

# Trading Conduct Report

## Market Monitoring Weekly Report

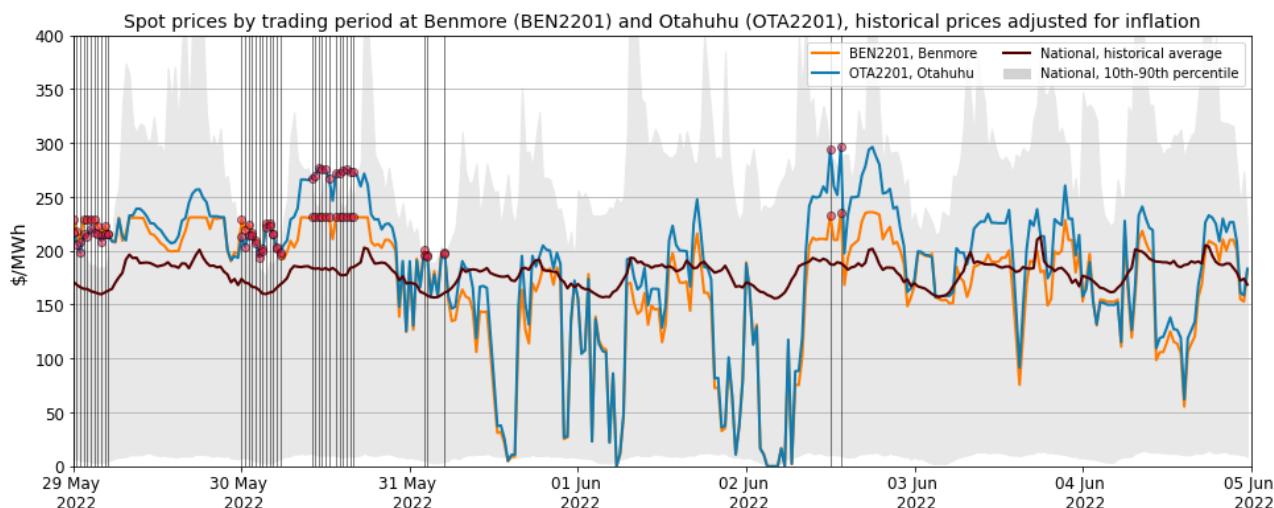
### 1. Overview for the week of 29 May to 4 June

1.1. Spot prices this week appear to be consistent with supply and demand 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. To do this, we assess whether spot prices are behaving in line with market conditions. 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. The average wholesale electricity spot price across all nodes between 29 May and 4 June dropped by ~\$40/MWh from the previous week's average of \$228.19/MWh to \$188.11/MWh. 95 per cent of prices this week fell between \$9.08/MWh and \$263.99/MWh.
- 2.3. Figure 1 shows spot prices from the past week at Benmore and Otahuhu alongside their historic mean and historic 10<sup>th</sup>-90<sup>th</sup> percentiles adjusted for inflation.
- 2.4. Despite above average prices at the beginning of the week, prices dropped substantially from 31 May to mid-2 June, before cycling around the historical mean for the remainder of the week. Off peak (morning and midday) prices on 29, 30 and 31 May as well as 2 June were marked as being historically high.

