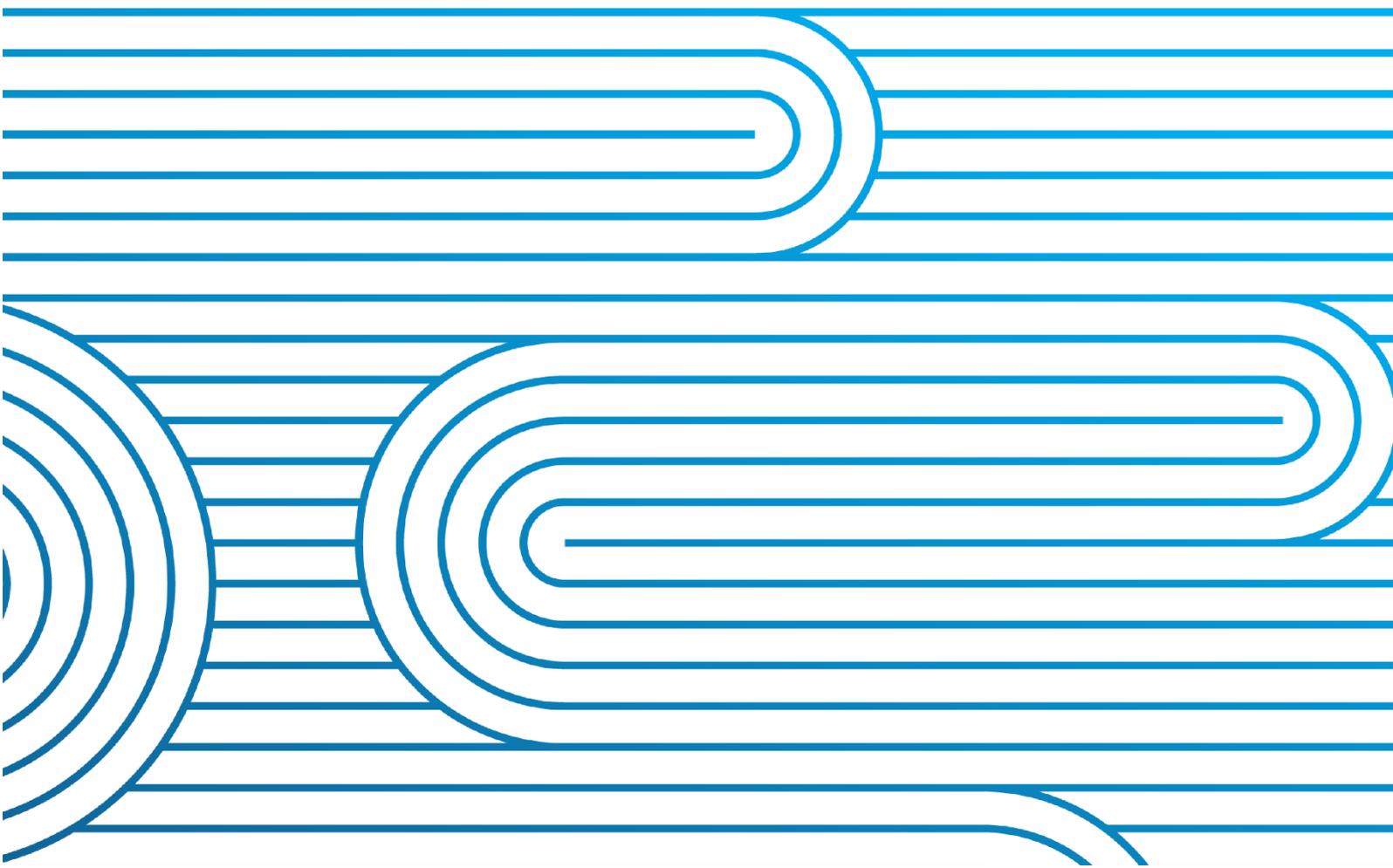


Quarterly system performance information

October to December 2023



Report Purpose

To provide the information on ancillary services reporting and an overview of notices which was previously included in the Quarterly reports written for the Electricity Authority



