday afternoon.

Figure 5: HVDC northward flow and capacity

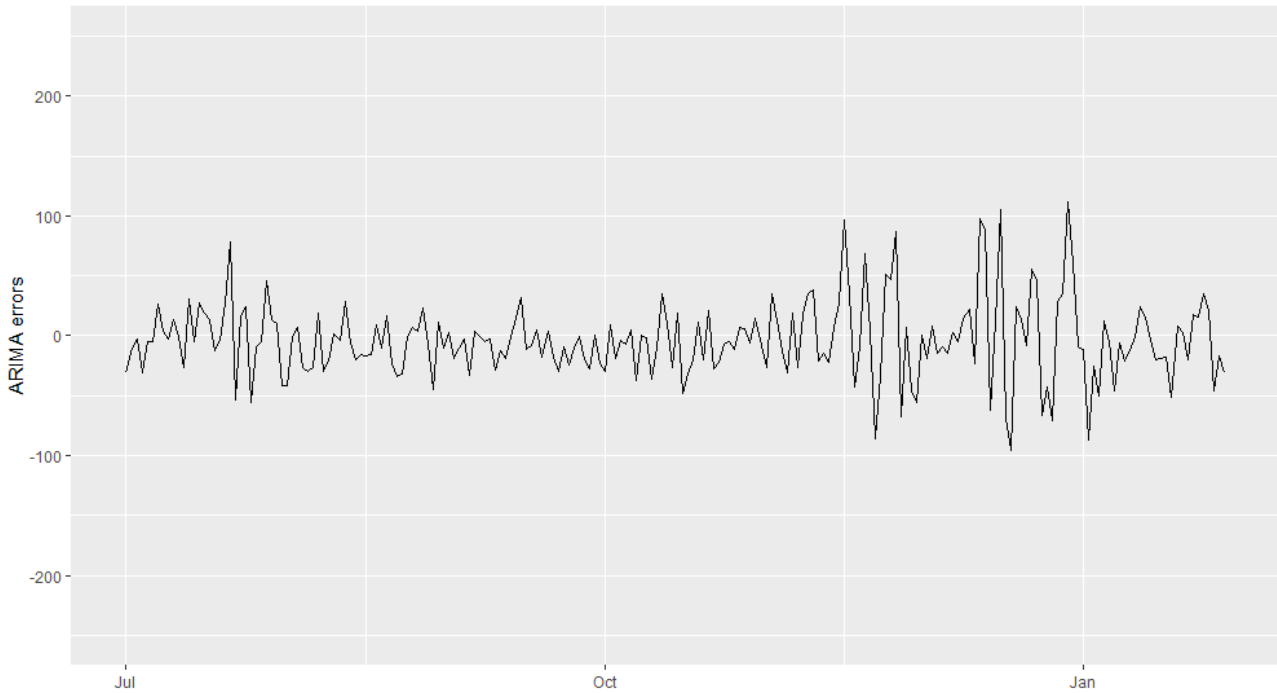


## 5. Regression Residuals

- 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 A<sup>3</sup> on the trading conduct webpage.
- 5.2. Figure 6 shows the residuals of autoregressive moving average (ARMA) errors from the daily model. Residuals were relatively small, suggesting that prices on those dates appear to be largely aligned with market conditions.

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

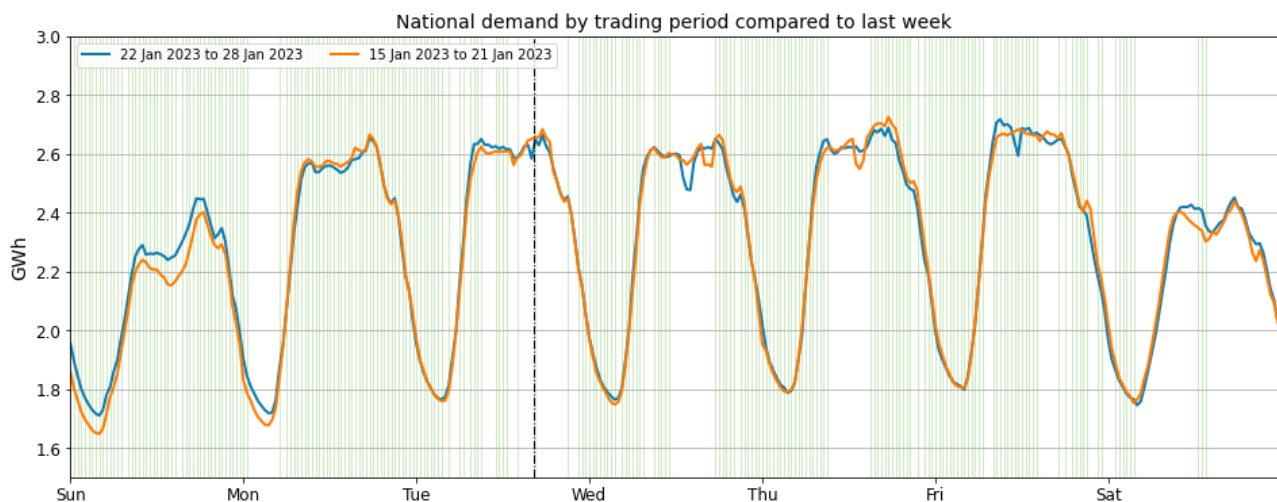
Figure 6: Residual plot of estimated daily average spot prices from 1 July 2022 – 28 January 2023



## 6. Demand

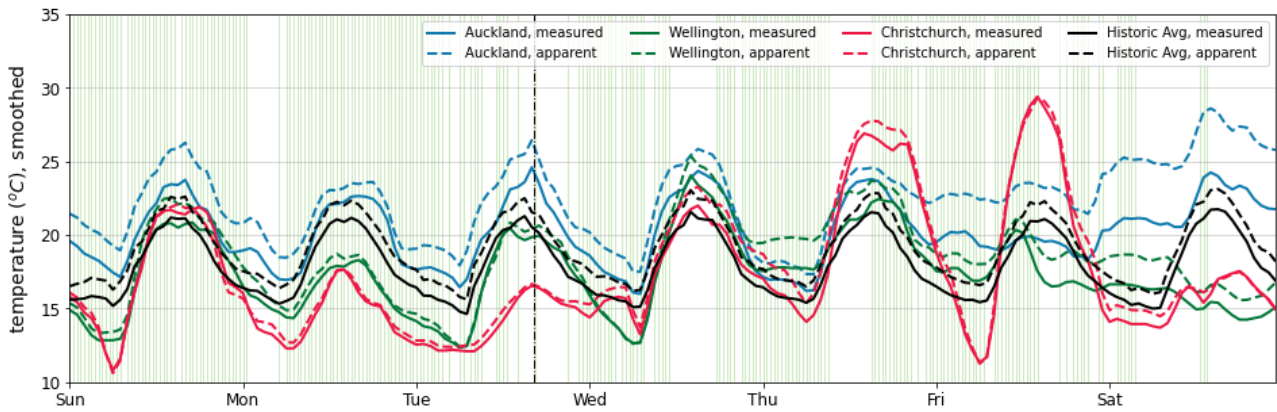
- 6.1. Figure 7 shows national grid demand between 22-28 January 2023, compared to the previous week. Daily demand was relatively similar to the previous week as temperatures across the country remained high, and continued dry weather saw continued high load from irrigation.

