

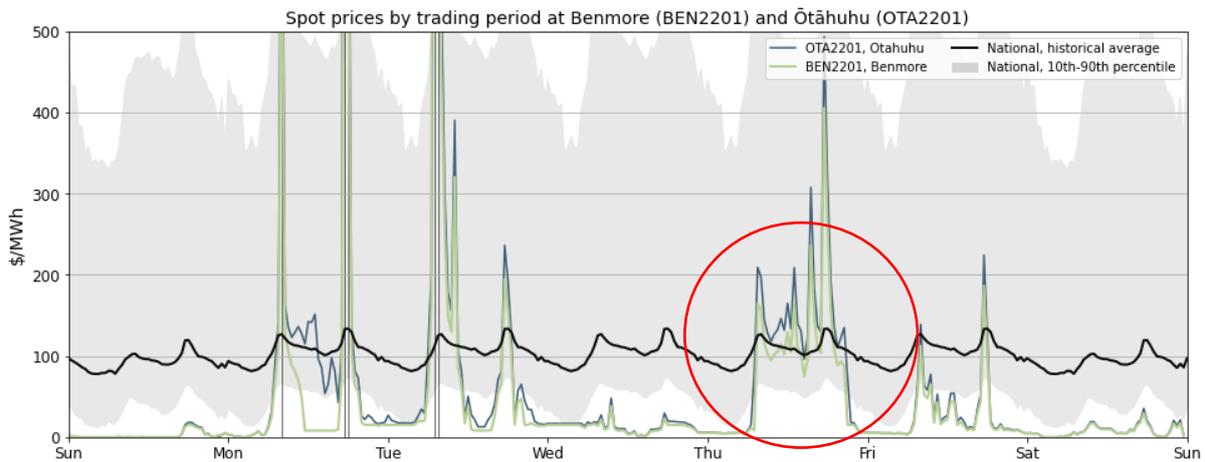
Review of off-peak prices on Thursday 18 May 2023

August 2023

1. Background

- 1.1. On Thursday 18 May, off-peak prices, specifically for trading periods 21-34 (10 am-4:30 pm), were between \$78/MWh and \$245/MWh. These off-peak prices were much higher than during previous days – and especially higher than those which occurred on Tuesday 16 May, which had similar low wind generation. These prices are shown in Figure 1.
- 1.2. Further analysis has been conducted by the Electricity Authority’s Market Monitoring team to understand what caused these higher off-peak prices. This document sets out our findings. We found that prices were consistent with underlying conditions, so we are not proposing any further action.

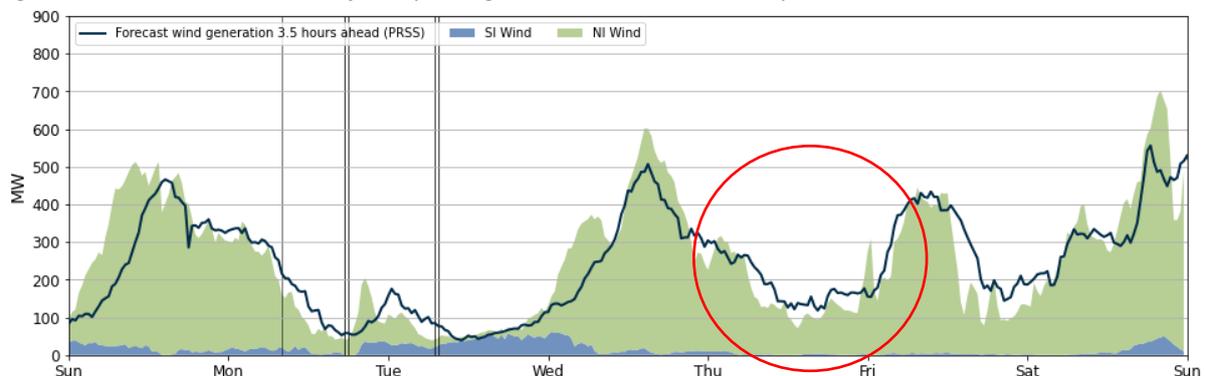
Figure 1: Half-hourly Benmore and Otahuhu spot prices between 14-20 May 2023