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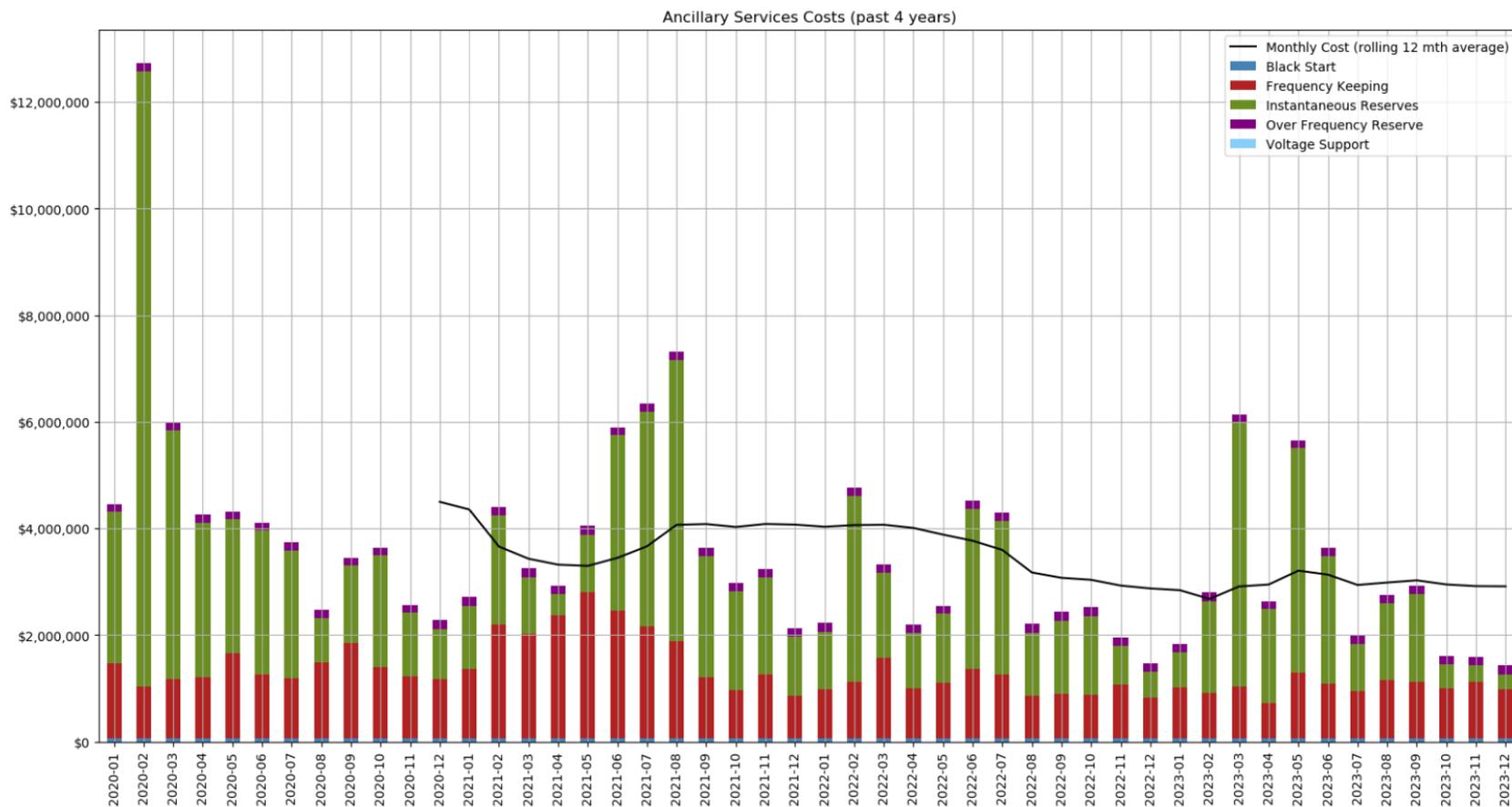
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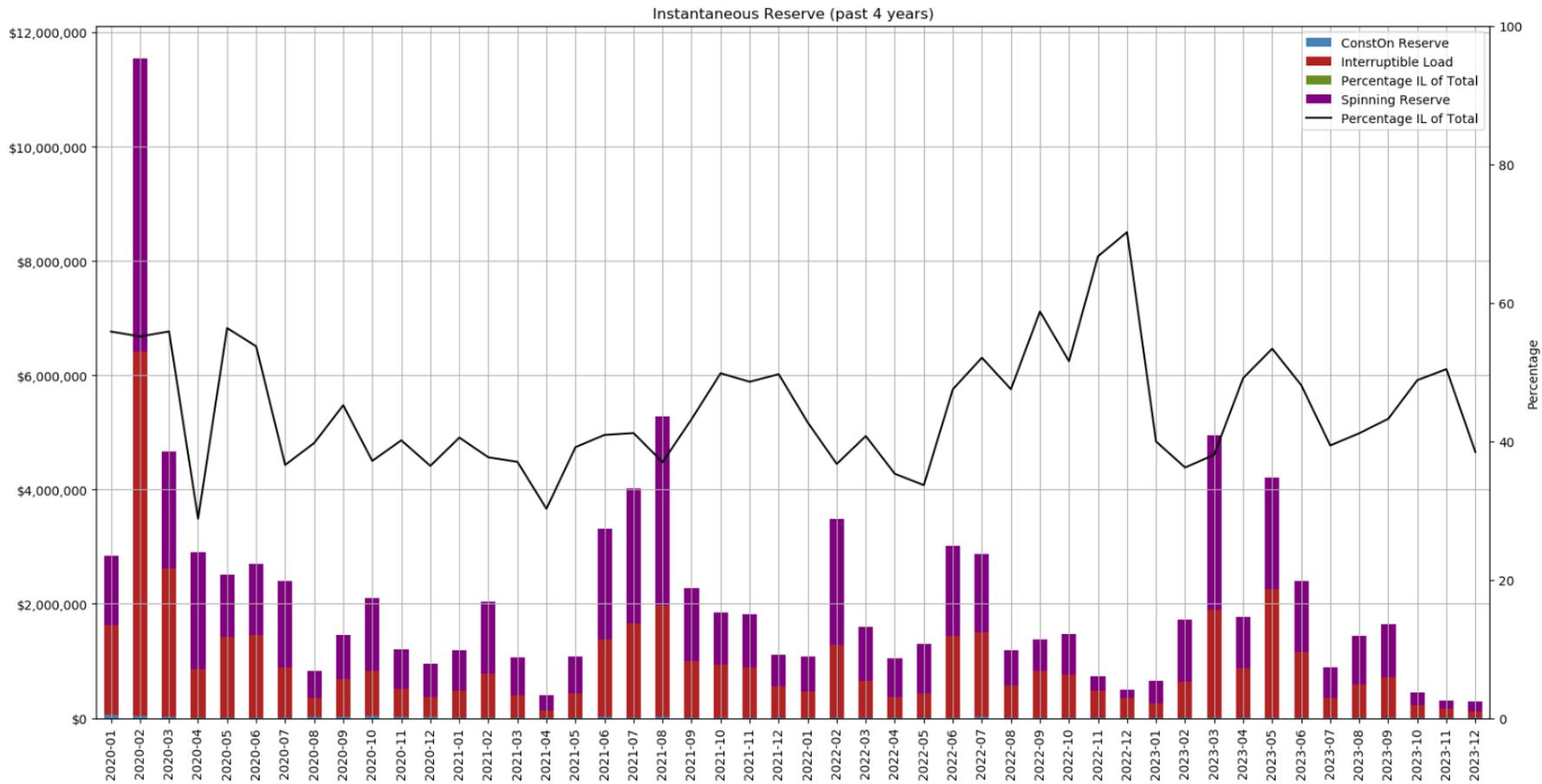
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1 Ancillary service costs