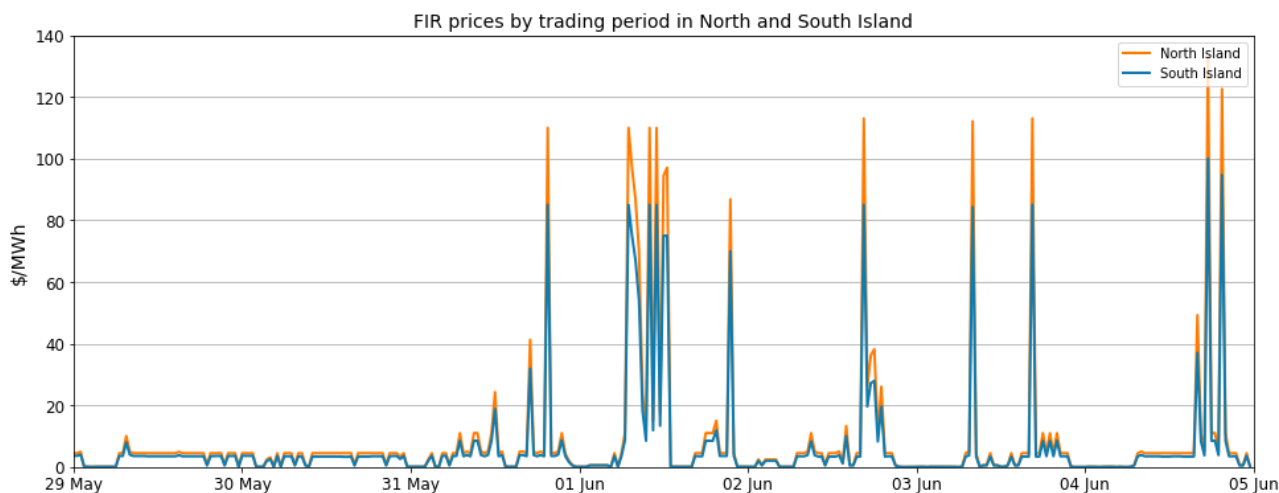
Figure 1: Wholesale Spot Prices



### 3. Reserve Prices

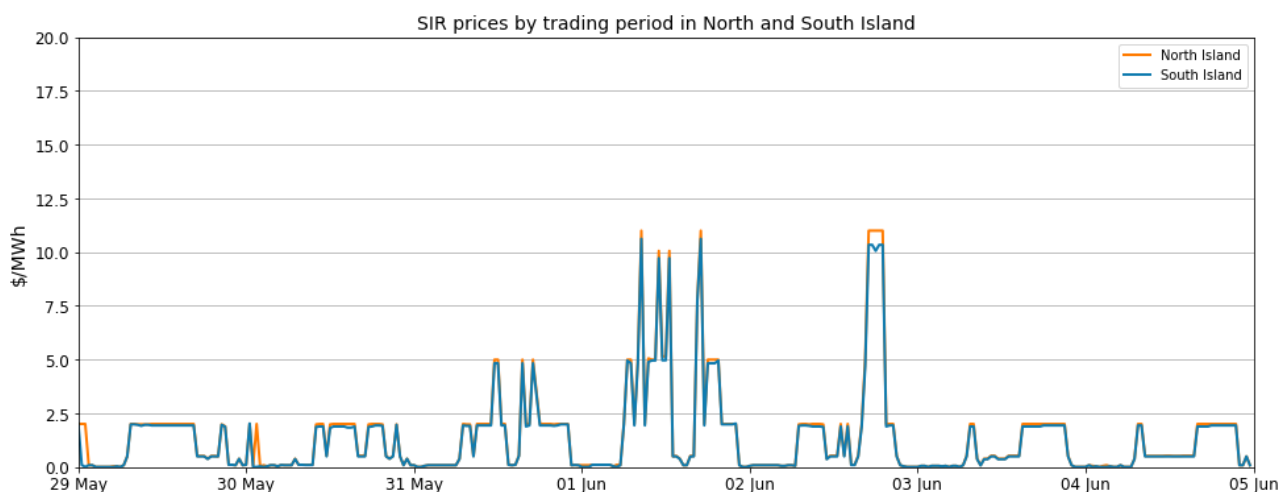
3.1. Fast instantaneous reserves (FIR) prices for the North and South Island are shown below in Figure 2. FIR prices this week saw spikes up to \$140/MWh. It looks as though these spikes may be due to a mixture of factors including less industrial demand resulting in less interruptible load, fewer reserve offers due to stations such as Huntly not running and possible co-optimisation by the system operator. Overall these price spikes do not appear to be a result of any deliberate changes in offers and so do not show signs of trading misconduct.

Figure 2: FIR prices by trading period and Island



3.2. Sustained instantaneous reserves (SIR) prices for the North and South Island are shown below in Figure 3. SIR reserve prices this week also showed some price spikes, though the spikes were within a reasonable range of just above \$10/MWh. SIR prices otherwise remained within normal bounds at below \$5/MWh.

Figure 3: SIR prices by trading period and Island



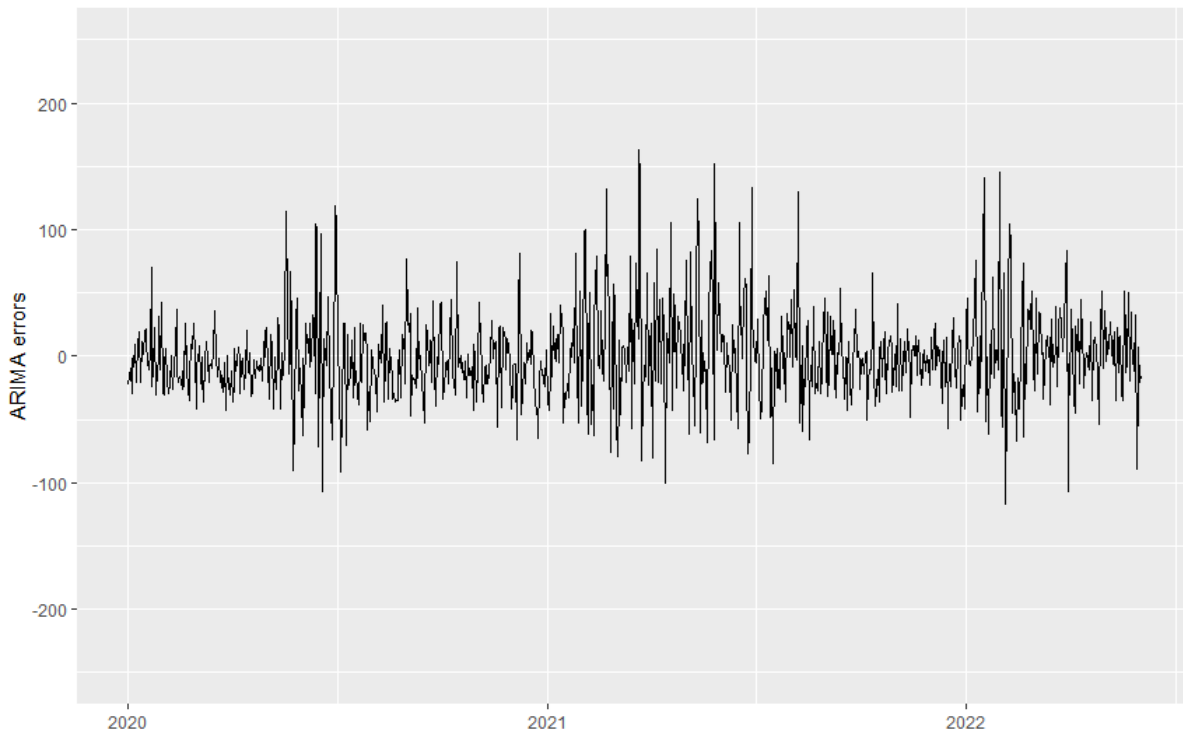
### 4. Regression Residuals

4.1. The Authority’s monitoring team has developed two regression models of the 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>1</sup> on the trading conduct webpage.