2. Generation and demand conditions

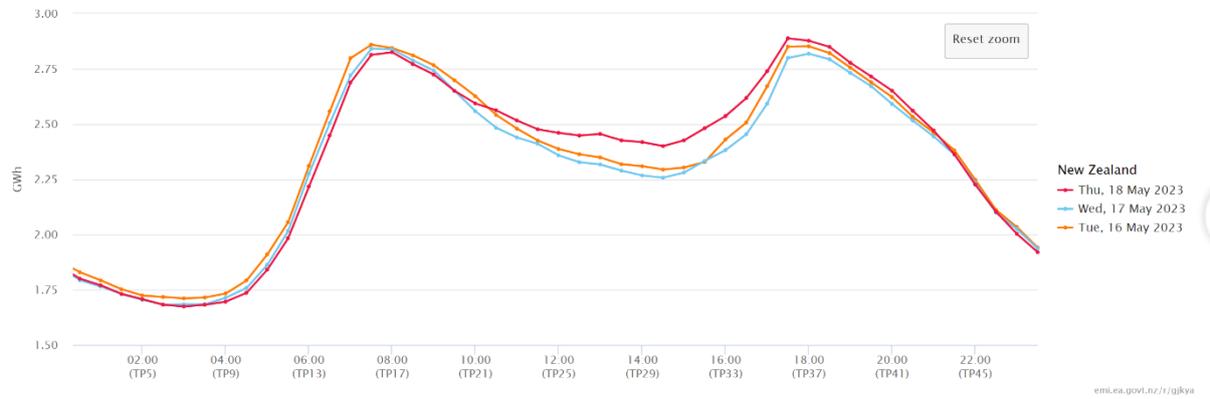
- 2.1. Wind generation throughout the day was low – with national wind generation staying below ~150 MW throughout the off-peak day period - as seen in Figure 2. Final wind generation was also lower than forecast throughout the day. However, wind generation was higher, on a national level, than the wind generation on the previous Tuesday.

Figure 2: North and South Island half hourly wind generation between 14-20 May 2023



2.2. Daytime off-peak demand on Thursday was also higher when compared to Tuesday and Wednesday – this can be seen in Figure 3.

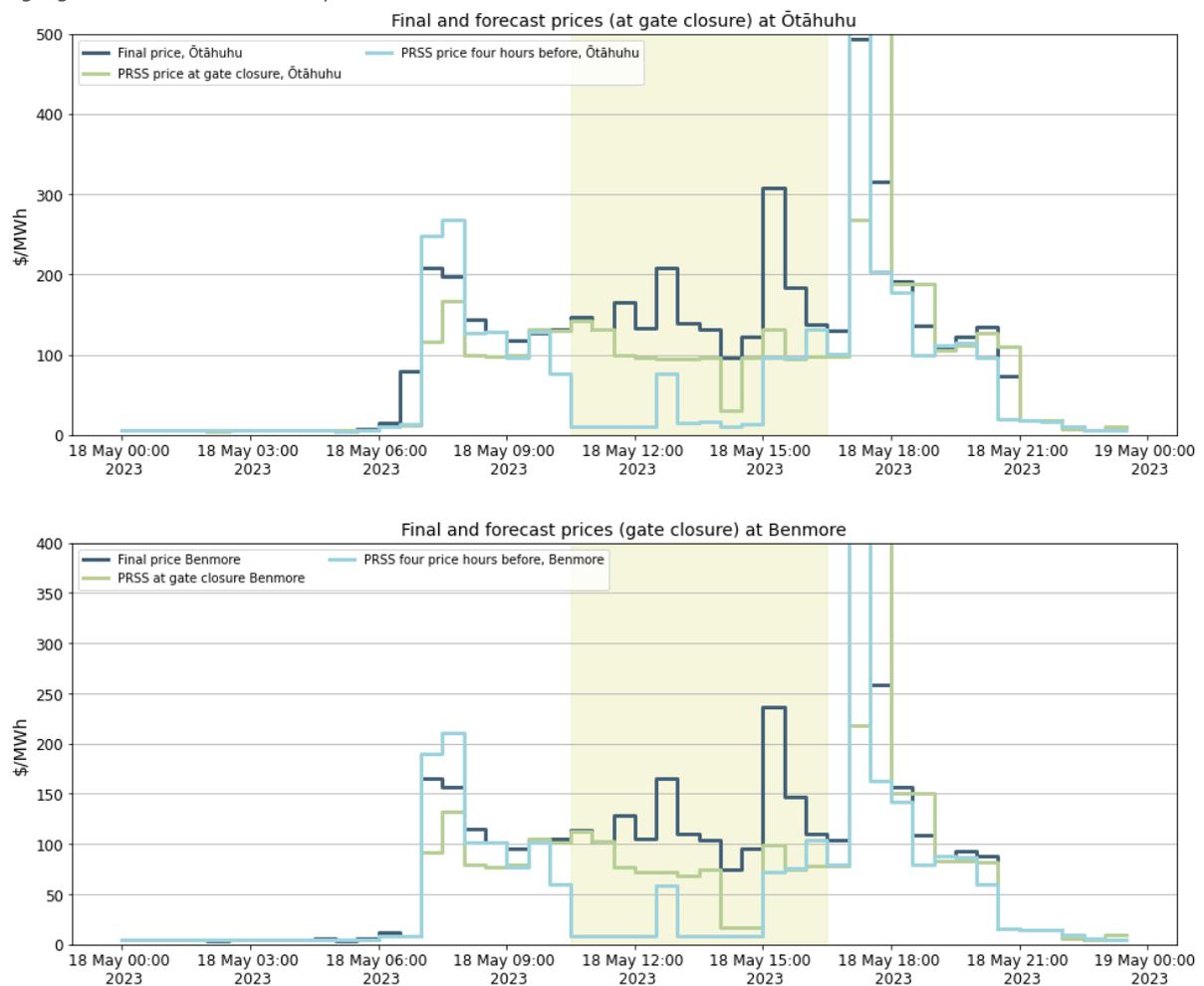
Figure 3: Daily demand profiles for 16, 17, and 18 May 2023



