# Market Performance Quarterly Review Q3 2020

Information paper

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## Tables



## Figures

# 1 Purpose of the report

1.1 This document covers a broad range of topics in the electricity market. It is published quarterly to provide visibility of the regular monitoring undertaken by the Electricity Authority.

1.2 This quarter's report includes a general overview of the quarter (June to September 2020), including potential impacts from the COVID-19 response. It also includes a deep dive into the cause of high prices on the morning of 14 May 2020.

# 2 Highlights over the last quarter

2.1 Demand was highest in July when the weather was coldest. Level 3 restrictions in Auckland had an impact on demand during August.

2.2 Switching has rebounded since the last quarter. Small retailers, like Electric Kiwi, continue to grow, increasing overall competition in the market.

2.3 Low lake levels, uncertainty in the gas market, cold weather and low wind generation all contributed to high prices throughout the quarter. Lake levels improved at the end of September

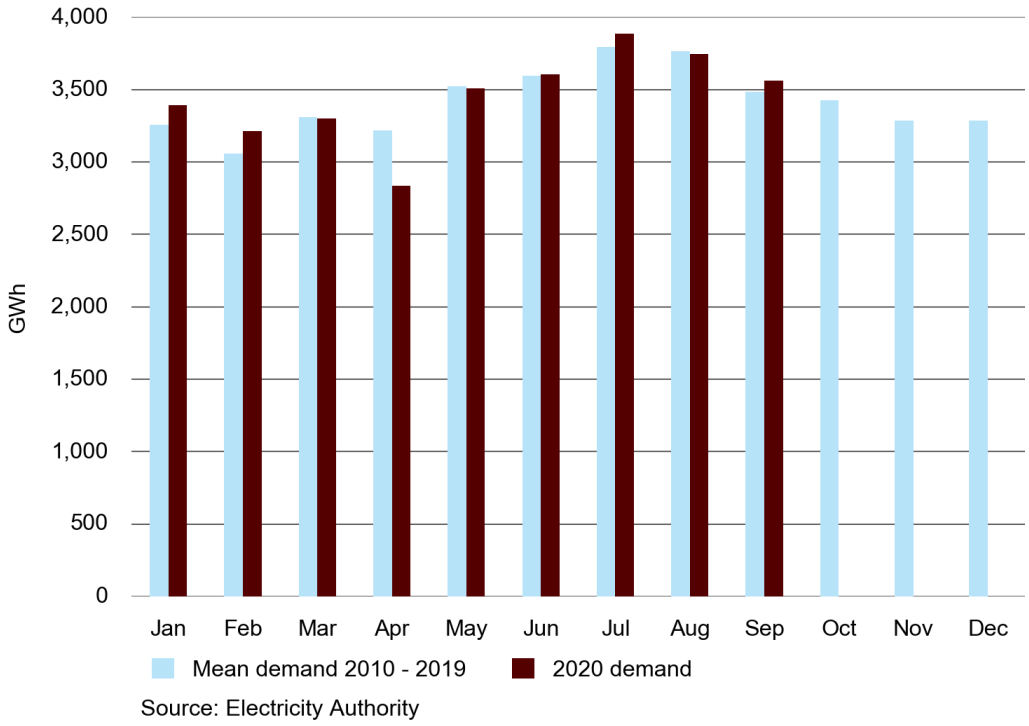
2.4 The announcement of the potential closure of Tiwai's smelter in August 2021 and the governments reactions had a large impact on forward prices this quarter.

# 3 Demand

3.1 Reconciled demand (including Tiwai), shown in Figure 1, was 2.4 percent higher than average (since 2010) in July, 0.5 percent lower in August and 2.1 percent in September. Winter demand is significantly influenced by daily temperatures due to load from heating. In July the average temperature nationally was 8.6 °C, 0.8 °C above average (1981-2010), in August it was 10.1 °C, 1.2 °C above average and in September it was 11 °C, 0.5 °C above average[1]. Overall it looks like demand is growing, with July and September's demand 2 percent higher than the average demand. The lower demand in August was likely a combined impact of the average temperature being more than 1 °C higher and the 'second wave' of COVID-19 which increased the alert levels.

[1] NIWA, Monthly Climate Summaries (July, August and September 2020), https://niwa.co.nz/climate/monthly

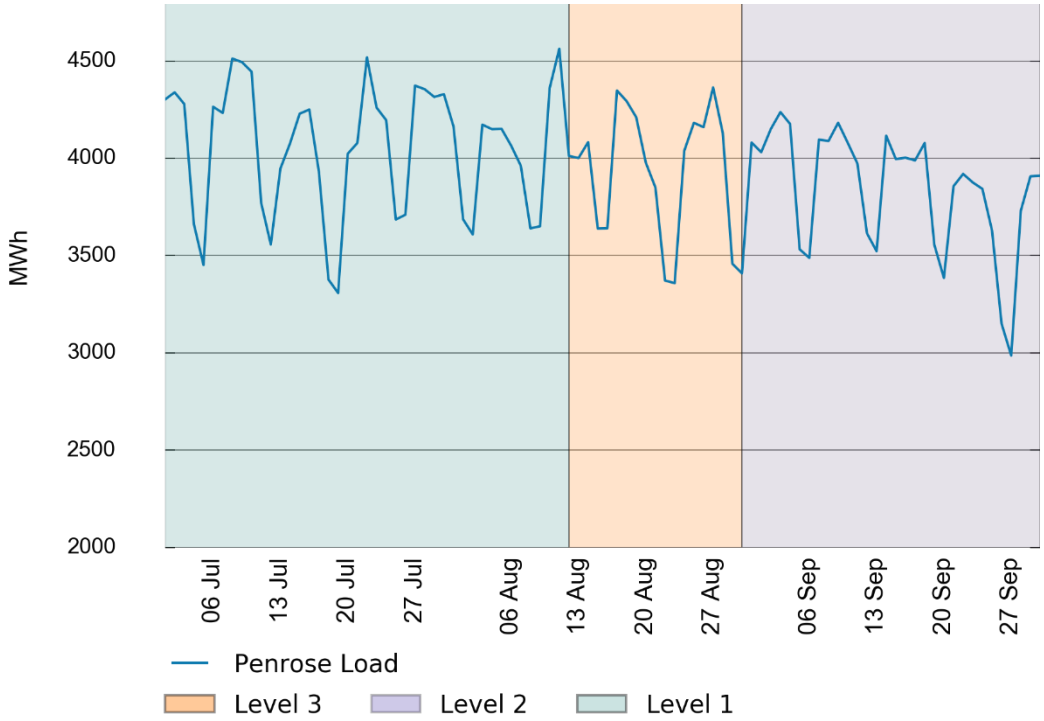
**Figure 1: Monthly reconciled demand in 2020 compared to 2010-2019**




Source: Electricity Authority

3.2 The response to COVID-19 has had an impact on demand, especially during alert level 4 in March/April. On 12 August Auckland returned to alert level 3. Figure 2 shows demand at Penrose, which covers a large proportion of Auckland residential area. There was a noticeable drop in demand on 12 August and for the rest of that week. While large industrial businesses remained open (unlike during alert level 4), many small businesses based in residential areas (such as cafes, restaurants and store fronts) partially or fully closed due to the restrictions.

**Figure 2: Demand at Penrose July-September 2020**



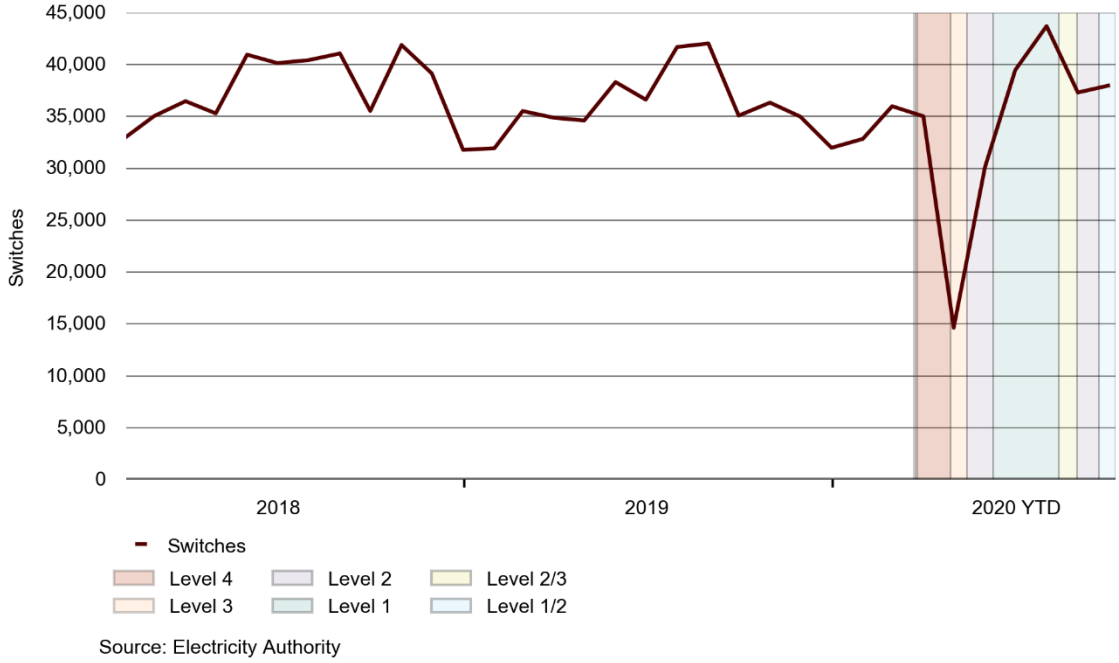

3.3 There was a noticeable shift in the daily usage patterns in Auckland while alert level 3 was in place. The morning demand peak was lower and later in the morning due to children and many workers staying at home. This was similar to the pattern seen in April and May when schools were closed, with the morning peak returning to normal the week schools reopened.