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

4.2. Figure 4 shows the residuals of autoregressive moving average (ARMA) errors from the daily model. Residuals this week indicated a decreasing trend in spot prices. Prices appear to largely align with market conditions.

Figure 4: Residual plot of estimated daily average spot price YTD

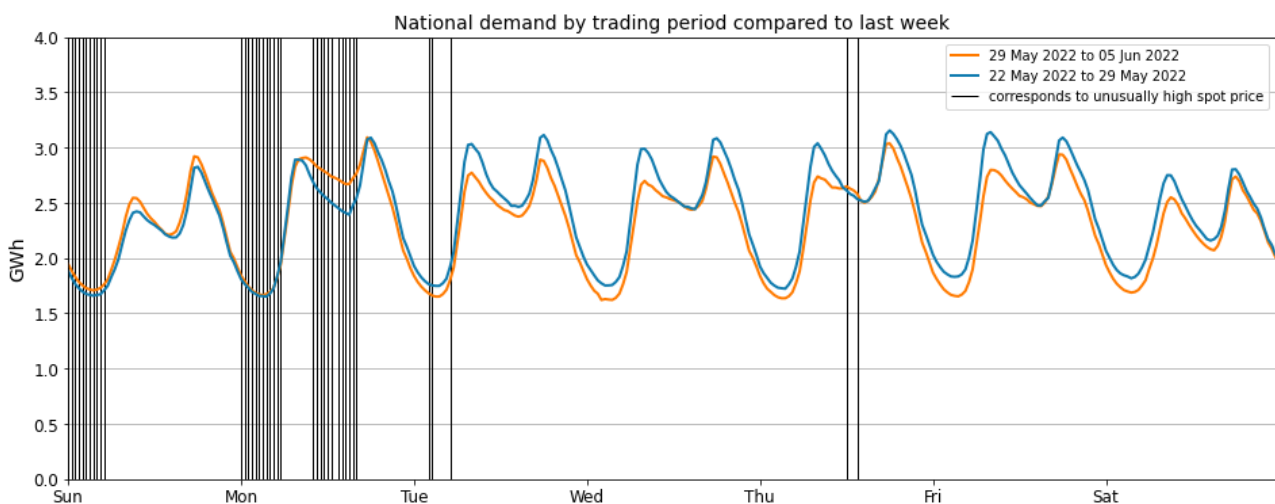


## 5. Demand

5.1. Figure 5 shows this week's national grid demand against national grid demand from the previous week. Grid demand between 29 May and 4 June totalled 768.8 GWh.

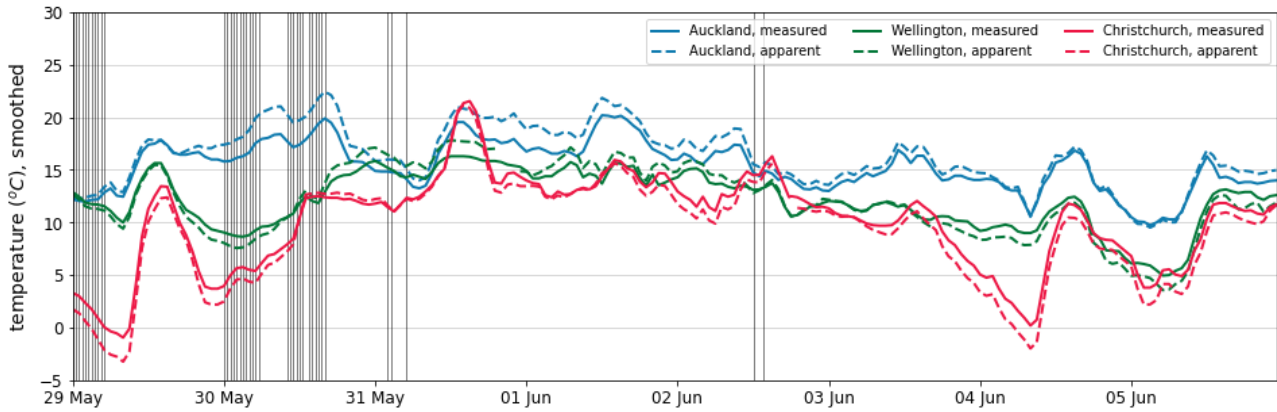
5.2. Overall grid demand this week has dropped compared to the previous week. Due to low temperatures the previous week had the highest demand of the year to date. With higher temperatures this week however (as seen in Figure 6), demand has dropped, with the reduction likely one of the main reasons for the decrease in average spot price this week.

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



- 5.3. 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.
- 5.4. Temperatures at main population centres this week were relatively mild for this time of year with temperatures mostly averaging around 10°-15° degrees. Temperatures in the middle of the week when they were at their highest points correlated with low spot prices this week.