3. Forecasting

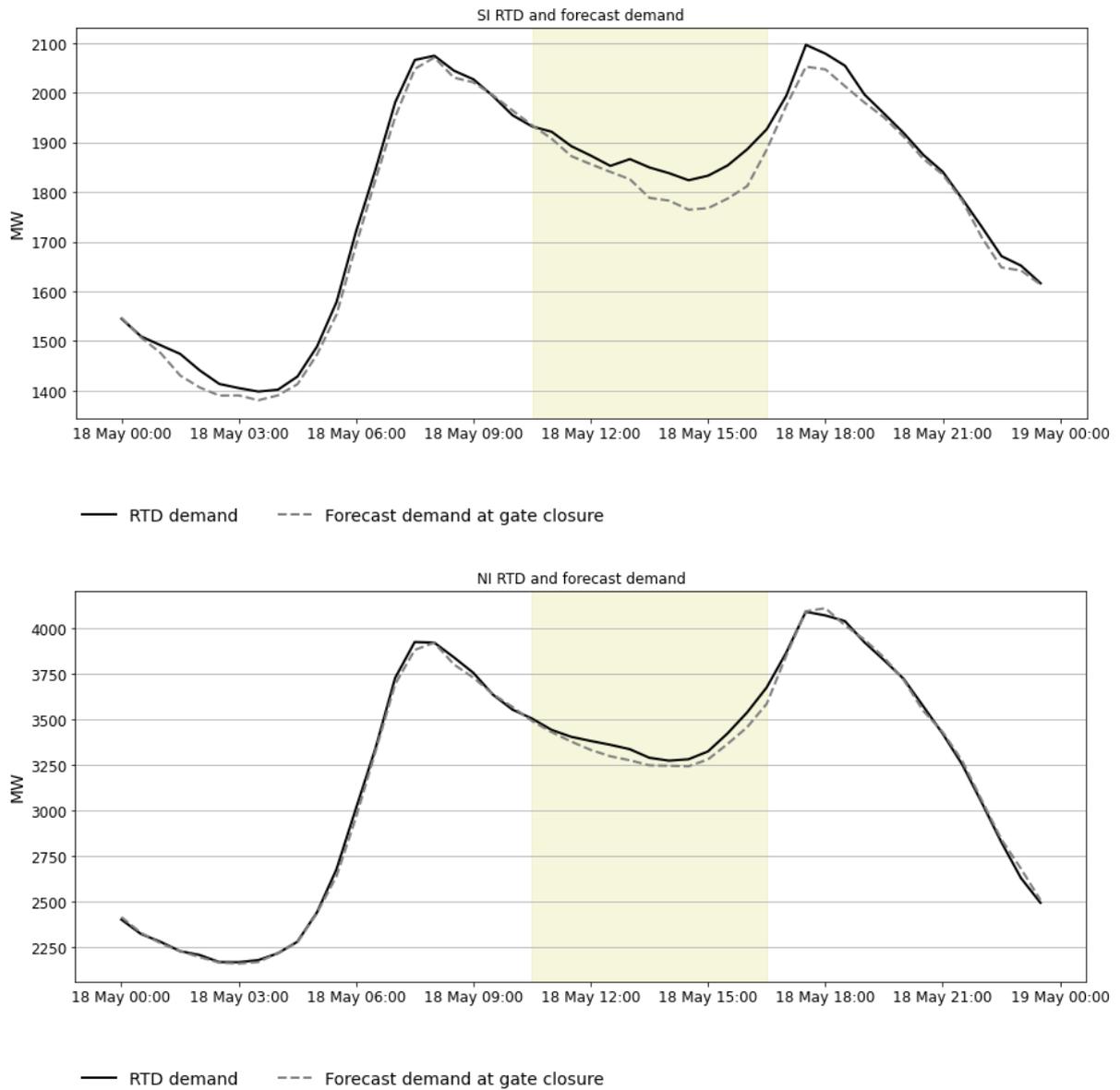
- 3.1. While wind generation was low on Thursday, staying below 150 MW nationally throughout the off-peak period, it was consistently forecast to be higher during this time. See Figure 2. While, not a large contributing factor – as wind was already low – it likely exacerbated the issues around the accuracy of the forecast prices.
- 3.2. Final and forecast prices, both at gate closure and 4 hours before, are shown in Figure 4. In the four hours before Price Responsive Schedule Short (PRSS) pre-dispatch price schedules for Benmore and Otahuhu between 10:30-4:30, the final price was consistently under forecast, often by over \$100/MWh. While forecast prices did rise closer to final prices by gate closure (green line compared to the light blue line) – there were still times with over \$50/MWh difference between the PRSS and final price.