# 4 Retail market

## Switching

4.1 Switching this quarter rose to 119,000 switches from a low of 84,000 switches last quarter due to restrictions on movement during alert level 4. Switching was highest during July. Some of the increase in switching in July may have been due to households postponing events (such as putting their house on the market) during March to May because of the restrictions during alert level 4. There was also an increase in trader switches due to Energy Club exiting the market and increased marketing by other retailers.

**Figure 3: Total number of retail switches (move in and trader) 2018-2020**



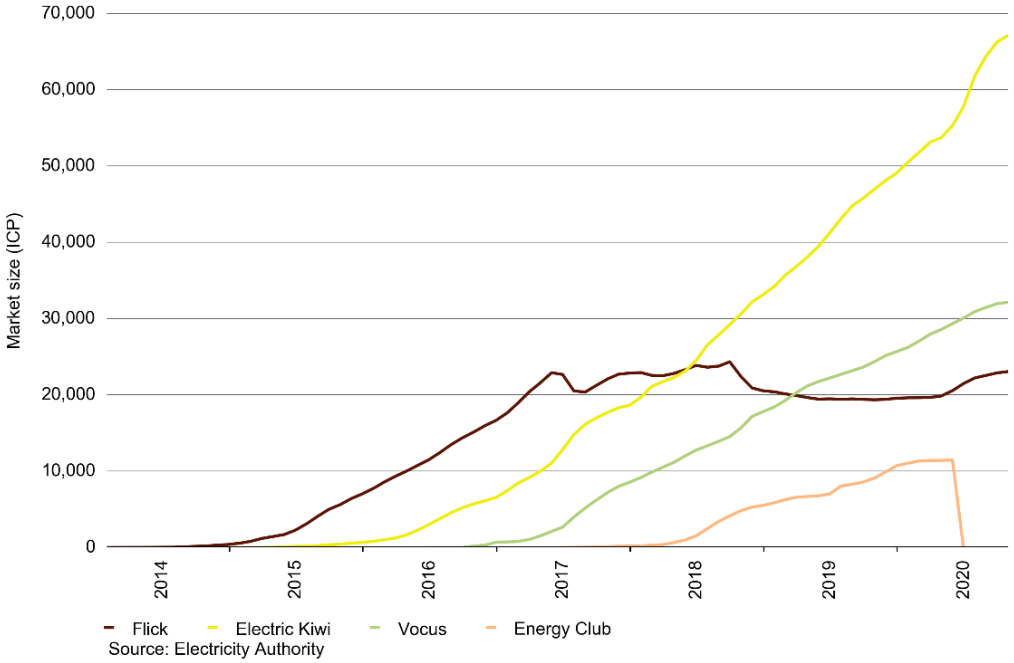

Source: Electricity Authority

4.2

4.3 Figure 4 shows the number of ICPs for small retailers (with between 10,000-100,000 ICPs). Energy Club had around 11,000 ICPs when it decided to exit in late June. Those ICPs were transferred to Contact.

4.4 Both Flick and Electric Kiwi have had a noticeable increase in growth, which coincide with their advertising campaigns. Flick's numbers had been steady around 20,000 ICPs since late 2018 but they have made a net gain of over 3,000 ICPs since releasing a new advert in May. Electric Kiwi released a new advert in June and saw their net gains increase from around 1,000 ICPs a month to over 3,000 ICPs. That dropped to a net gain of 2,000 ICPs in September.

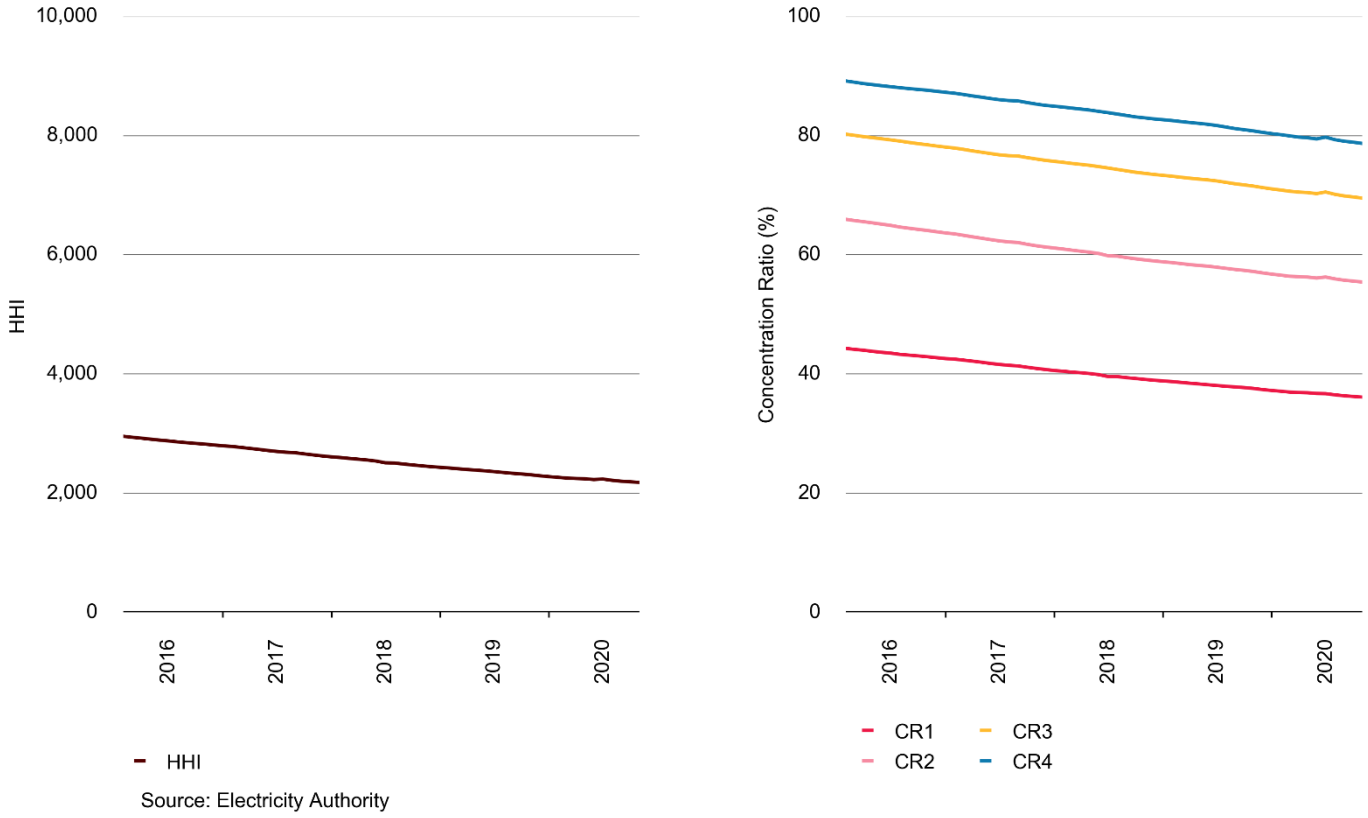
**Figure 4: Market size (ICPs) of small retailers (10,000-100,000 ICPs)**



Source: Electricity Authority

4.5 Figure 5 shows the national HHI and concentration ratios 1-4 for the residential market. HHI is a common measure of market concentration where a monopoly would score 10,000, while the CRX measures the average market share that the largest X firms have in each region of New Zealand (eg, the CR1 shows the average market share of the largest retailer in each region of New Zealand). Overall there has been a decline in these measures due to the growth of smaller retailers, reflecting increased competition. The closure of Energy Club did reduce competition for a short time, with HHI and CR2+ values increasing in the month of June. However, this did not have a noticeable impact on the overall trend.