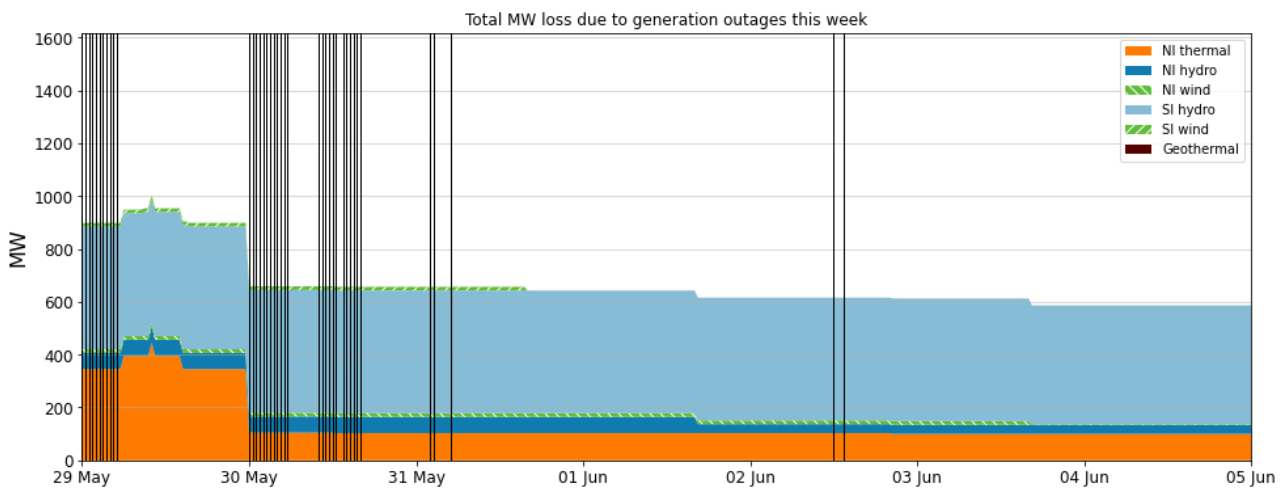
Figure 6: Temperatures across main centres



## 6. Outages

- 6.1. Figure 7 shows generation capacity lost due to outages by fuel type. A large reduction in thermal outages has reduced total generation capacity lost due to outages to around ~600 MW from 30 May. South Island hydro outages, made up the bulk of outages this week. The reduction in capacity lost would have helped keep spot prices within historical bounds this week from 30 May onwards.

Figure 7: Total MW loss due to generation outages



## 7. Generation

- 7.1. Figure 8 shows wind generation this week. Strong wind in the middle of the week brought total wind generation up from 100 MW to 700 MW on 1 June. The increase in wind generation led to a decrease in thermal generation and a reduction in average spot price between 31 May and 2 June.