Figure 4: Final and forecast prices (at gate closure and four hours ahead) at Otahuhu and Benmore on 18 May. Yellow highlight shows 10:30 am – 4:30 pm.



3.3. South Island off-peak demand was also higher than forecast – with demand being up to 74 MW under forecast. This can be seen in Figure 5.

Figure 5: Final and forecast demand (at gate closure) at Otahuhu and Benmore on 18 May. Yellow highlight shows 10:30 am - 4:30 pm.



4. Offers and generation

- 4.1. To compensate for the low wind generation, Huntly 2, 4, and 5 ran throughout the day on Thursday. There was a higher output from Huntly 5 through the day when compared to Tuesday - with it generating roughly between ~220-310 MW during daytime off peak on Thursday as compared to ~180-340 MW on Tuesday. Generation from Huntly 2,4, and 5 can be seen in Figure 6. Adjusted thermal offers from Genesis can be seen in Figure 7.

Figure 6: Half hourly thermal generation between 14-20 May

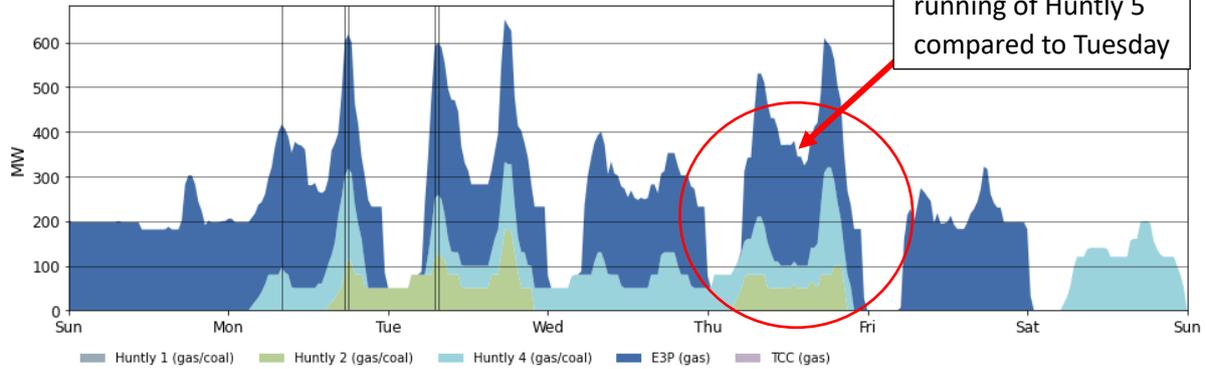
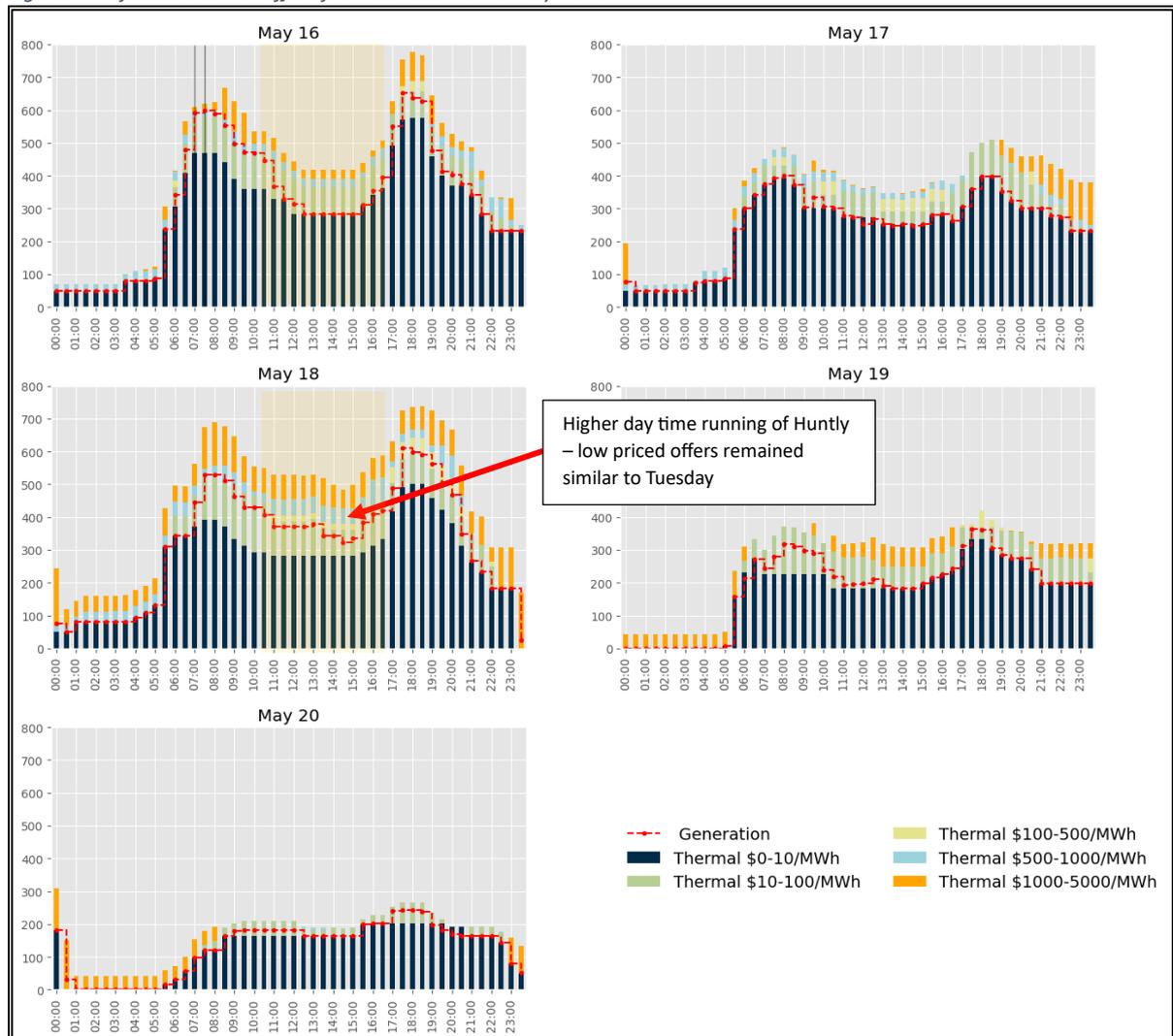
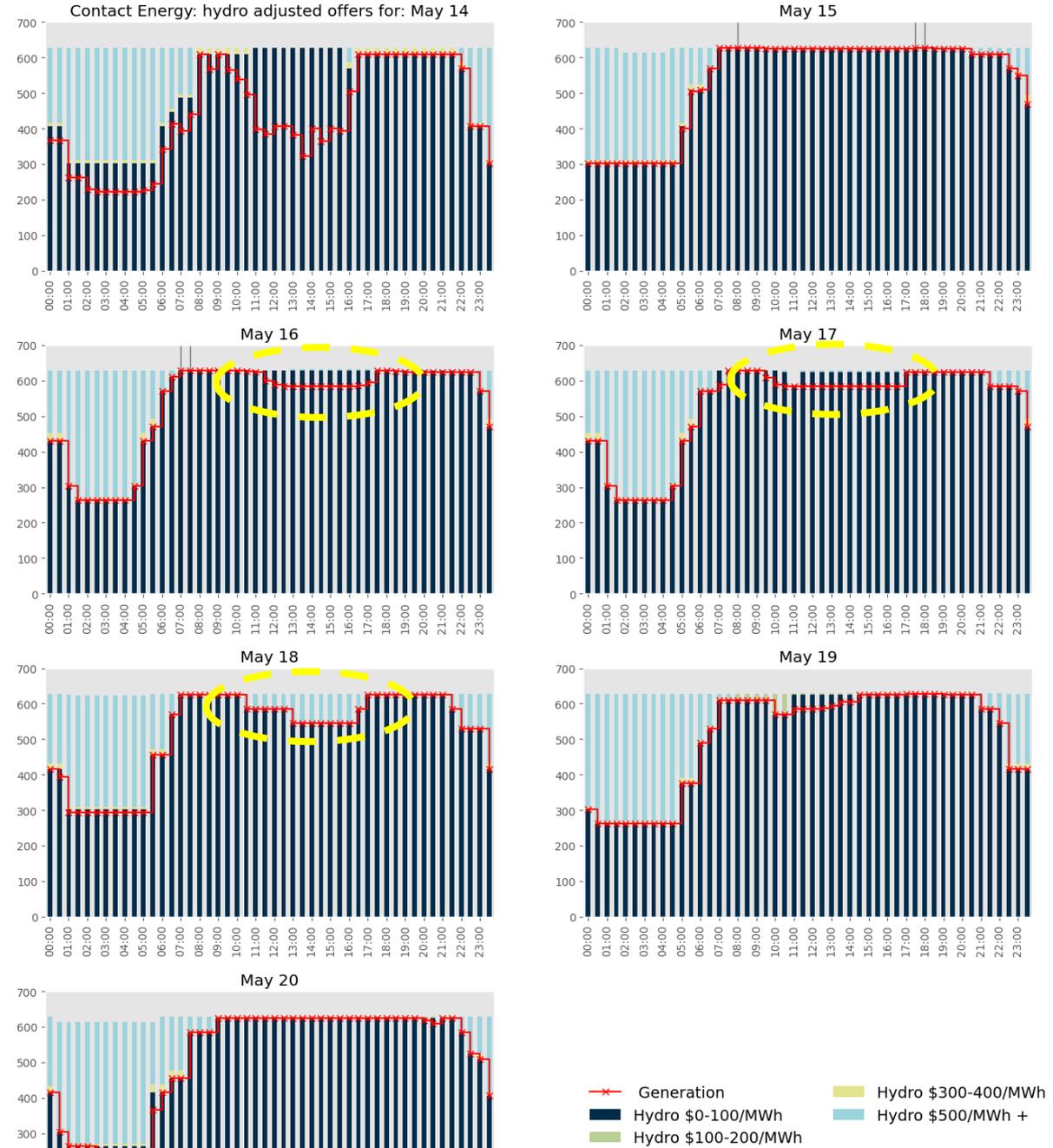