Figure 7: National demand by trading period compared to the previous week



- 6.2. Figure 8 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 22-28 January, temperature in Auckland were mostly above the historic average, and ranged between ~16-26 degrees. It was slightly more varied in Christchurch and Wellington, with temperatures between ~11-29 and ~12-25 degrees, respectively.

Figure 8: Temperatures across main centres



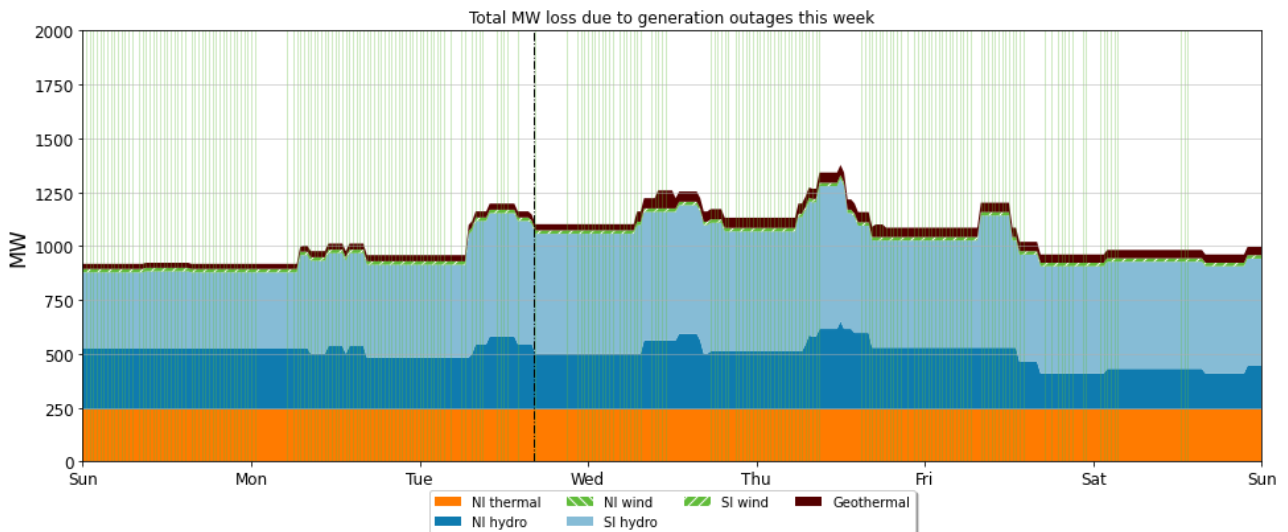
## 7. Outages

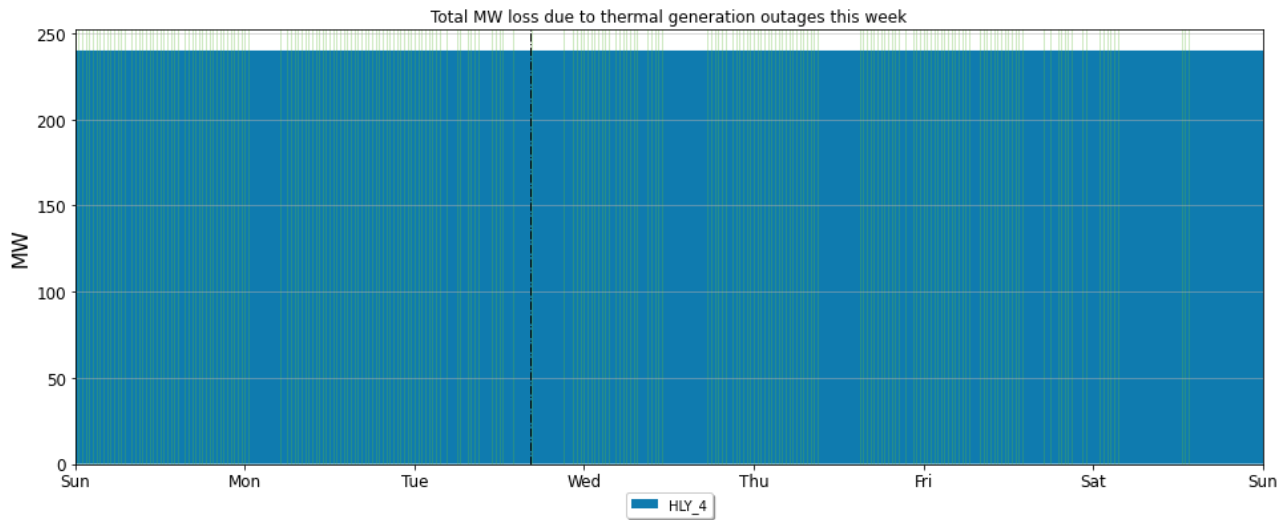
7.1. Figure 9 shows generation capacity on outage. Total capacity on outage between 22-28 January 2023 ranged between ~900 – 1,300 MW. Outages stepped up from ~900 MW on Tuesday and ranged between ~1,200-1,300 between Tuesday and Friday, as there were periodic North and South Island hydro outages during the day.

7.2. Notable outages include:

- (a) Huntly 4 remains on outage.
- (b) Multiple Manapōuri units went on outage this week.
- (c) Roxburgh had multiple outages this week.
- (d) Ōhau B and C had multiple outages this week

Figure 9: Total MW loss due to generation outages

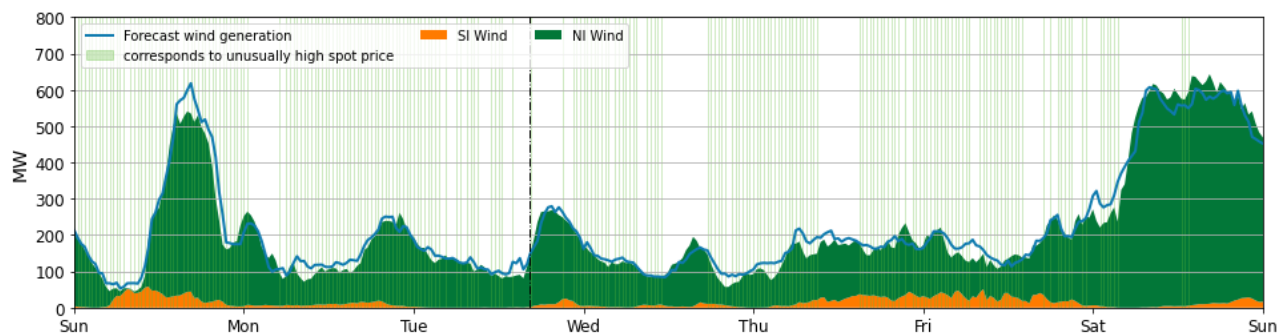




## 8. Generation

- 8.1. Wind generation, between 22-28 January 2023, varied between 50 and 600 MW. Wind generation was low, mostly under 200 MW between Monday and Friday. On Saturday wind generation picked up and was generating at over 500 MW for several hours. High prices this week were largely influenced by low wind generation.

Figure 10: Wind Generation and forecast



- 8.2. Figure 11 shows generation of thermal baseload and thermal peaker plants between 22-28 January 2023. E3P/Huntly 5 ran all week, bar its tripping on Tuesday, with it running close to capacity during the weekdays. Huntly 1 also ran between Monday and Friday, with Huntly 2 running on Friday afternoon.
- 8.3. Essentially all the peakers, bar Whirinaki, ran this week, with Friday seeing the highest amounts of peaker generation. Interestingly some peakers ran more similar to baseload than to actually cover peaks.