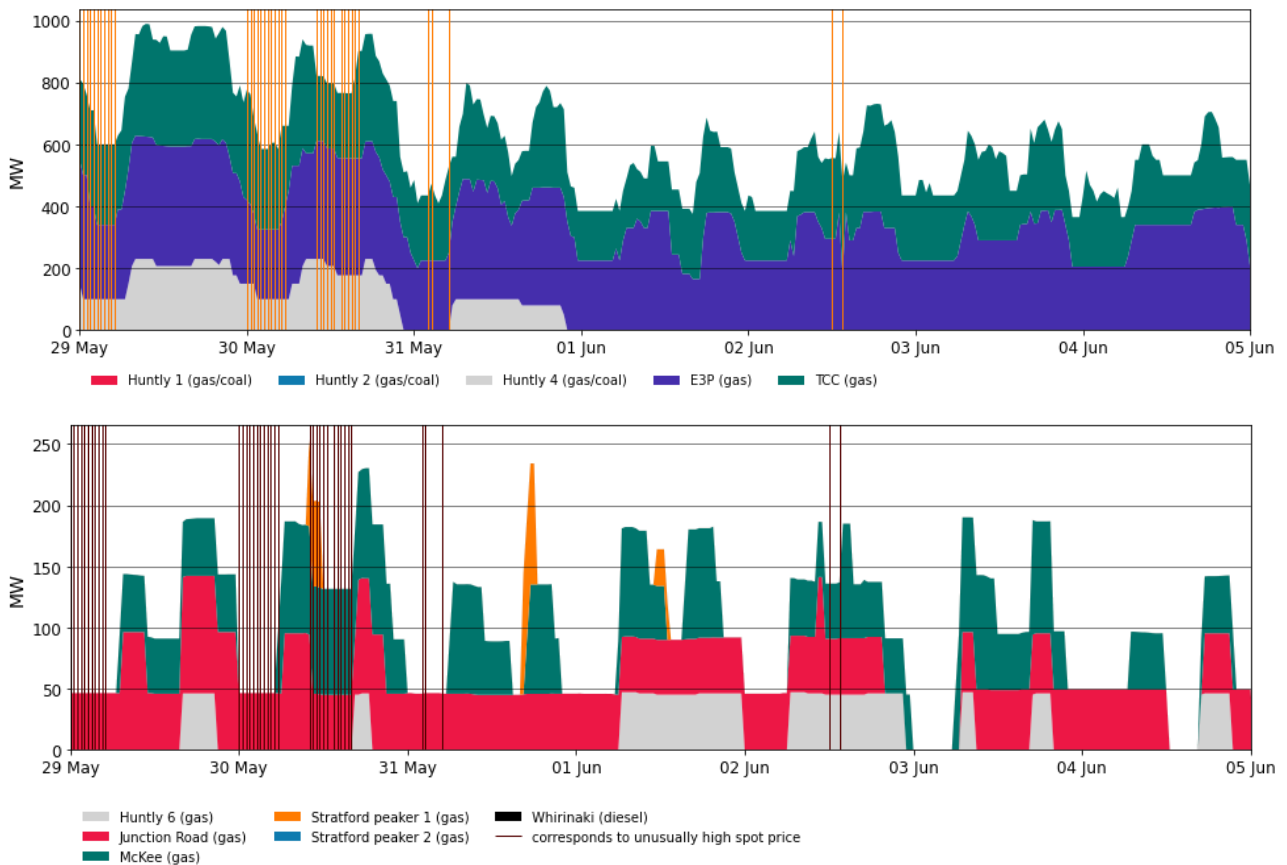
Figure 8: Wind Generation



7.2. Figure 9 shows generation at thermal and thermal peaker plants. Following the increase in wind generation on 31 May thermal generation dropped from between 600-1000 MW to between 400-800MW. Even after wind generation subsided back to 100 MW thermal generation remained below 800 MW with hydro generation increasing to meet remaining demand.

7.3. Thermal peaker generation followed thermal generation trends, decreasing from 31 May onwards. The decrease in overall thermal generation would have been one of the main contributors to lower spot prices this week.

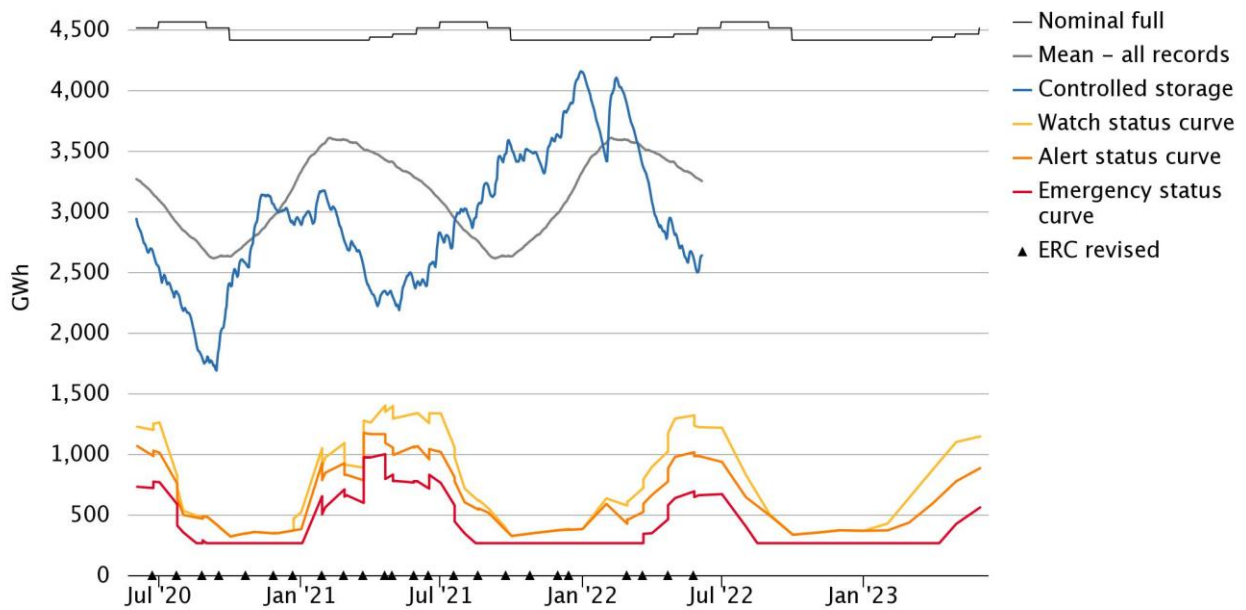
Figure 9: Thermal Generation



## 8. Storage/Fuel Supply

8.1. Figure 10 shows total controlled national hydro storage. Recent rainfall has increased hydro storage to 2,636 GWh though overall hydro storage remains relatively low. Low hydro storage keeping the opportunity cost of hydro generation high continues to be a large contributor towards high spot prices.