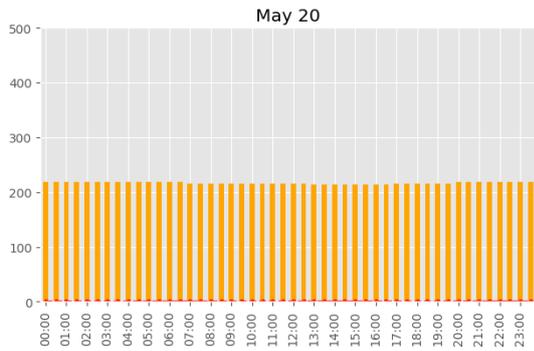
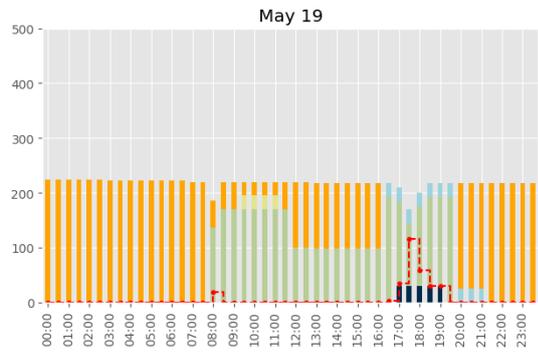
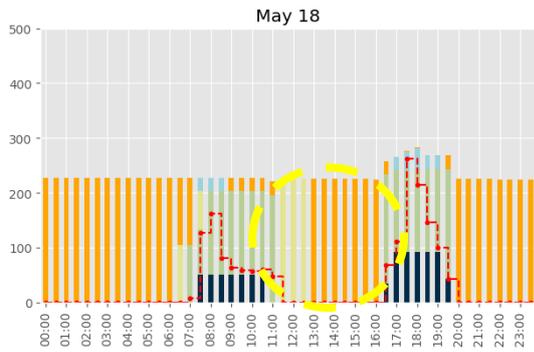
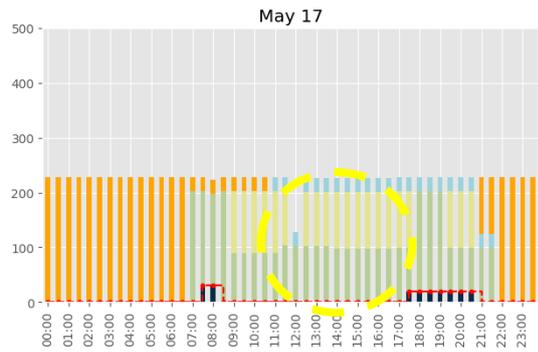
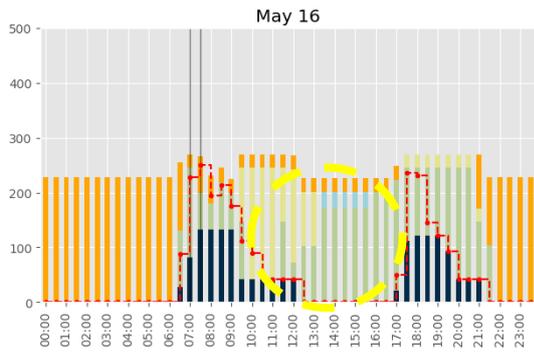
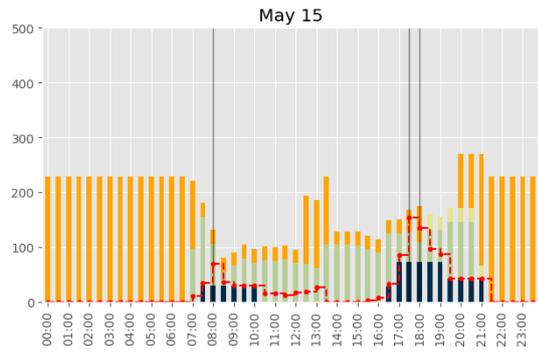
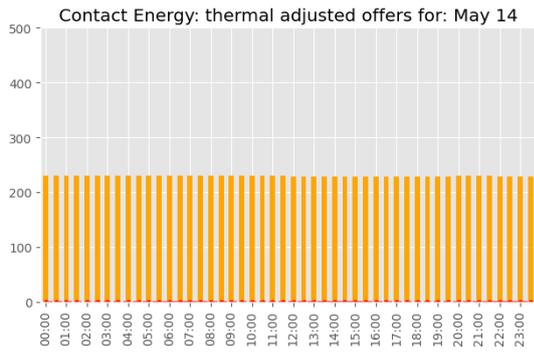
Figure 7: Adjusted thermal offers from Genesis 16-18 May 2023