The overall ancillary service costs have been lower this quarter than the previous few months. The main factor contributing to this is the reduction in the instantaneous reserve costs which are shown in the next graph.

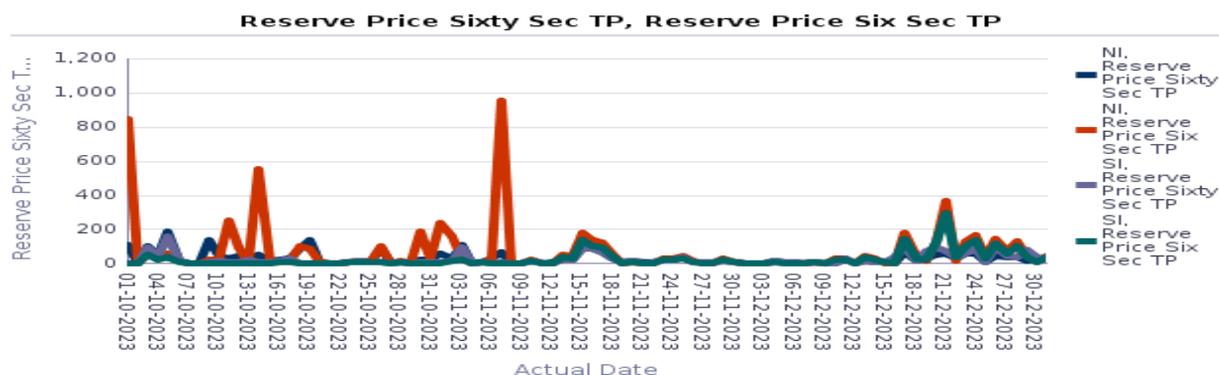


Instantaneous reserve costs were lower this quarter, reflecting lowered demand which is typical for the time of year. Huntly unit 5 remained on outage all quarter, and Huntly unit 2 and the remaining Stratford peaker went on outage in October. As a result, more thermals entered the market on a more long-term basis which contributed to lower costs as there were less start-up costs for thermal units entering the market specifically for the peaks. Average hydro storage decreased over the quarter to below the mean for the time of year however, this coincided with reduced demand, keeping reserve prices low.