Figure 11: Thermal Generation

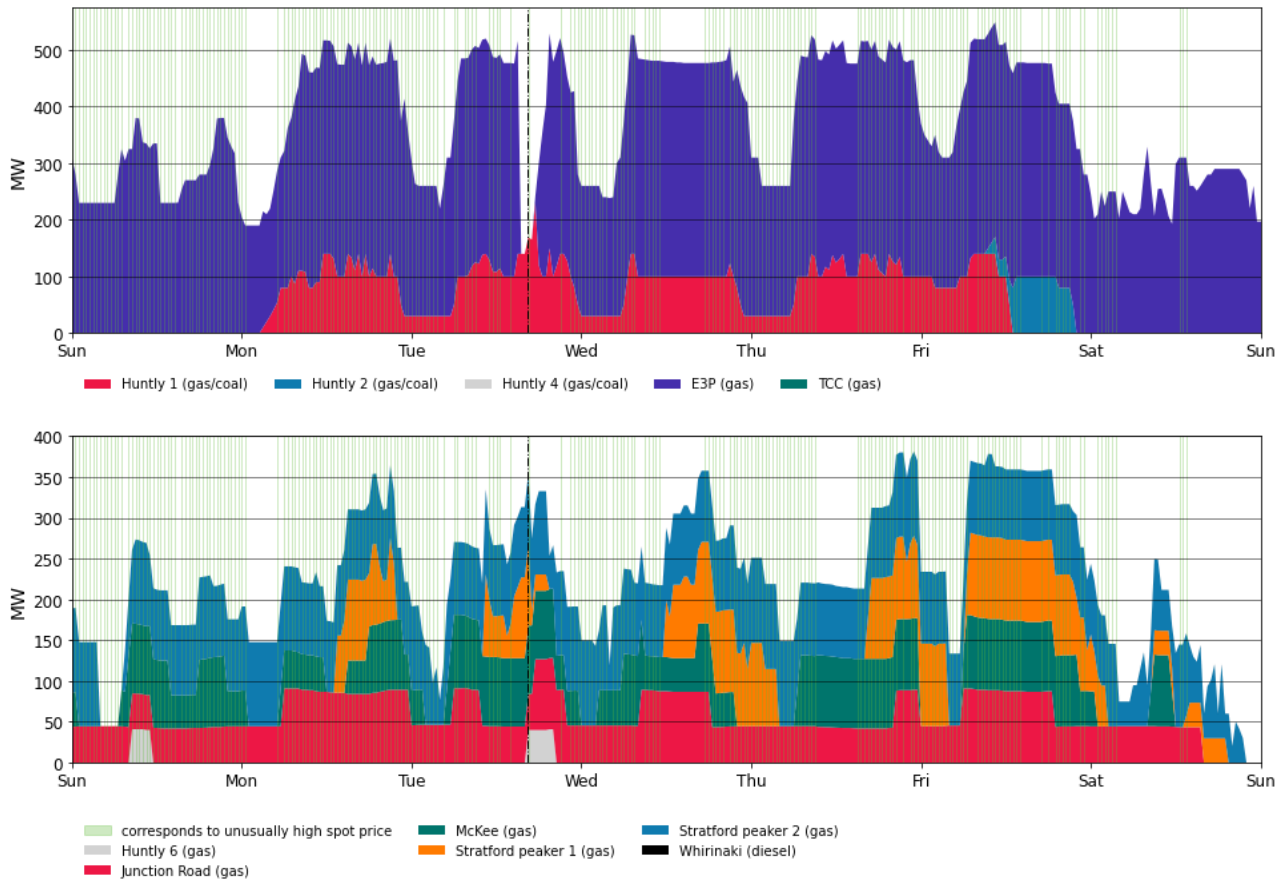
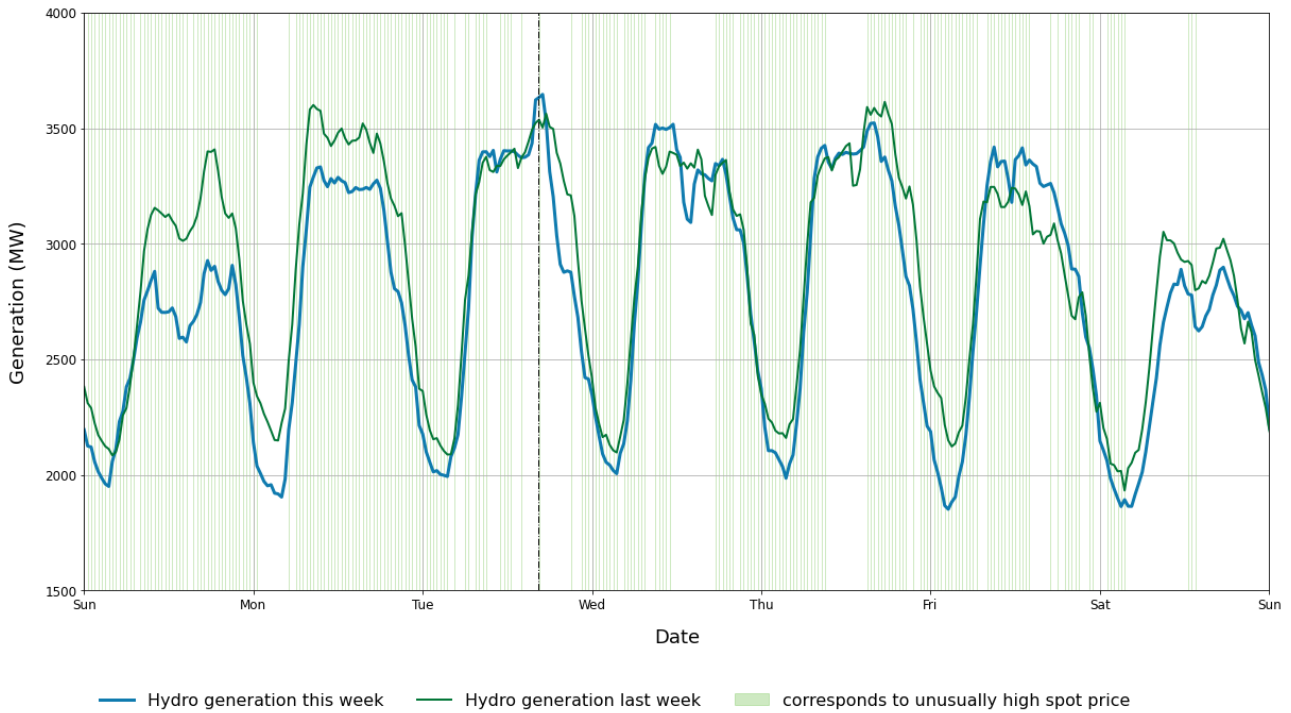