4.2. For Contact's hydro offers, which include the Clyde and Roxburgh dams, between 40 and 80 MW of off-peak generation was priced up, from the \$0-100/MWh range into the \$500/MWh + range. This can be seen in Figure 8. Only very small changes to offers occurred at the Clyde dam on Thursday (off-peak times) so its output stayed the same as the previous days.

Figure 8: Stacked half hourly adjusted hydro offers and thermal dispatch (red line) from Contact between 14-20 May

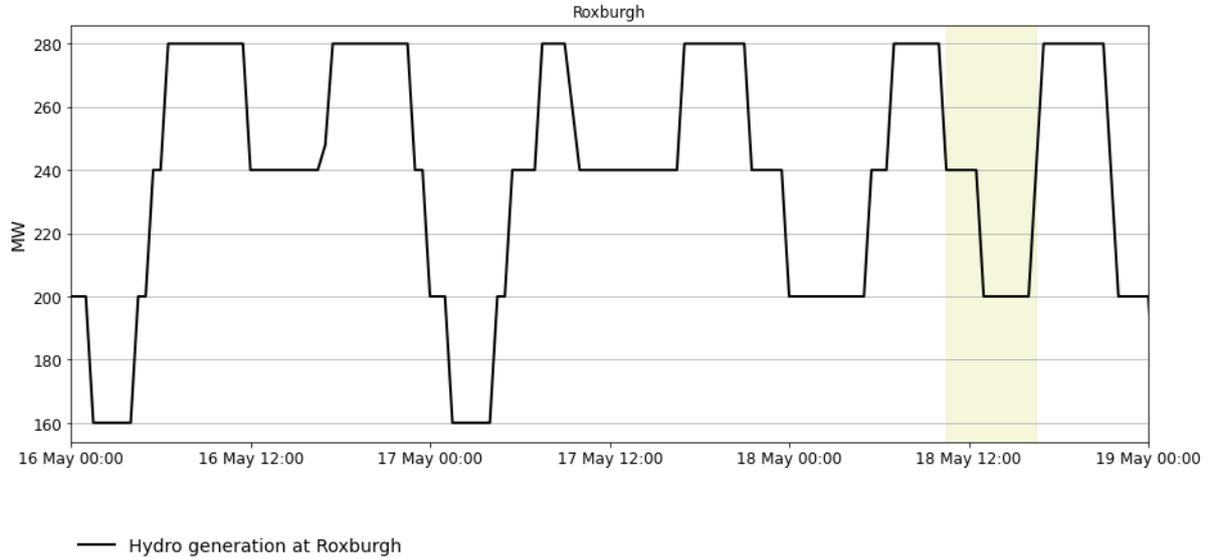




- - - Generation
- Thermal \$0-10/MWh
- Thermal \$10-100/MWh
- Thermal \$100-500/MWh
- Thermal \$500-1000/MWh
- Thermal \$1000-5000/MWh

- 4.3. However, changes did occur at Roxburgh. While on Tuesday and Wednesday, between 40-44 MW of energy was priced above \$20/MWh between 9:30 – 4:30 am, on Thursday this changed to between 40-80 MW priced over \$500/MWh between 10:30 am – 4:30 pm. As a result, off-peak day time running of Roxburgh changed from 240 MW to 200 MW, see Figure 9.