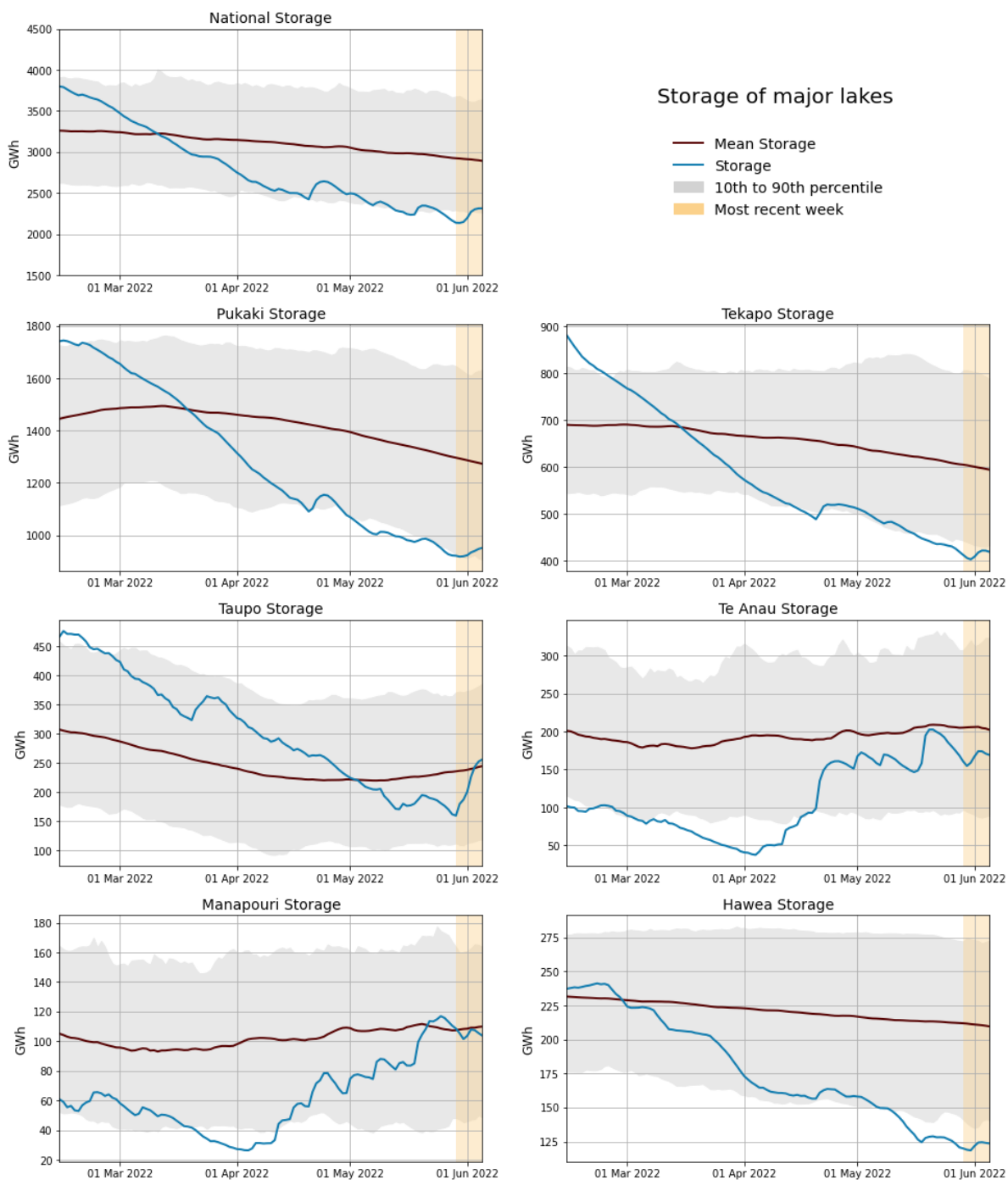
Figure 10: Hydro Storage



emi.ea.govt.nz/r/bp4fy

8.2. Figure 11 shows hydro storage at major lakes compared to their historic average and historic 10<sup>th</sup>-90<sup>th</sup> percentiles. All major catchments have seen a small bump in storage with the greatest gains seen at Lake Taupo where storage has risen to just above historical mean. Manapouri and Te Anau levels are close to their historic means with remaining South Island lakes close to their 10<sup>th</sup> percentiles.