Figure 12: Hydro generation between 22-28 January compared to the previous week

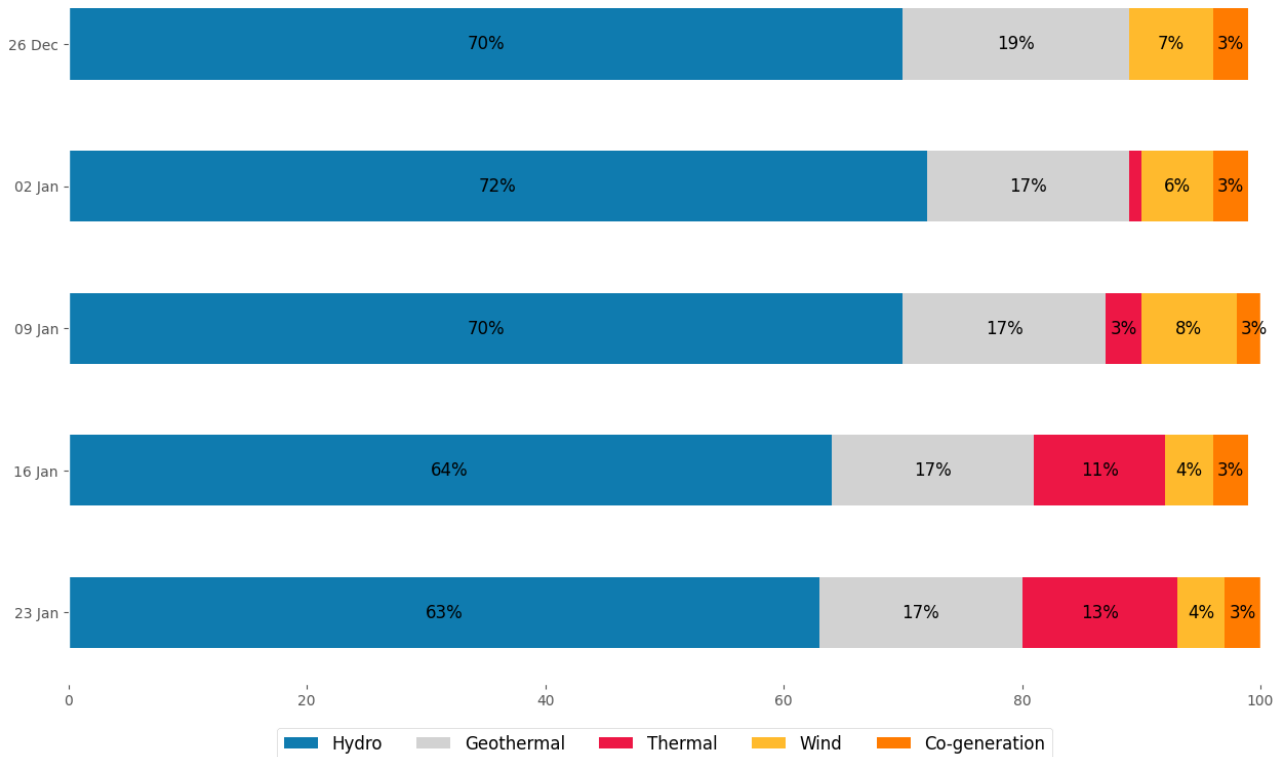


8.4. Figure 12 shows total hydro generation in MW produced each trading period, compared to the same time in the previous week. Hydro generation was mostly similar to or less than the previous week. Generation was lower on Sunday and Monday.



8.5. As a percentage of total generation, between 22-28 January, total weekly hydro generation totalled 62.5 percent, geothermal 17.1 percent, thermal 13 percent, wind 3.9 percent, and co-generation 3.5 percent.

Figure 13: Total generation as a percentage each week between 19 December 2022 and 28 January 2023

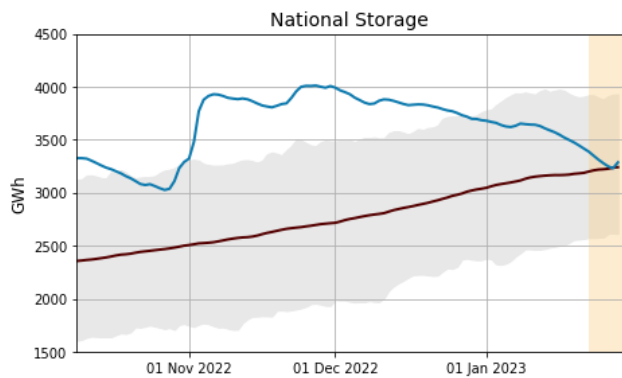


## 9. Storage/Fuel Supply

- 9.1. Figure 14 shows total controlled national hydro storage as well as the storage of major catchment lakes including their historical mean and 10<sup>th</sup> to 90<sup>th</sup> percentiles.
- 9.2. National hydro storage levels continue to decrease overall this week, as inflows continue to be below average, however, there was a small uptick on Saturday – as storage increased at Taupō. Total storage is still around 82 per cent of nominal full.
- 9.3. All lakes, bar Taupō, decreased last week, with many now close to their mean for this time of year. Storage at Lake Te Anau and Manapōuri has continued to decline, forcing Manapōuri Power Station into its low operating range<sup>4</sup>. Storage at Taupō increased this week, and it is now above its 90<sup>th</sup> percentile.

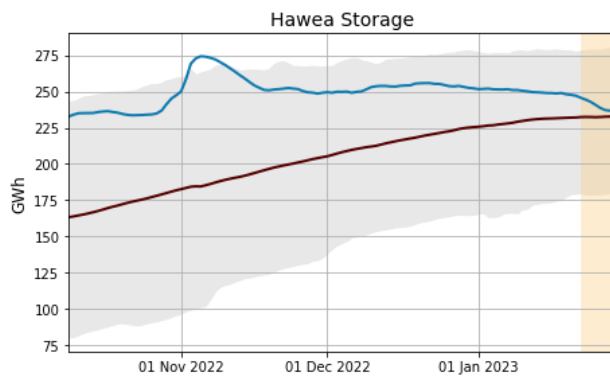
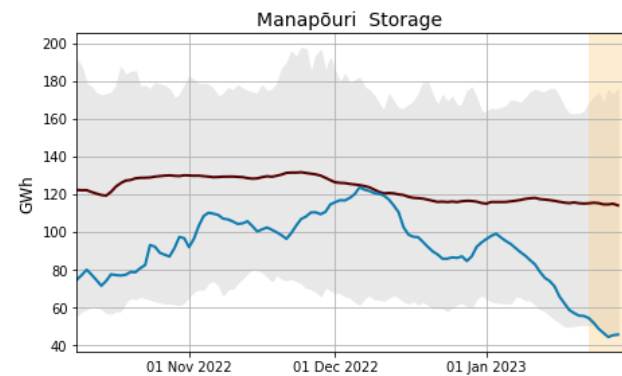
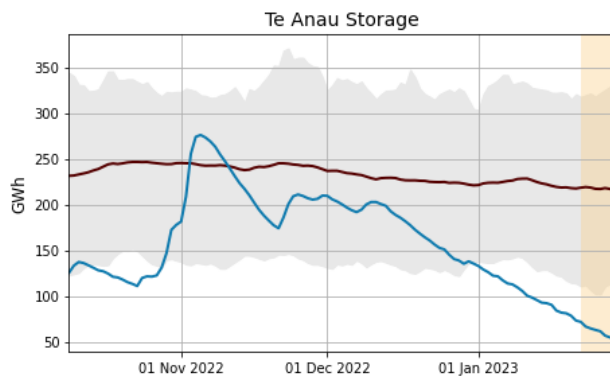
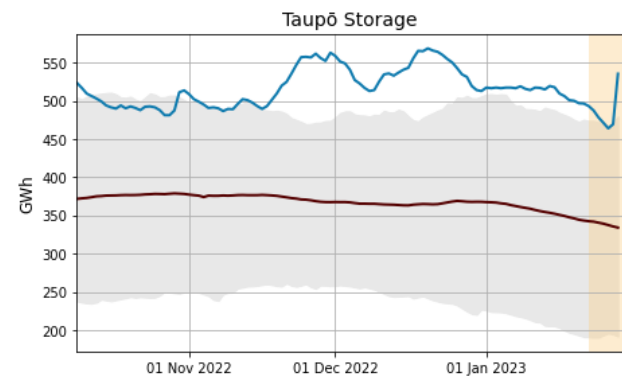
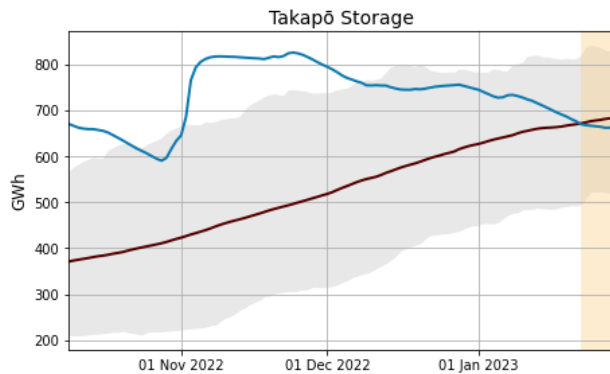
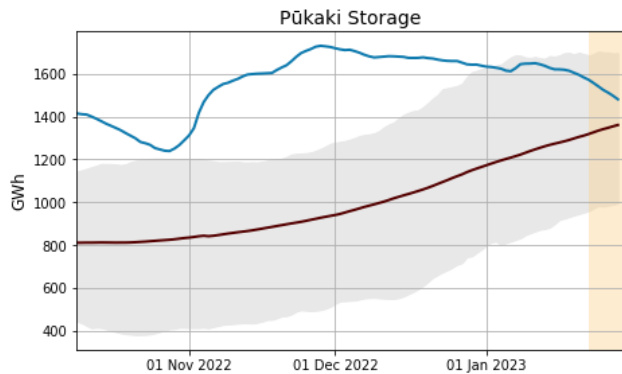
<sup>4</sup> [Lake Manapōuri and Lake Te Anau levels update | Meridian Energy](#)