**Figure 5: HHI and CRX for the residential retail market**



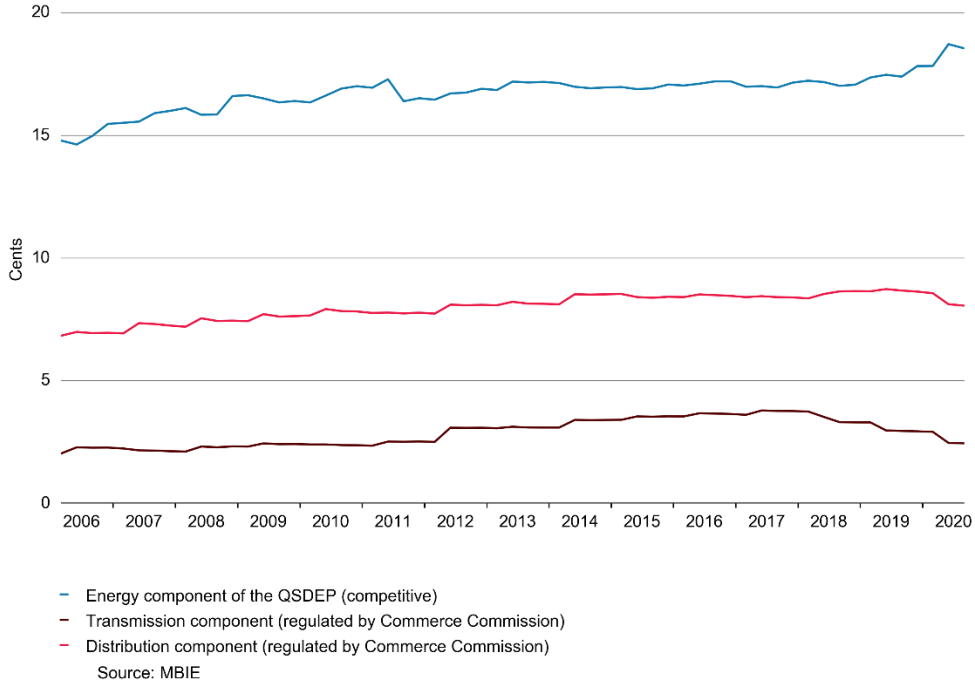

Source: Electricity Authority

## Retail cost

4.6 Figure 6 compares changes in the components that make up MBIE's QSDEP- an indicator of residential retail prices, adjusted for inflation. The energy component is set by retailers who are in competition with each other for customers. The energy component of the QSDEP was flat in in real terms for many years, but increased in 2019 and first half of 2020, consistent with the increase in the average spot price.

4.7 The transmission and distribution components are regulated by the Commerce Commission, who set price-quality paths for distributors and Transpower (for transmission). The default price-quality paths for distributors was reset from 1 April 2020, which is shown in the decline in the distribution component in the last two quarters. The transmission component has also declined since 2018.

**Figure 6: QSDEP – residential retail prices by cost component 2006-2020**




Source: MBIE

# 5 Wholesale market

## Spot market commentary

5.1 Inflows in the North Island have been low in 2020. Figure 7 shows total North Island inflows to the end of September for every year since 1926. It shows that inflows for the first nine months of 2020 have been the lowest seen in almost 100 years.

5.2 Figure 8 shows that while Lake Taupo was above the 90th percentile at the start of the year, the combined impact of low inflows and the HVDC outages (January to March) saw levels quickly drop, to below the 10th percentile by late May. This reduced the availability of hydrogeneration in the North Island during winter.

**Figure 7: Total North Island inflows (January - September) 1926-2020, ranked**

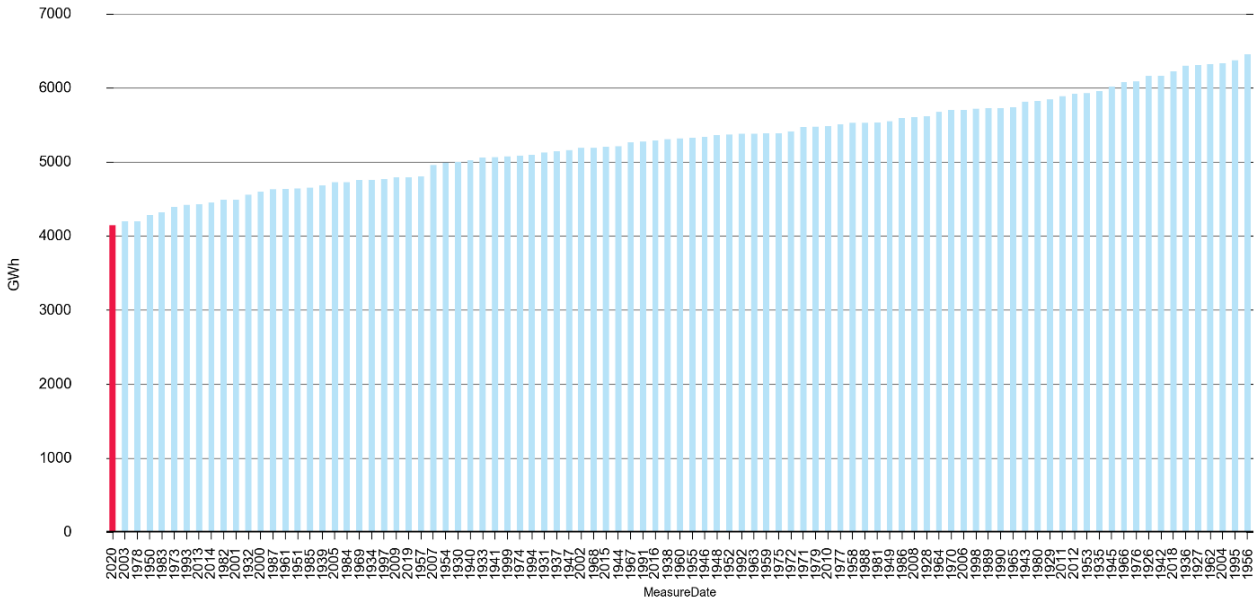
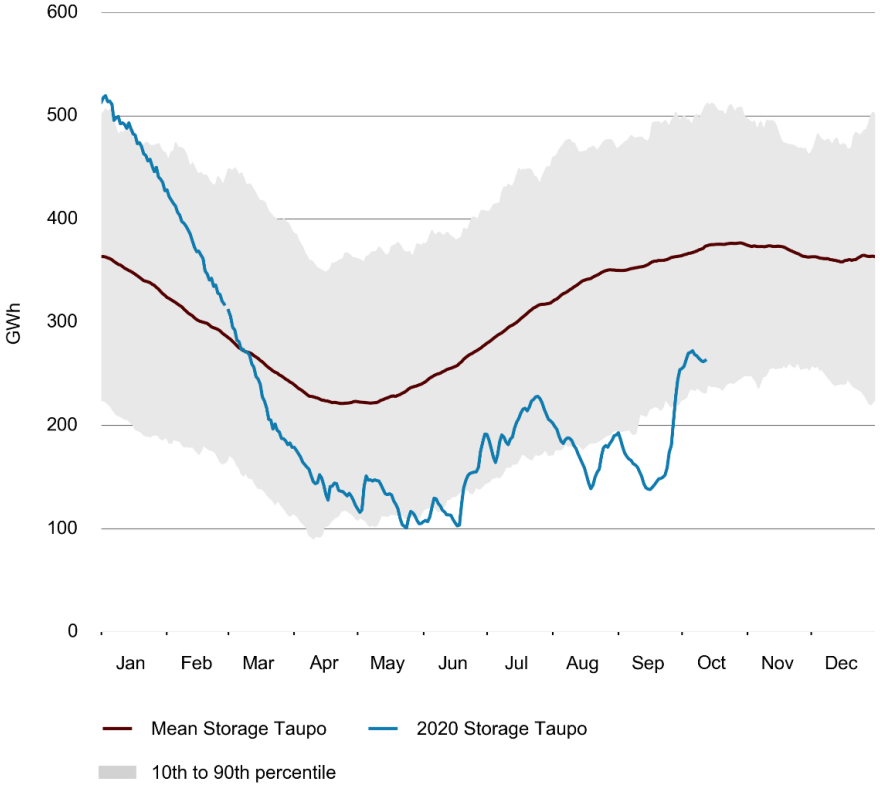
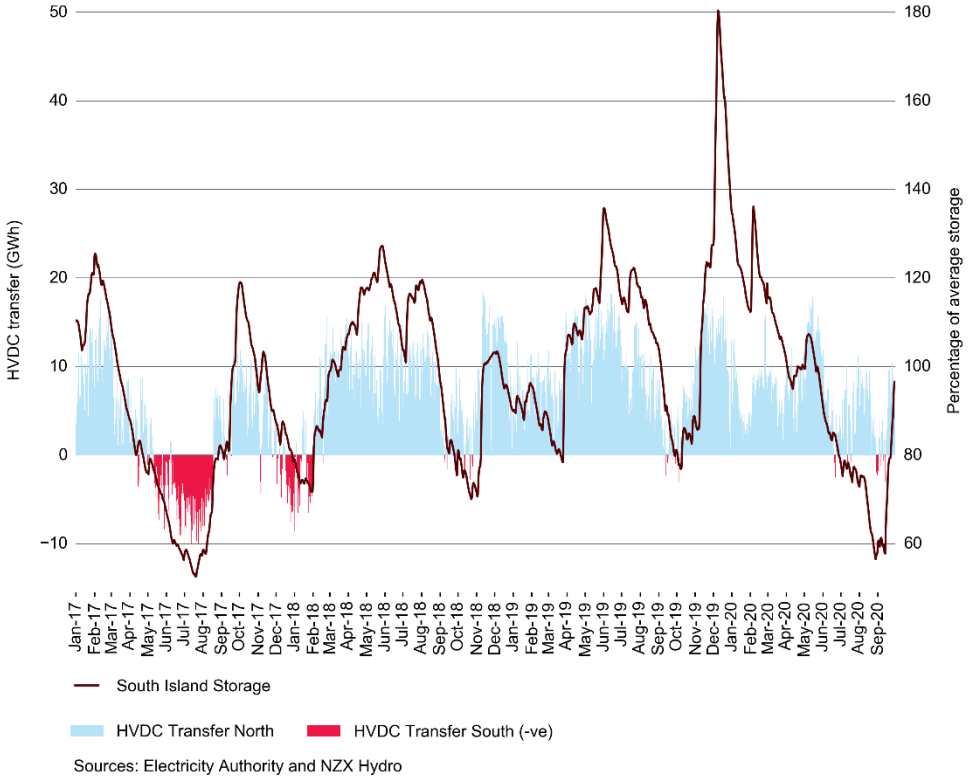