Figure 9: Generation at Roxburgh between 16-18 May. Yellow highlight shows 10:30 – 16:30 on 18 May

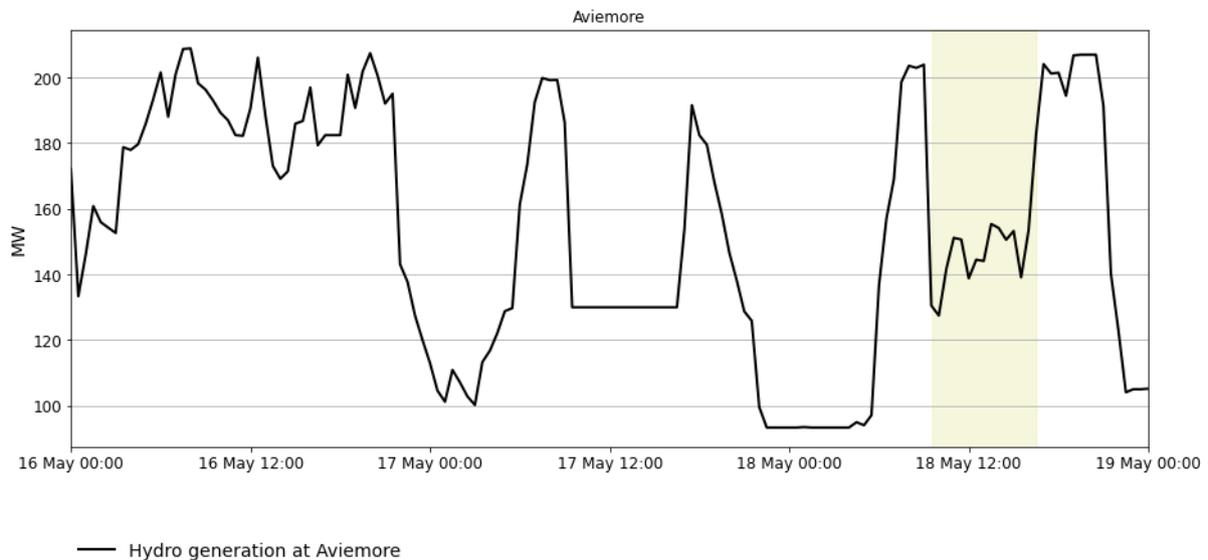


- 4.4. There were also offer changes at both Stratford peakers during the daytime off-peak times. In the previous days, Contact had priced their Stratford peakers, during the off-peak daytime period, below \$500/MWh for between 173 and 200 MW. However, on Thursday between 11:30 am and 4 pm Contact priced the total capacity from both peakers above \$1,000/MWh. During the daytime off-peak period on Tuesday and Wednesday, the peakers had not run as prices were lower than the lowest tranche of the peakers (~\$200/MWh).
- 4.5. The indications were therefore that the price on Thursday during off-peak times would be lower than the cost of running the Stratford peakers – as indicated both by forecasts (prices, demand, and wind generation) and prices on Tuesday when wind was even lower. This sort of offering is common with thermal plant as it is costly (increased maintenance costs) to run for short periods.

5. Constraints and generation outages

- 5.1. There were some lines constraints in the South Island – which impacted the drawing up of Southern hydroelectricity to be transferred Northward across the HVDC. In particular, the [AVI-BEN line](#) was constrained between trading periods 20-34 (9:30 am -12:00 am) – which limits the amount of power that could be produced at Aviemore, see yellow highlight in Figure 10, and other dams downstream of the line constraint. A similar constraint occurred on the 17th between TPs 20-33.

Figure 10: Generation at Aviemore 16-18 May



- 5.2. Additionally, a second 90 MW unit outage at [Benmore](#) occurred between 7:30 on 18 May – 13:30 on 19 May – alongside a longstanding outage of unit 2 which was scheduled to end on June 16. This would have impacted the market by requiring more generation from other stations to meet North Island demand. Furthermore, outages at Maraetai between 10:00-16:00 on 18 May, decreased North Island hydro capacity by ~105 MW.

6. Conclusion

- 6.1. The demand and wind forecasting differences led to pre-dispatch prices being lower than final prices for all of the off-peak trading periods on 18 May. This would have affected generators, especially thermal operators, decision making about their offers into the market. Low wind generation exacerbated this issue, as there is less ability to run hydro in a flexible way – as more of it must run to meet baseload. Furthermore, this also combined with hydro outages on the day – which removed ~ 100 MW of cheaper generation in each island. These outages were exacerbated by a line constraint along the Aviemore-Benmore line, which limited generation from Aviemore and others downstream of the constraint to be exported north. These outages and constraints led to more generation from Huntly 5 being cleared between trading periods 21-34.