Figure 14: Hydro Storage



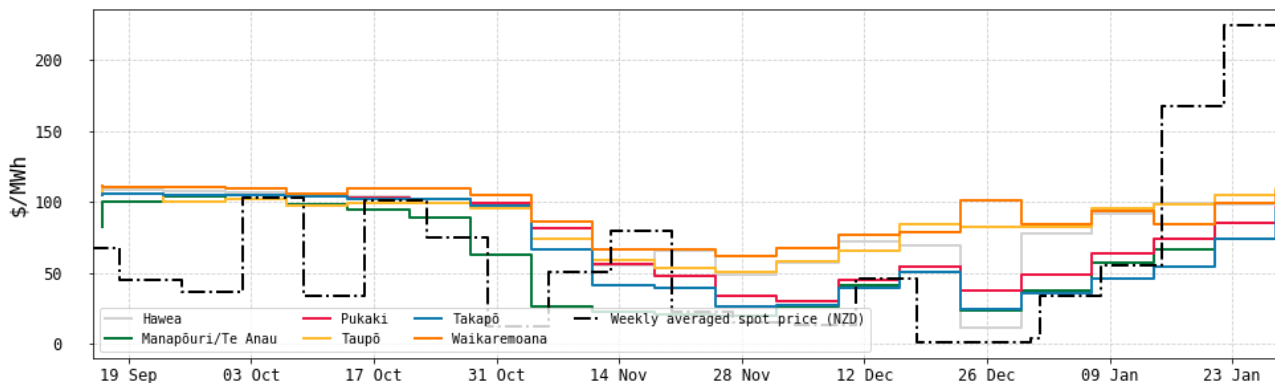
Storage of major lakes

- Mean Storage
- Storage
- 10th to 90th percentile
- Most recent week



## 10. JADE Water Values

Figure 15: JADE water values across various reservoirs between 15 September and 2022 and 28 January 2023



- 10.1. The JADE<sup>5</sup> 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 15 shows the national water values between 15 September 2022 and 28 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 B<sup>6</sup> 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. Water values across all lakes increased last week, as hydro inflows remain low. The weekly average spot price this week was greater than the highest water values.

## 11. Price versus estimated costs

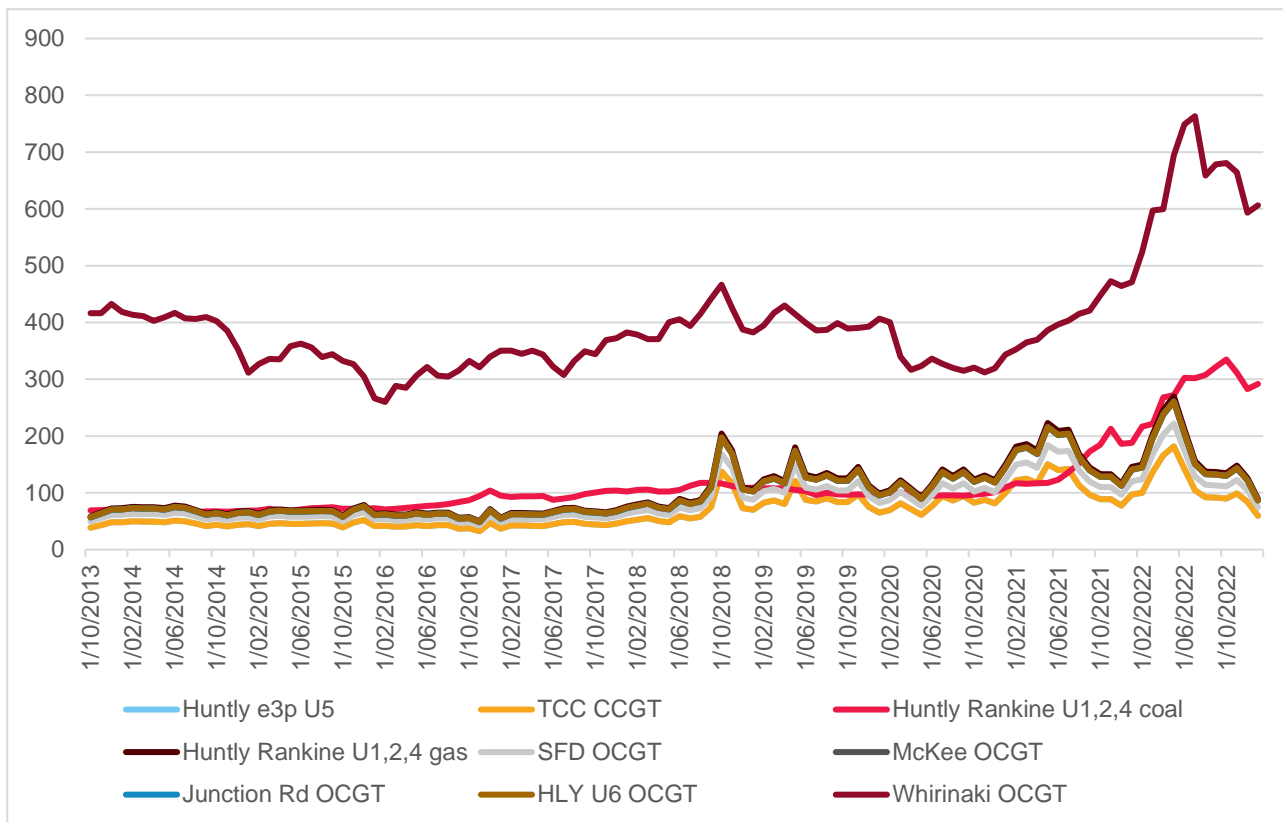
- 11.1. In a competitive market, prices should be close to (but not necessarily at) the short run marginal cost (SRMC) of the marginal generator (where SRMC includes opportunity cost).
- 11.2. The SRMC (excluding opportunity cost of storage) for thermal fuels is estimated using gas and coal prices, and 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 16 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 during summer.
- 11.6. More information on how the SRMC of thermal plants is calculated can be found in Appendix C<sup>7</sup> on the trading conduct webpage.