**Figure 8: Lake Taupo levels 2020 compared to mean**



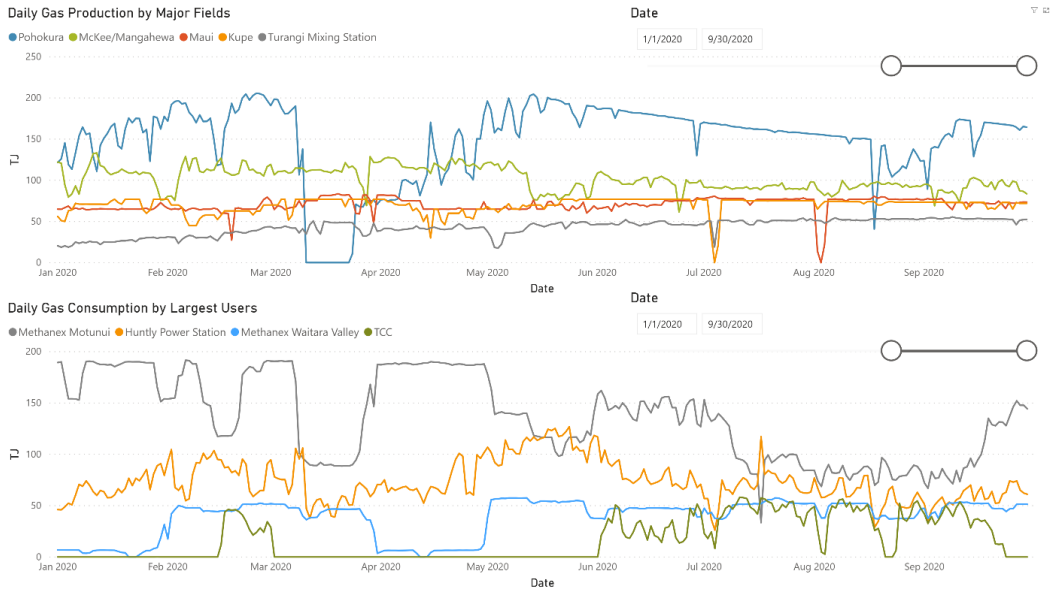

5.3 Figure 9 shows South Island storage and HVDC transfer over the last four years. It shows that from 2017 to 2019 when South Island storage was near or below 80 percent of average storage there was a decrease in HVDC transfer North and an increase in transfer South. In 2020 when South Island storage first approached 80 percent of average storage there was a decrease in Northward flow and more Southward flow. However, because of low storage in the North Island, Northward flow began to increase, which contributed to South Island storage dropping to 60 percent.

**Figure 9: South Island storage and HVDC transfer**




5.4 Figure 10 shows gas production and consumption by the largest participants in the gas market[2]. It shows Pohokura's outage in mid-March and its return to full production. It also shows that since May there has been a steady decline of output from Pohokura, potentially due to scaling. This has reduced the amount of gas available to the market. OMV completed work commissioning a compression plant in September which increased Pohokura's output, however, it did not stop the decline from continuing.

**Figure 10: Daily gas production and consumption by Main Participants 2020**

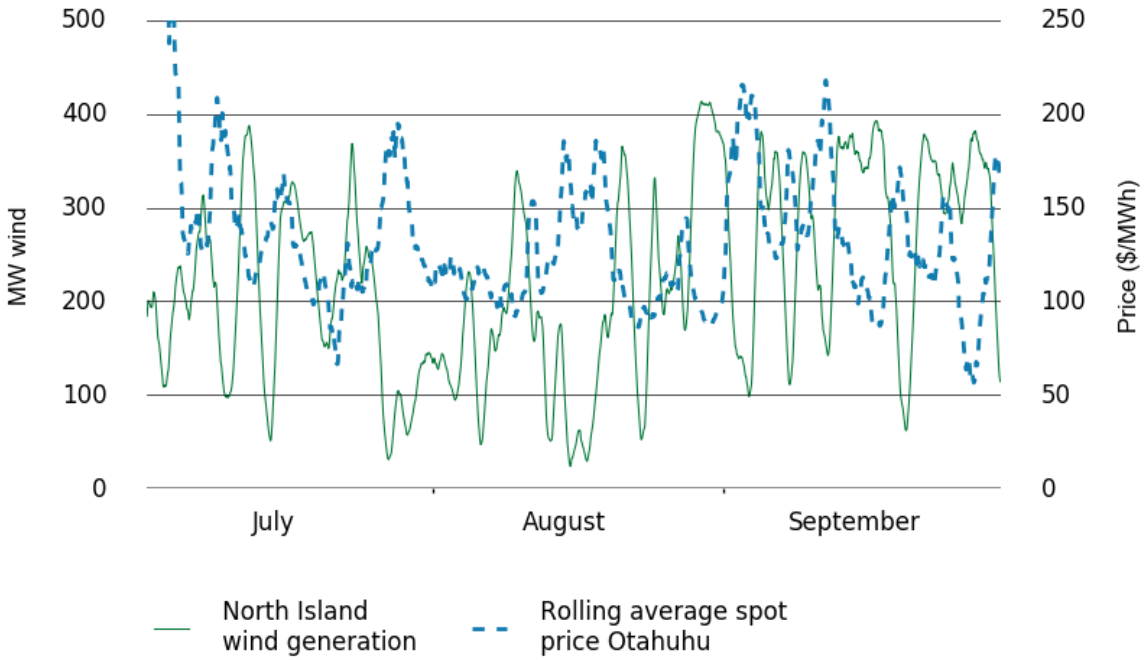



[2] Gas Industry Company, https://www.gasindustry.co.nz/about-the-industry/gas-industry-information-portal/gas-production-and-major-consumption-charts/

5.5 The decline and outage at Pohokura as well as other gas production outages (planned and unplanned) reduced the availability of gas in winter. Methanex reduces its consumption by shutting down a unit at Motonui from July until after the Pohokura outages finished in September. However, with low lake levels in both islands there was high demand for thermal generation. This resulted in high spot prices in both the gas and electricity market. The Taranaki Combined Cycle (TCC) began running at the start of June. Around this time Huntly reduced its gas consumption and likely began running the Rankines on coal.