Figure 11: Storage Catchment Levels

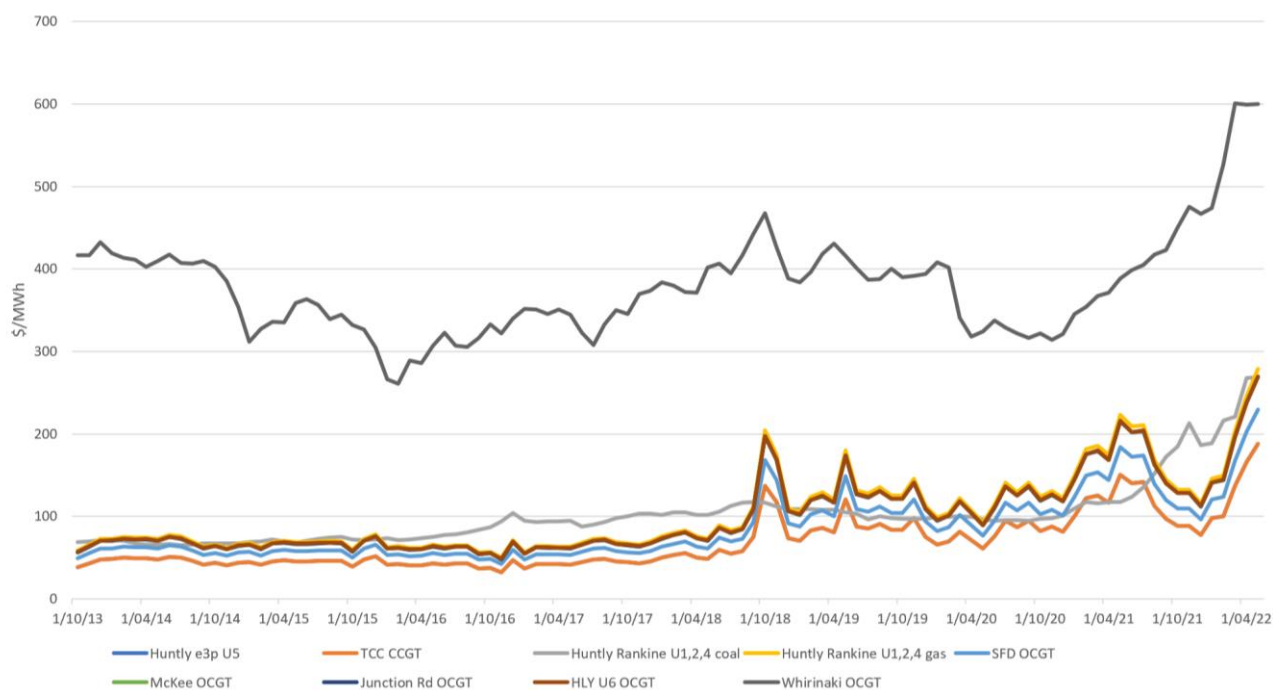


## 9. Price versus estimated costs

- 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 can be 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. Figure 12 shows an estimate of thermal SRMCs as a monthly average up to 1 May 2022. The SRMC of all plants has increased sharply since the beginning of 2022.
- 9.3. The SRMC of coal and diesel have both increased due to global supply and demand conditions. As well as supply disruptions caused by Covid, the Russian-Ukraine conflict has

increased the premium on all international coal due to sanctions placed on Russia. Recently the international unit cost in terms of USD has dropped for coal indicating prices are settling. The reductions in market prices have not necessarily materialized for local consumers however due to increased inflation and a weakening NZD. Coal prices in NZD are currently around \$420/tonne. Limited local gas production has also put a premium on gas spot prices with the current month long full field outage at Maui gas field (14 May-8 June) pushing the VWAP of gas spot prices to around ~\$25/GJ. High historical carbon prices have also affected thermal generation costs with prices on the secondary market currently averaging ~\$77/tonne. This puts the latest SRMC of Huntly generation at above ~\$270/MWh.

Figure 12: Estimated monthly SRMC for thermal fuels



## 10. JADE Water values

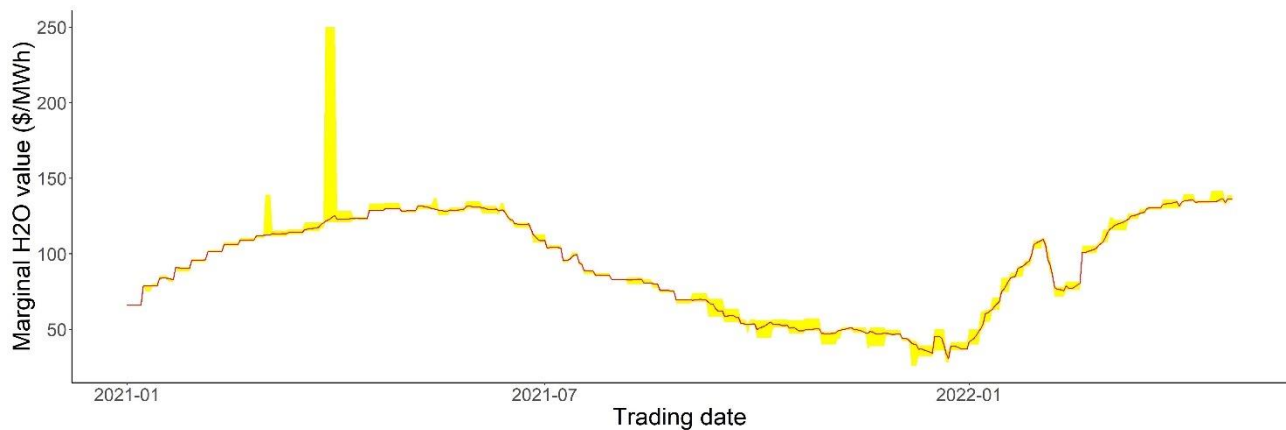
- 10.1. The JADE<sup>2</sup> model gives a consistent measure of the opportunity cost of water, by seeking to minimise the expected fuel cost of thermal generation and the value of lost load and provides an estimate of water values at a range of storage levels. Figure 13 shows the national water values to 31 March 2022 using values obtained from JADE. The outputs from JADE closest to actual storage levels are shown as the yellow water value range. These values are used to estimate marginal water value at the actual storage level. More details on how water values are calculated can be found in Appendix B<sup>3</sup> on the trading conduct webpage.
- 10.2. In general, marginal water values have increased when total national hydro storage has decreased. For the last two months water values have been gradually increasing as hydro storage has declined and despite the recent bump in hydro storage water values have almost reached \$150/MWh.