<sup>5</sup> 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.

<sup>6</sup> <https://www.ea.govt.nz/assets/dms-assets/29/Appendix-B-JADE-water-value-model.pdf>

<sup>7</sup> <https://www.ea.govt.nz/assets/dms-assets/30/Appendix-C-Calculating-thermal-SRMCs.pdf>

Figure 16: Estimated monthly SRMC for thermal fuels



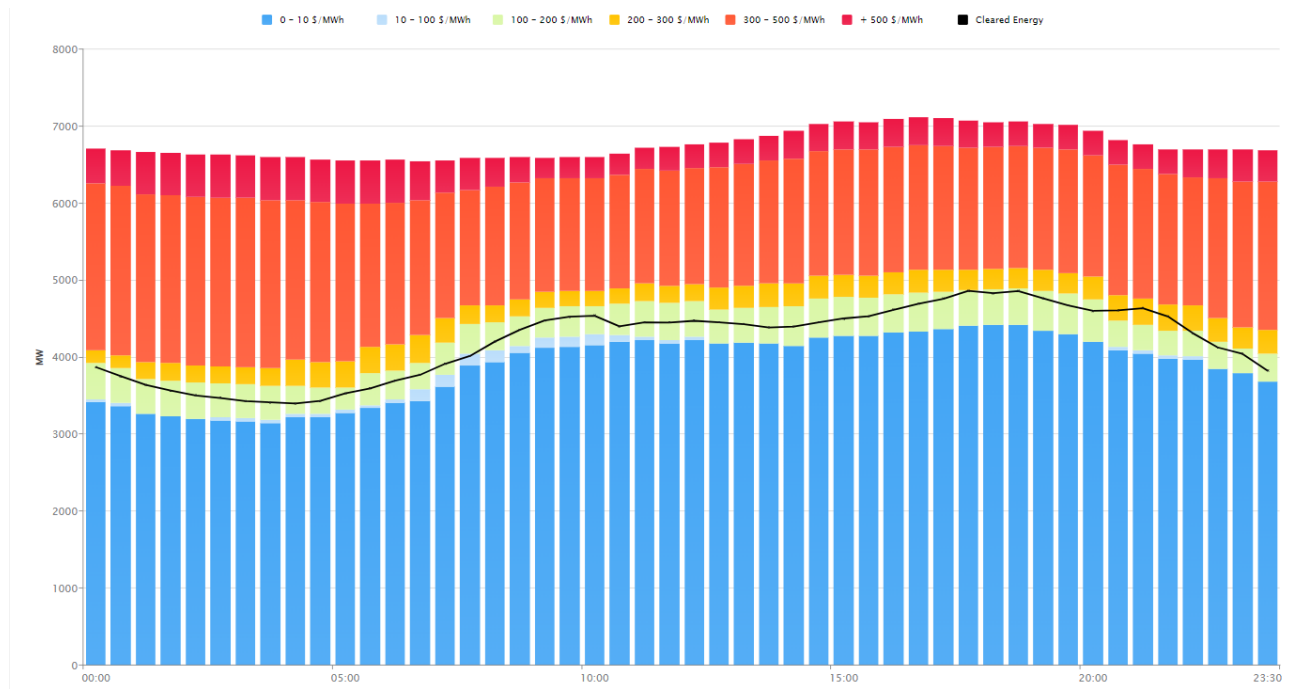
## 12. Offer Behaviour

12.1. Figure 17 shows this week’s national daily offer stacks from WITS<sup>8</sup>. The black line shows cleared energy, indicating the range of the average final price. The majority of energy, between Monday and Friday, was cleared in the \$200-300/MWh band. This is an increase on the previous week, as the amount offered in the \$100-\$200/MWh band decreased. On Saturday, energy mostly cleared in the \$10-100 or \$100-200/MWh bands, which reflected the lower demand and higher amounts of North Island wind.

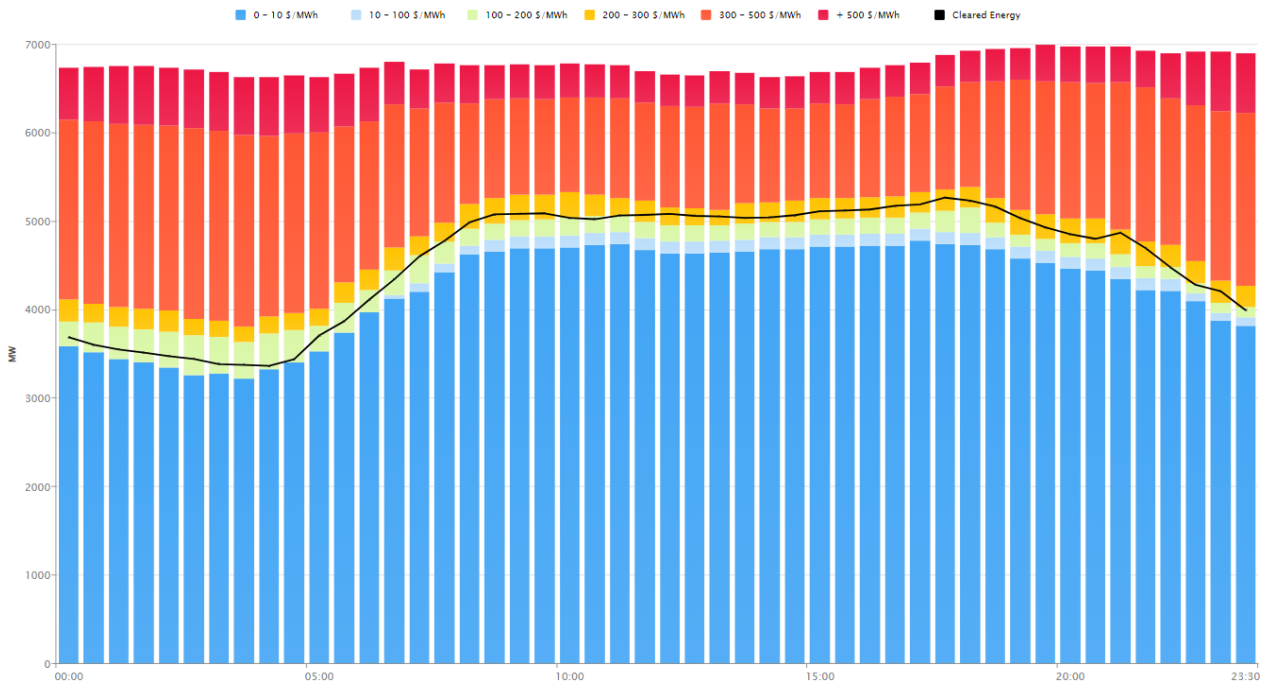
<sup>8</sup> Cleared Energy Stack | WITS (electricityinfo.co.nz)