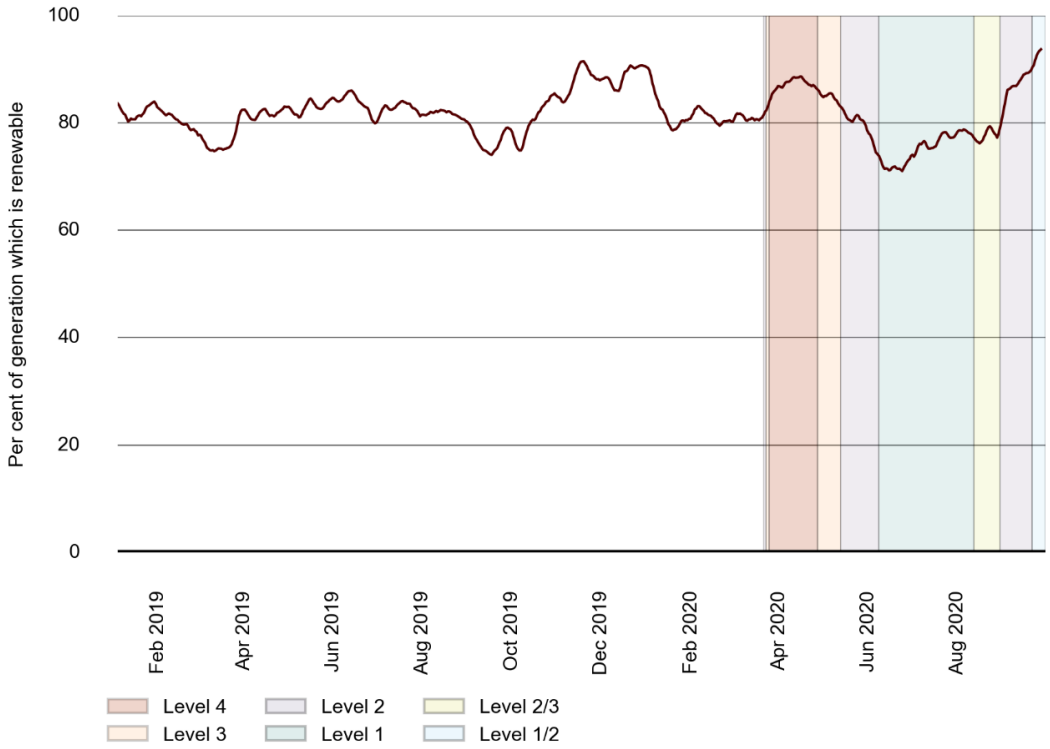
5.6 Figure 11 shows daily average wind generation and average price over quarter three. It shows that large price spikes tended to coincide with low wind generation. When wind generation decreased other generation was dispatched, which pushed up the prices. Low wind generation also often accompanied cold weather, so often most of the cheaper generation was already dispatched, resulting in high cost generation being dispatched.

**Figure 11: Daily mean wind generation and spot price (smoothed by 48 trading periods)**




5.7 Figure 12 shows the proportion of generation which was from renewable sources over the last two years. For most of winter this was between 70 and 80 percent due to low lakes and high amounts of thermal generation. However, this increased to 93 percent by the end of September due to a decrease in demand, an increase in hydro generations (especially in the lower South Island) and higher wind generation.

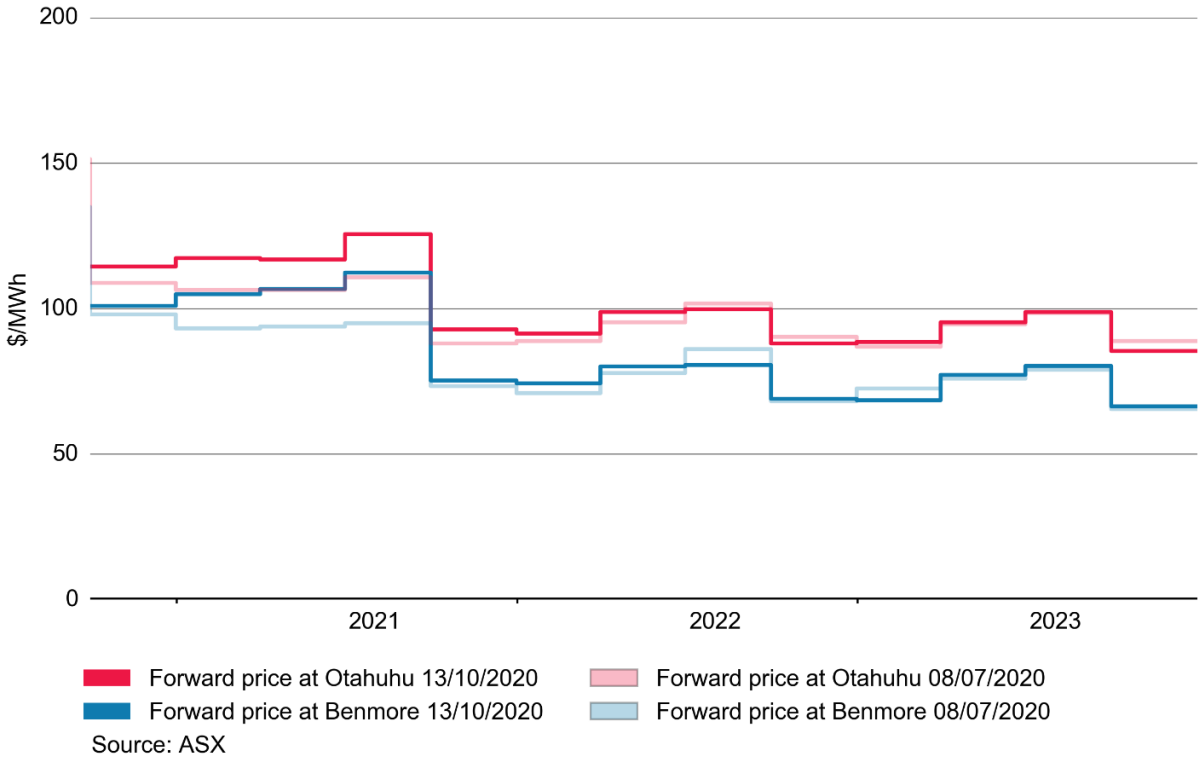
**Figure 12: Proportion of generation from renewable sources 2019-2020**




# 6 Forward market

6.1 Figure 13 shows the change in forward prices at Otahuhu and Benmore between July and October 2020. It shows an increase in prices for the next year, which is consistent with low lake levels and uncertainty around the gas market which could impact on prices in 2021. Long-term forward prices were similar at the beginning and end of the quarter, despite dramatic changes during the quarter which are shown in Figure 14.

**Figure 13: Forward prices at Otahuhu and Benmore**

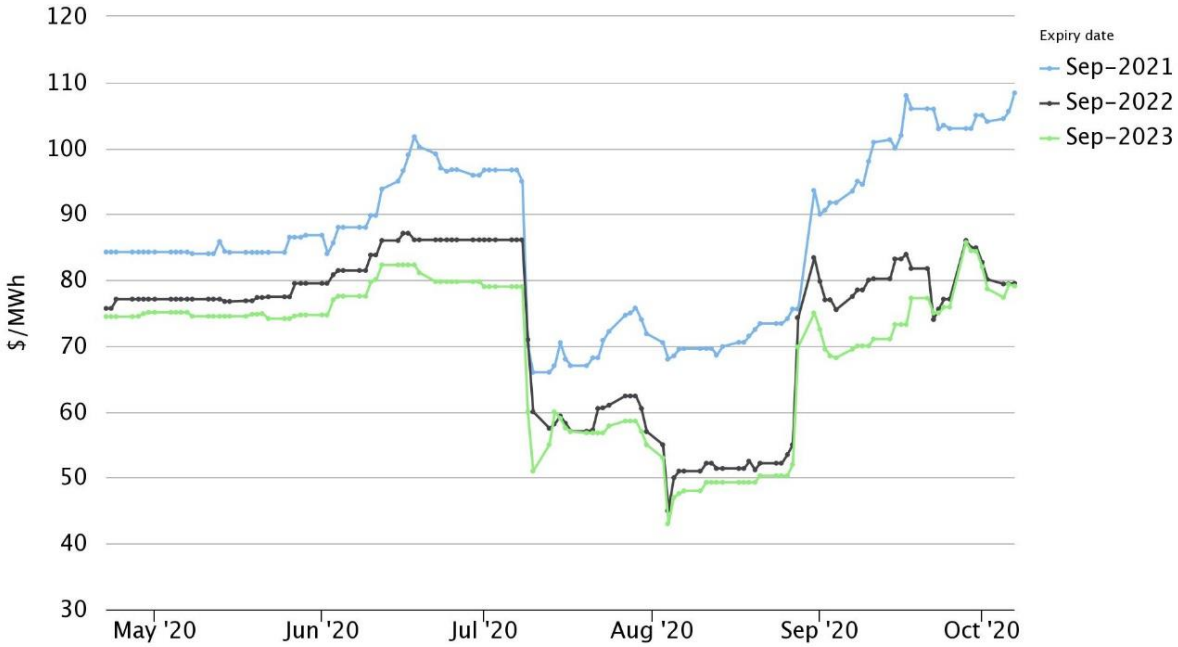


Source: ASX

6.2 Figure 14 shows how the forward prices at Benmore changed over a six-month period, using the September quarters for each year as a representative. On July 9, Meridian announced that Rio Tinto had given notice terminating their contract as Tiwai Point Aluminium Smelter would be closed from 31 August 2021. This resulted in a large fall in forward prices due to anticipation that the smelter's closure would result in lower prices, especially at Benmore, due to the increase in available generation. There was also an increase in price separation between Benmore and Otahuhu.