<sup>2</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>3</sup> <https://www.ea.govt.nz/assets/dms-assets/29/Appendix-B-JADE-water-value-model.pdf>



Figure 13: Water Values



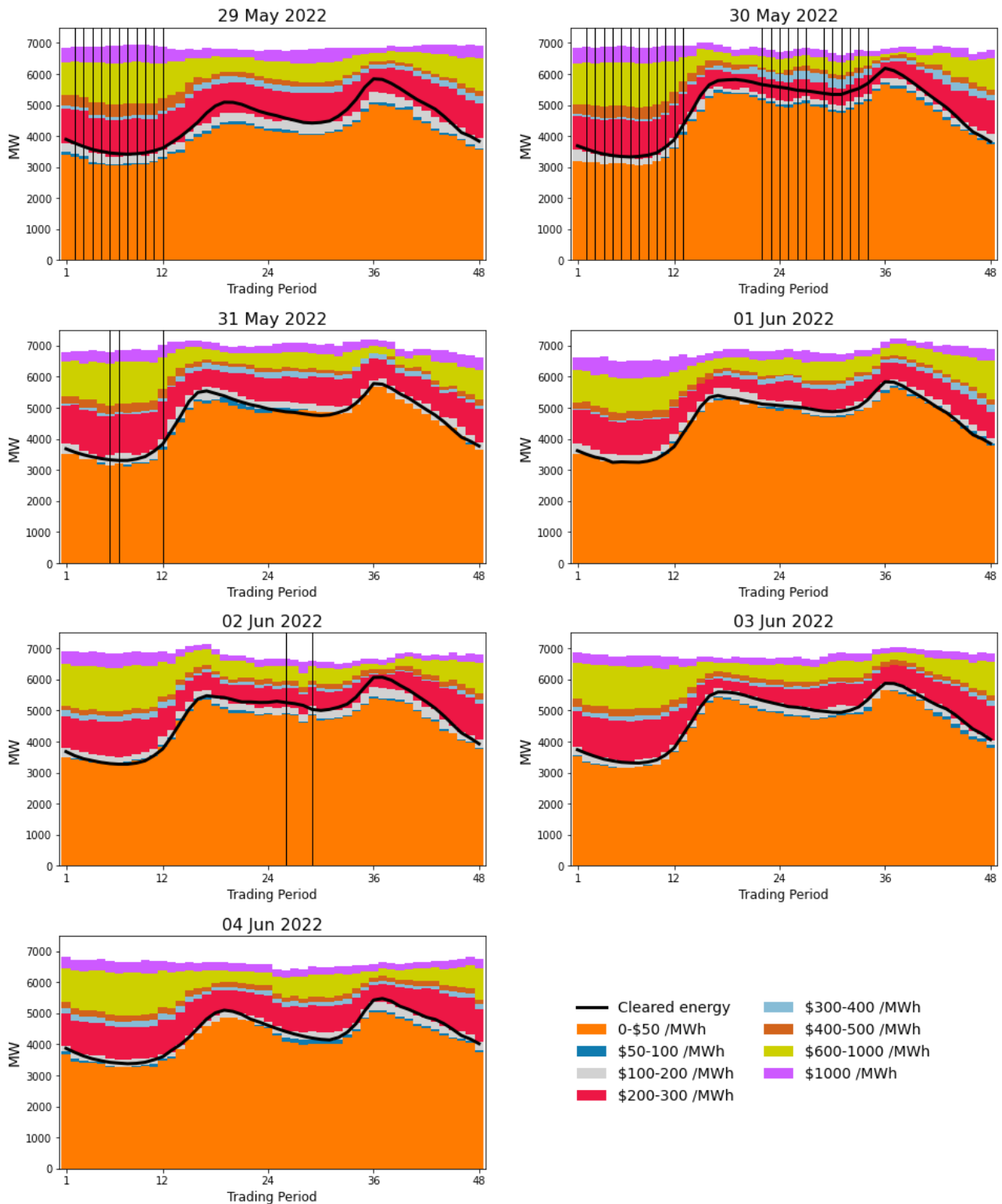
## 11. Offer Behaviour

- 11.1. Figure 14 shows this week's daily offer stacks, adjusted to take into account wind generation, transmission constraints, reserves and frequency keeping.<sup>4</sup> The black line shows cleared energy, indicating the range of the average final price.
- 11.2. High thermal and hydro generation opportunity costs as detailed above continue to drive a steep offer curve with few offers between \$50-200/MWh and \$300-600/MWh resulting in large price jumps with small increases in demand.
- 11.3. This week the majority of cleared generation fell below \$300/MWh as a result of lower grid demand and a higher percentage of renewable generation. High wind generation increased the amount of \$0-50/MWh offers between 31 May and 2 June allowing most cleared generation to fall below \$200/MWh. Lower thermal generation offers also kept most cleared generation below \$300/MWh from 2 June onwards.

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<sup>4</sup> 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 14: Daily offer stack



## 12. Ongoing Work in Trading Conduct

- 12.1. Low wind generation and low temperatures increasing grid demand increased off peak demand prices to above what we would historically expect at certain points of the week. Offer behaviour leading up to dispatch showed no sign of trading misconduct. Spot prices aligned with market conditions this week.
- 12.2. Genesis has advised the market on the E3P outage last week.

12.3. 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>
<b>19/02/22-24/02/22</b>		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.
<b>19/02/22-21/02/22</b>	Several	Further Analysis	High reserve prices were due to the HVDC outage, which increased reserve requirement in South Island, combined with less reserves available in the South Island due to low lake levels at Manapouri.
<b>30/06/21-21/08/21</b>	Several	Resolved	After going to the Compliance Committee Mercury was found to not be in breach. Changes to reserve offers were either due to unit outages or to avoid operating the units inefficiently.