Figure 17: Daily offer stack from WITS

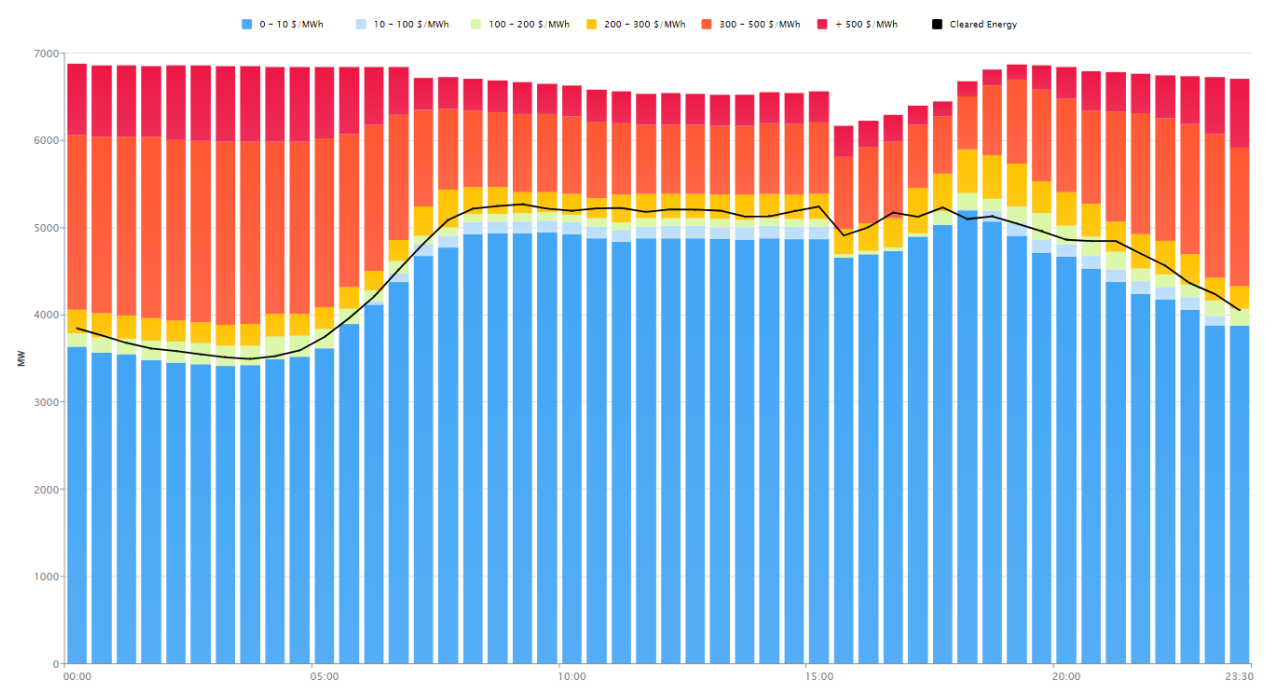
Sunday 22 January



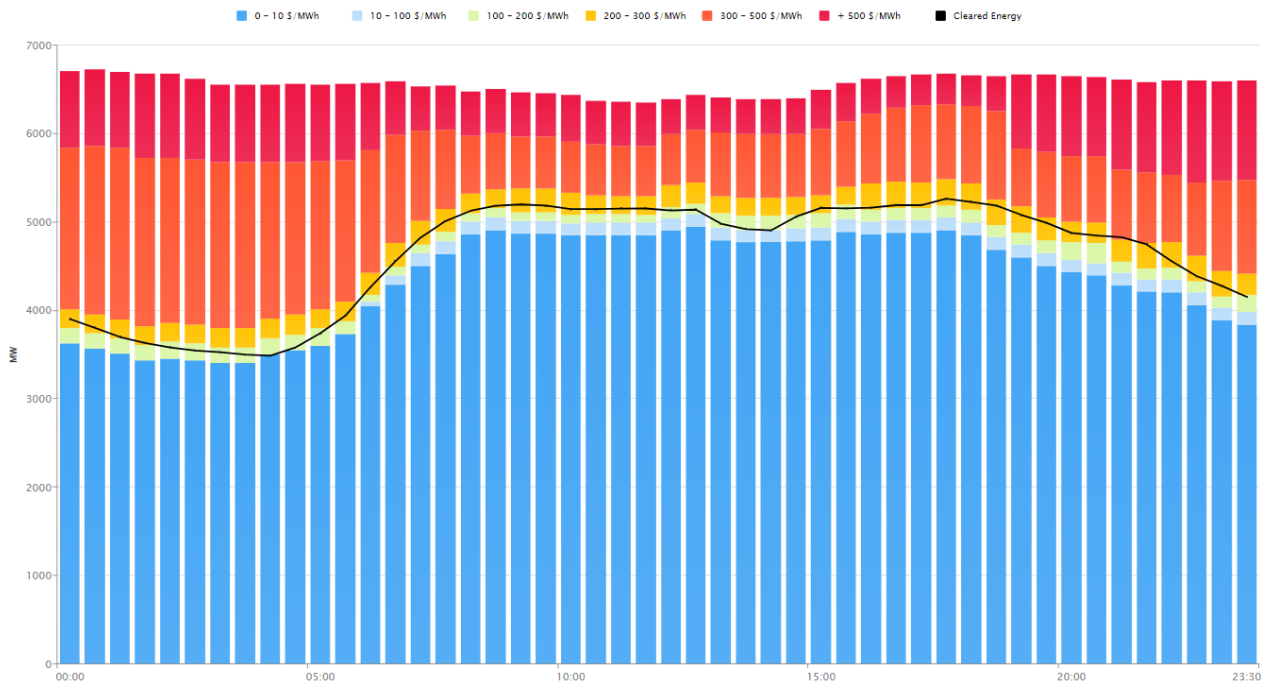
### Monday 23 January



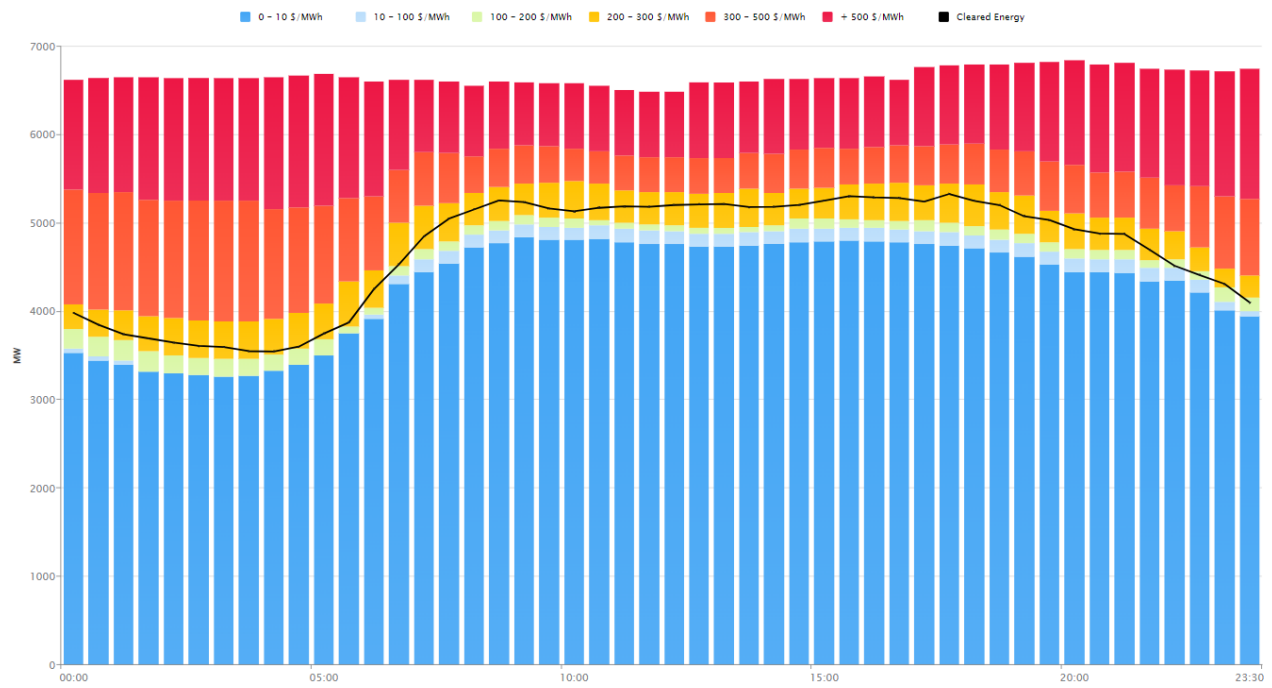
### Tuesday 24 January



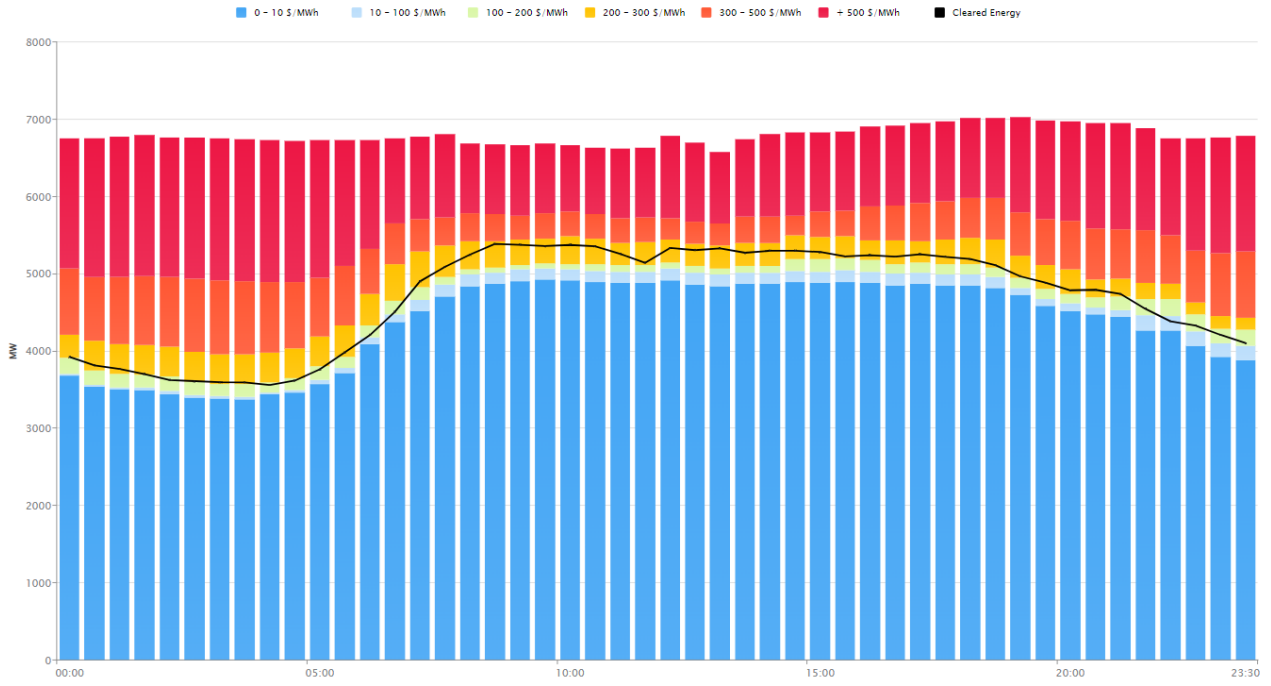
Wednesday 25 January



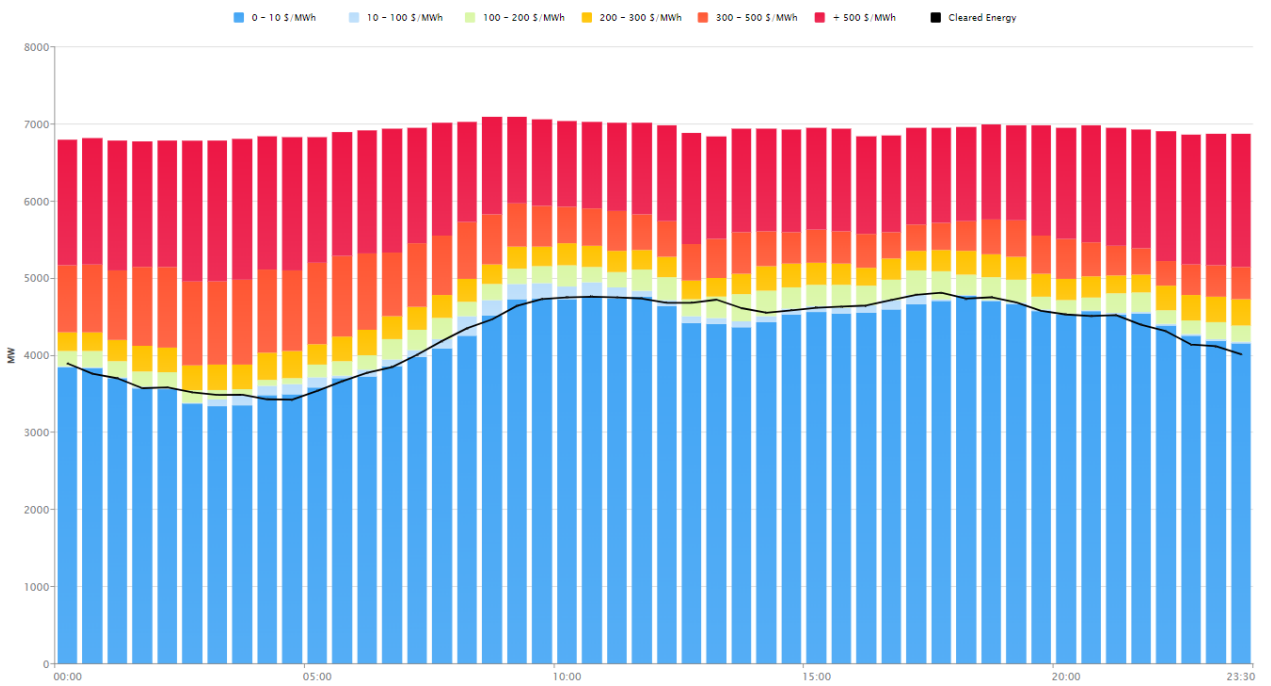
Thursday 26 January



Friday 27 January



Saturday 28 January





## 13. Ongoing Work in Trading Conduct

- 13.1. This week, all prices appeared to be consistent with supply and demand conditions, however, hydro offers this week 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

<b>Date</b>	<b>TP</b>	<b>Status</b>	<b>Notes</b>
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.
13/12/2022-16/12/2022	Several	Further analysis	The Authority will continue analysis into the high energy prices.
15/1/2023 28/1/2023	Several	Further analysis	The Authority will continue analysis into the high energy prices associated with high hydro offers.