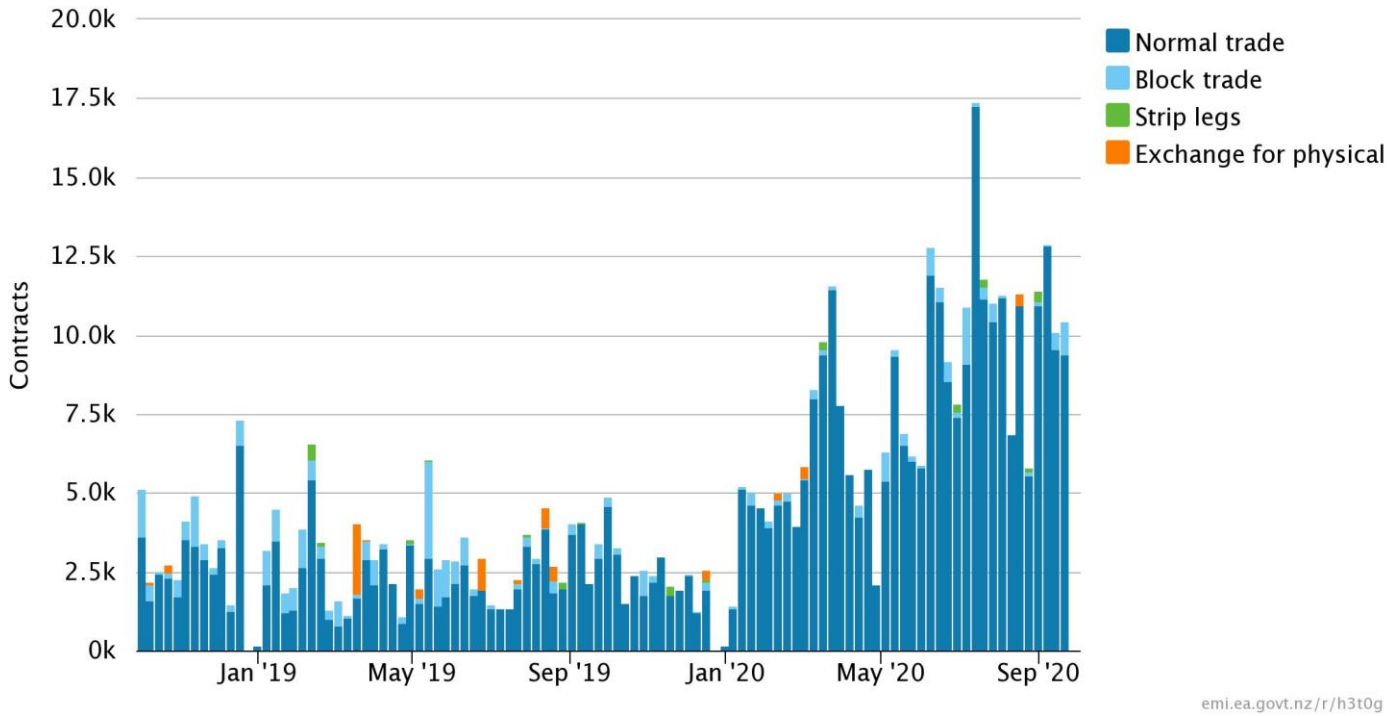
6.3 At the end of August, the government indicated that it was still in negotiations with Rio Tinto to keep the smelter open for several years beyond 2021. This announcement resulted in an immediate increase in the Benmore prices. The government confirmed a deal had been offered to keep Tiwai open on September 28. Rio Tinto announced on 14 January 2021 that it had accepted an offer from Meridian and Tiwai would stay open until the end of 2024.

**Figure 14: Changes in the forward prices for September quarters at Benmore**




6.4 Trade volumes have been substantially higher in 2020 compared to the previous year. New market making arrangements came into effect in February 2020 and have had a noticeable impact on the number of normal trades. The week with the most trades was the week following the announcement of the smelters closure, with 17,000 normal trades.

**Figure 15: Number of future trades per week for last two years**

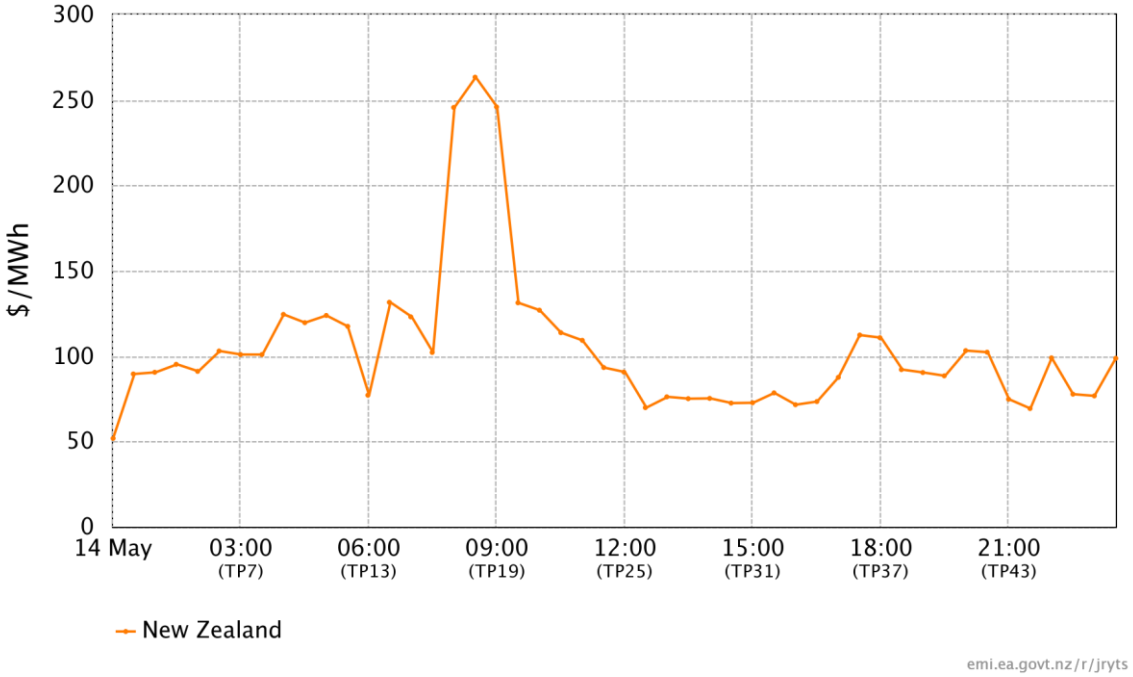


# 7 Special Topic: High prices on 14 May 2020

## Spot prices spiked on the morning of 14 May 2020

7.1 In trading period 18 (the morning peak) on 14 May the generation weighted average price (GWAP) rose to 263 $/MWh.

**Figure 16: New Zealand spot GWAP over 14 May 2020**




Source: Electricity Authority

7.2 Generating capacity on the day was reduced due to several outages.

**Table 1: Generation outages on 14 May 2020**

| Owner | Station/Scheme/Unit | MW reduction | Fuel type |
|---|---|---|---|
| Contact | Clyde G1 | 108 | Hydro |
| | Te Rapa Cogen | 7 | Gas |
| Genesis | Huntly Rankines G1, G2 | 480 | Gas/Coal |
| | Tekapo A | 30 | Hydro |
| | Tekapo B G2 | 80 | Hydro |
| | Waikaremoana scheme G3, G6, G7 | 56 | Hydro |
| Meridian | Benmore G4 | 90 | Hydro |
| | Manapōuri G4 | 121.5 | Hydro |
| | White Hill Wind Farm | 6 | Wind |
| | Ohau A G6 | 21 | Hydro |

| Owner | Station/Scheme/Unit | MW reduction | Fuel type |
|---|---|---|---|
| | Te Uku Wind Farm | 4.6 | Wind |
| | Waitaki G7 | 15 | Hydro |
| Nova | Junction Road | 100 | Gas |
| Trustpower | Waipori | 22 | Hydro |
| Total | | 1141 | |

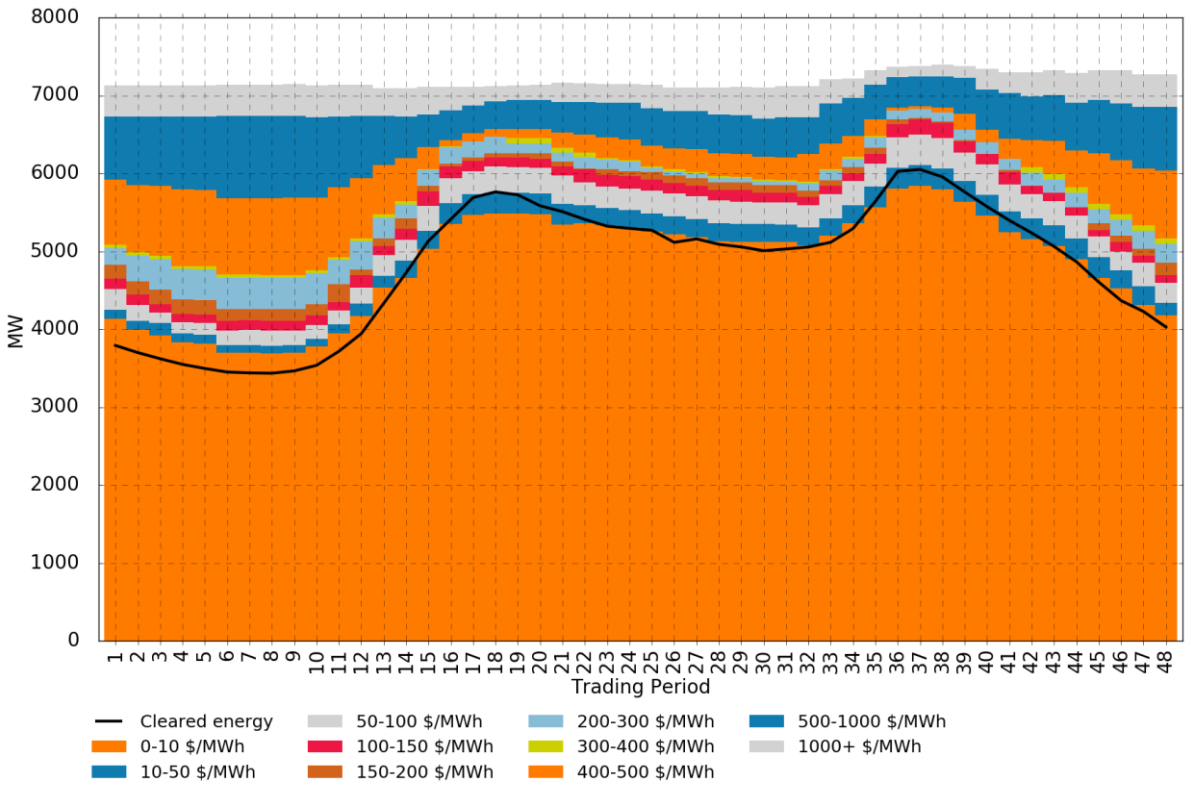
Source: Electricity Authority

7.3 In addition, Contact Energy were not offering their Taranaki Combined Cycle (TCC) plant as the relevant gas contract would not begin till 1 June. This amounts to approximately a further 360 MW unavailable, bringing total effective thermal outages to around 950 MW. While TCC was physically able to run and presumably Contact could have accessed spot gas at a higher price if required, they typically don't offer the plant unless it is expected to generate.

## Not all energy offers can supply energy

7.4 Figure 17 shows the energy offer stacks over 14 May 2020 together with the total cleared generation. This is the same as you would see in EMI. At the morning peak, the cleared energy only reaches up to about $50/MWh in the offer stack indicating a spot price of around $50/MWh. Also, there is apparently around 1360 MW of spare capacity.

**Figure 17: Raw New Zealand energy offers over 14 May 2020**



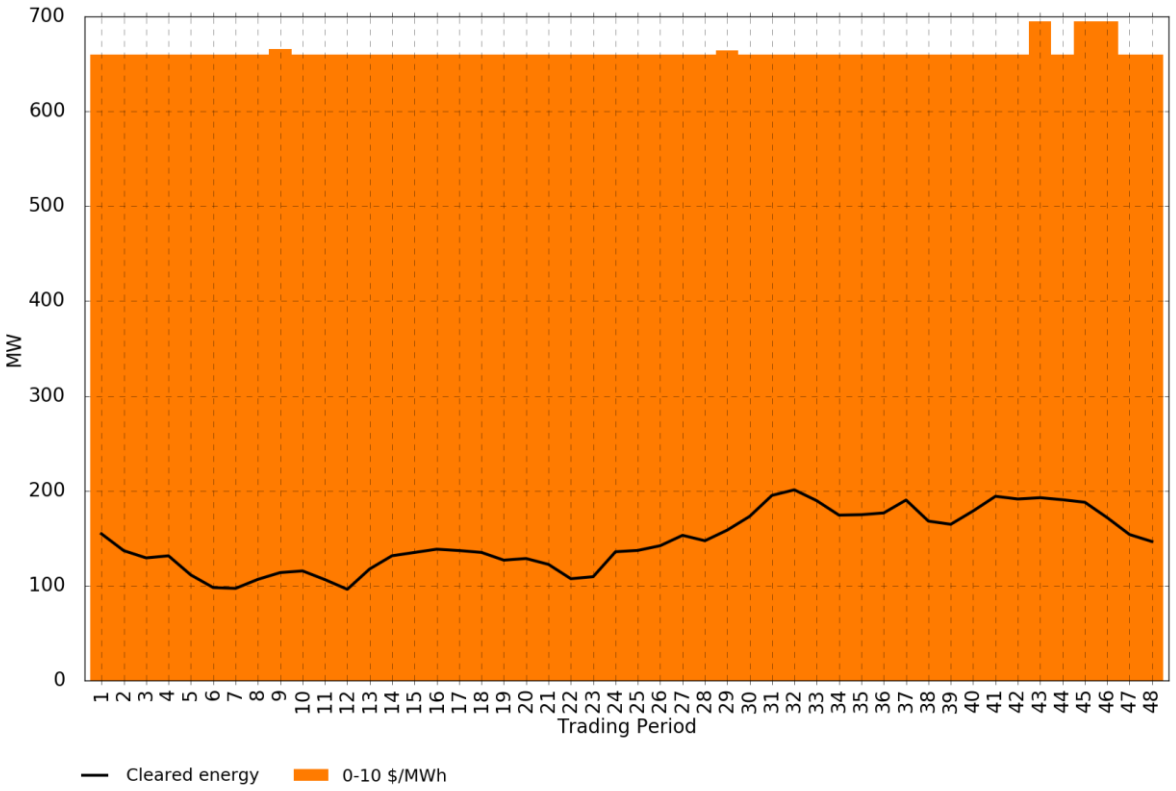

Source: Electricity Authority

7.5 However, there are several factors that mean not all these offers are available to supply energy.

## Wind

7.6 Over the morning peak, actual wind generation dropped to 135 MW, out of nominal offers of 660 MW. Thus 525 MW of wind offers were effectively unavailable. Note that wind generators continue to offer at 1 cent/kWh even though they are now permitted to offer in five price tranches like other generators. Hence, this output reduction was entirely due to low wind resource.

**Figure 18: Wind farm offers and cleared output on 14 May 2020**




Source: Electricity Authority

## Instantaneous reserve and frequency keeping

7.7 Instantaneous reserve (or IR), as its name suggests, is capacity held in reserve to rapidly increase its output to cover the shortfall if a generating unit or transmission element should trip. IR is also provided by load that is contracted to instantaneously disconnect in the event of a fault. This is known as interruptible load (IL). In trading period 18 on 14 May, 173 MW of energy offer capacity was required for IR and was thus not available for generation.

7.8 Frequency keeping (FK) reserve is generating capacity contracted to automatically ramp up and down within a specified FK band to help compensate for continual load fluctuations and thus maintain the electrical frequency close to the normal level of 50 Hz. A total band of +/- 30 MW of generating capacity is set aside for frequency keeping reserve, +/- 15 MW in each island. Generating units on frequency keeping duty are

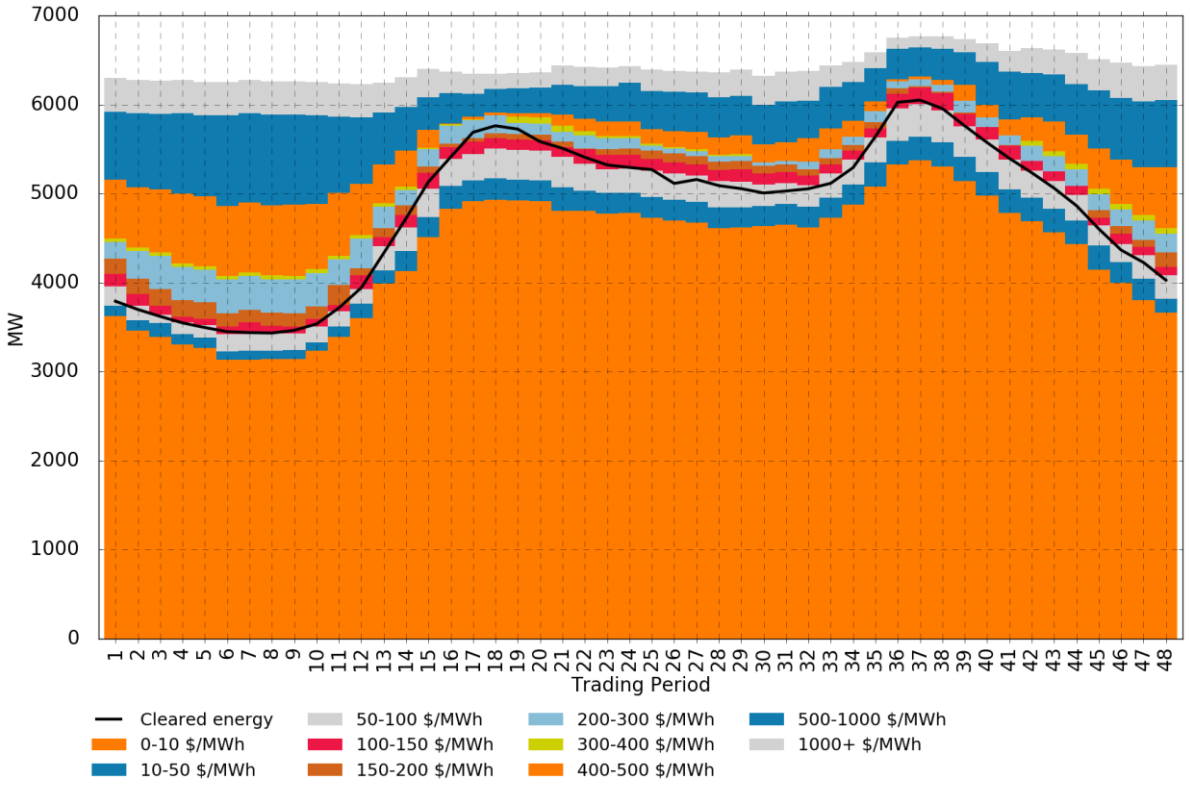
nominally dispatched to the middle of their FK band. This effectively renders another 30 MW of energy offers, ie, the upper half of the band, unavailable for generation dispatch.

7.9 However, in order to be able to cope with the continual output fluctuations, some generating units are further restricted to operate within a limited control range when on frequency keeping duty, neither too close to zero load nor full load. This further reduces the generating capacity available for generating energy. In trading period 18 on 14 May, FK effectively removed a total of 73 MW of energy offers from the stack.

7.10 Thus, the combined effect of IR, FK and low wind output was to reduce available energy offers in trading period 18 by 770 MW from a nominal 7120 MW down to 6350 MW (Figure 19). Now the cleared generation pushes up into the 200 to 300 $/MWh band at the morning peak, consistent with the GWAP of $263/MWh. And the spare capacity is reduced to 588 MW.

**Figure 19: Effective New Zealand energy offers over 14 May 2020**

Accounting for actual wind, IR and FK

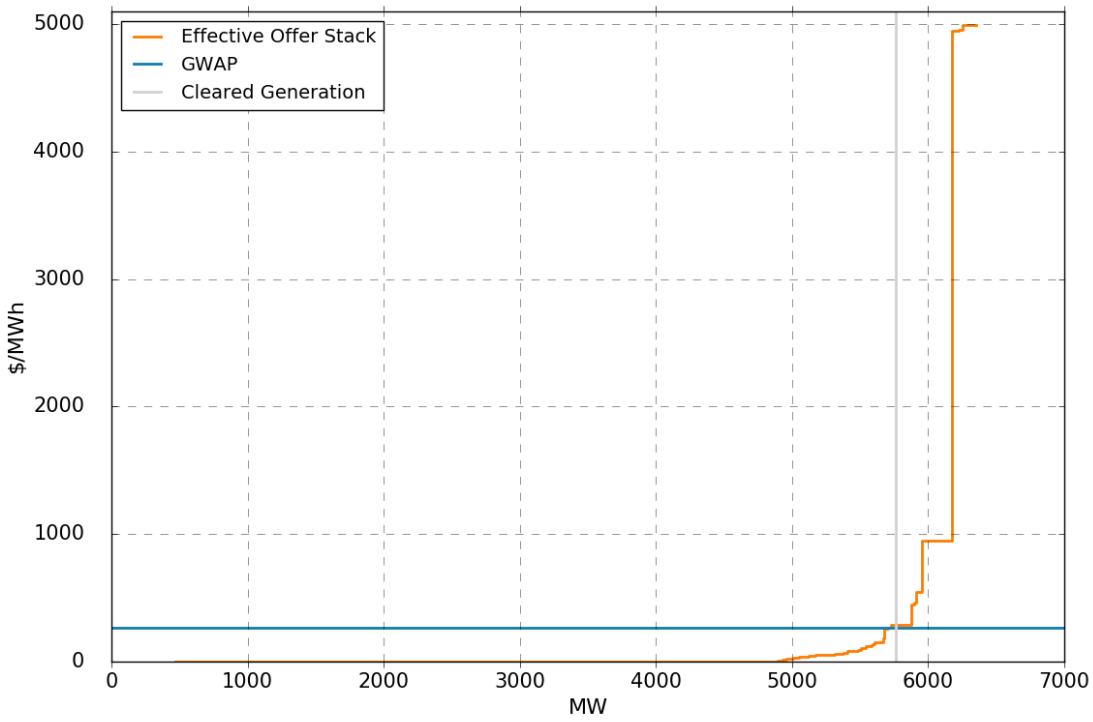



Source: Electricity Authority

7.11 Figure 20 shows another view of the effective total New Zealand offer stack for trading period 18, with the cleared generation cutting the stack at the GWAP.

**Figure 20: Effective NZ offer stack for trading period 18 on 14 May 2020**

Accounting for actual wind, IR and FK

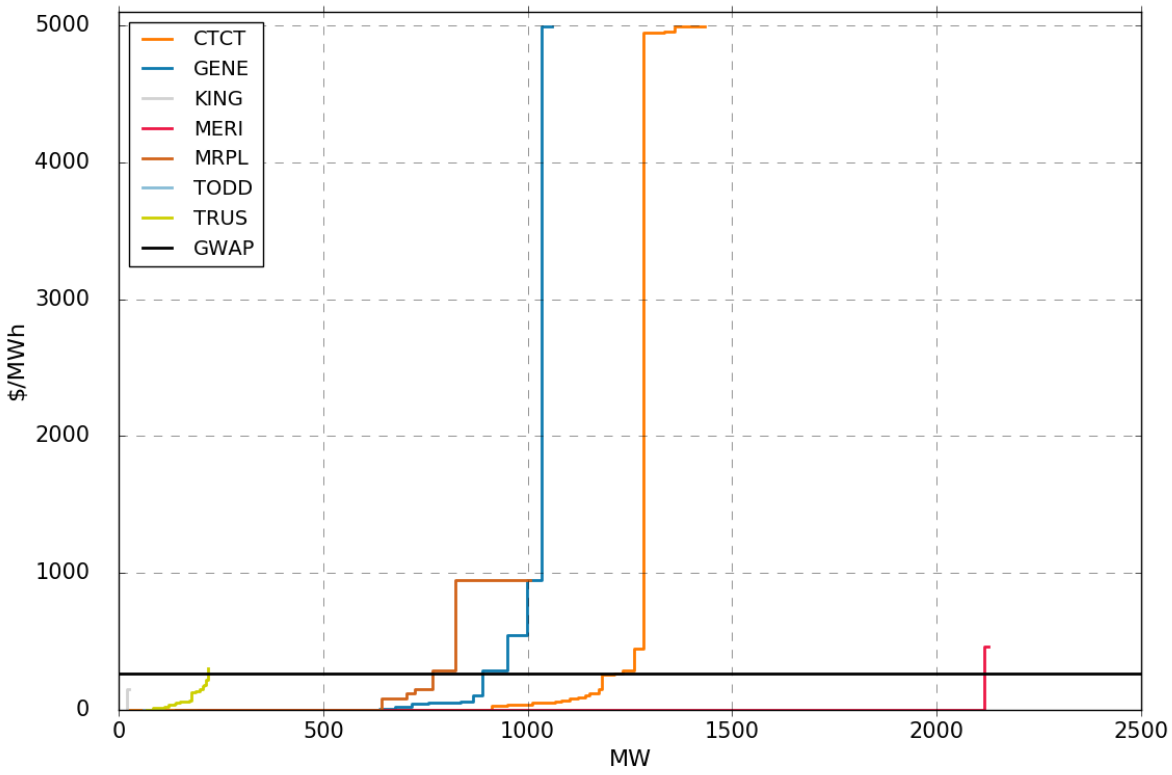



Source: Electricity Authority

7.12 Figure 21 shows effective offer stacks (or supply functions) for individual firms for trading period 18. Three firms — Mercury (MRPL), Genesis (GENE) and Contact (CTCT) — are all competing on the margin, while all other firms are already at or very nearly at the top of their respective offer stacks.

**Figure 21: Effective NZ offer stacks by firm for trading period 18 on 14 May 2020**

Accounting for actual wind, IR and FK




Source: Electricity Authority

Notes: 1. For clarity, firms with no offers above 1 cent/MWh have been omitted