Reserve prices in the North Island spiked on 9 October over the peak demand period as a consequence of high northward HVDC flow and reduced wind generation. On 11 October, reduced wind generation and thermal commitment meant a Low Residual Customer Advice Notice (CAN) was sent out. On this occasion the generation offered into the market in response to the CAN was limited, which resulted in higher reserve prices.

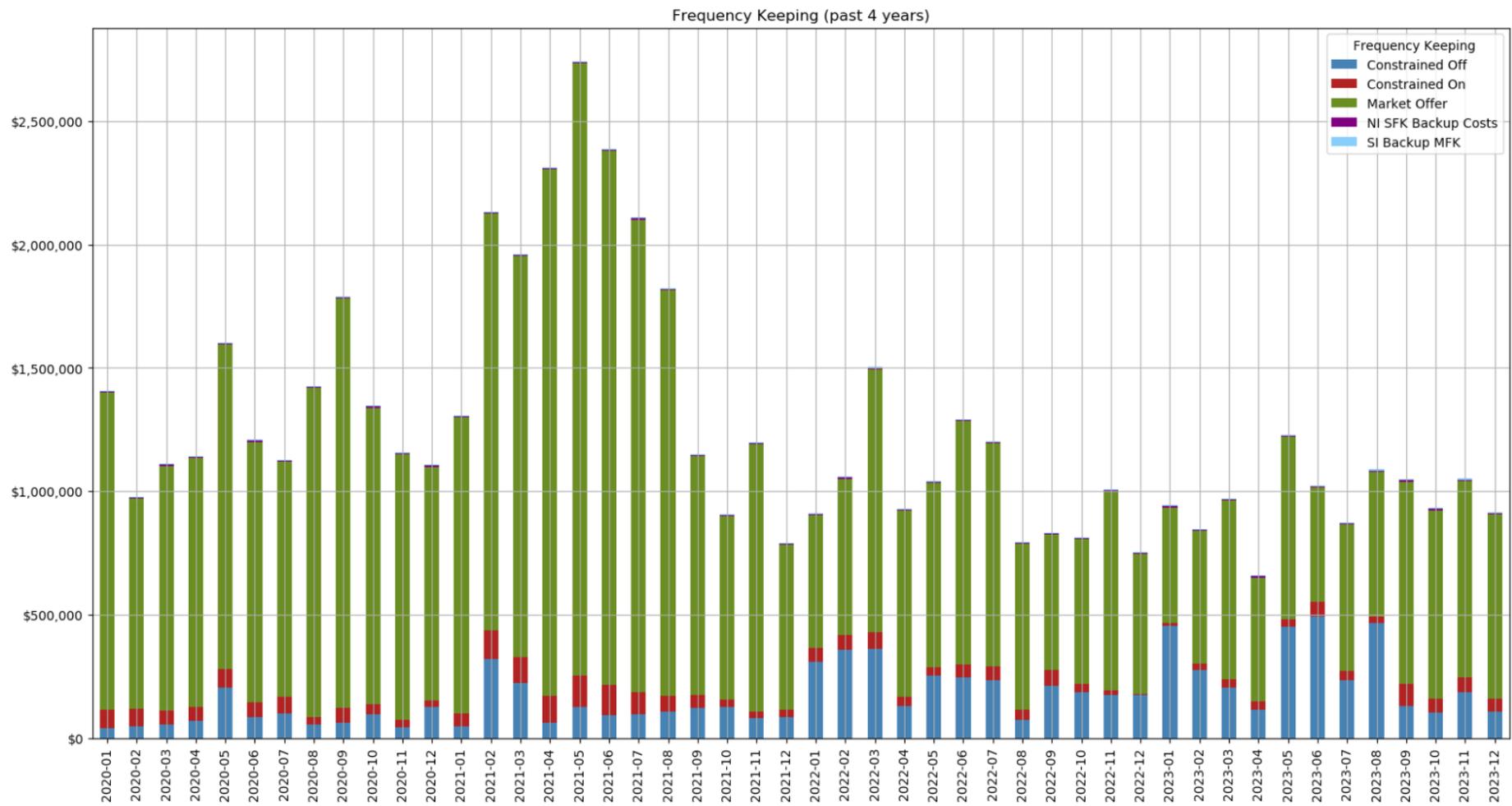
Reserve prices also spiked on 14 October when there were filter outages at Benmore and Haywards which reduced the HVDC risk subtractor¹. Reserve prices also spiked on 26 October, this time due to a period of reduced voltage operation of the HVDC caused by a tripping from the conductor clashing with the tower in extremely high wind. CANs were sent out to notify participants; the situation led to higher energy and reserve prices in the North Island.

Reserve prices also peaked on 30 October and on 1, 2, and 3 November during periods of low wind generation and low thermal generation commitment. Low Residual CANs were sent out for 2 November and 3 November. Price spikes on 7 November were the result of high HVDC flows which meant that more expensive reserves were needed to cover the increased HVDC risk.



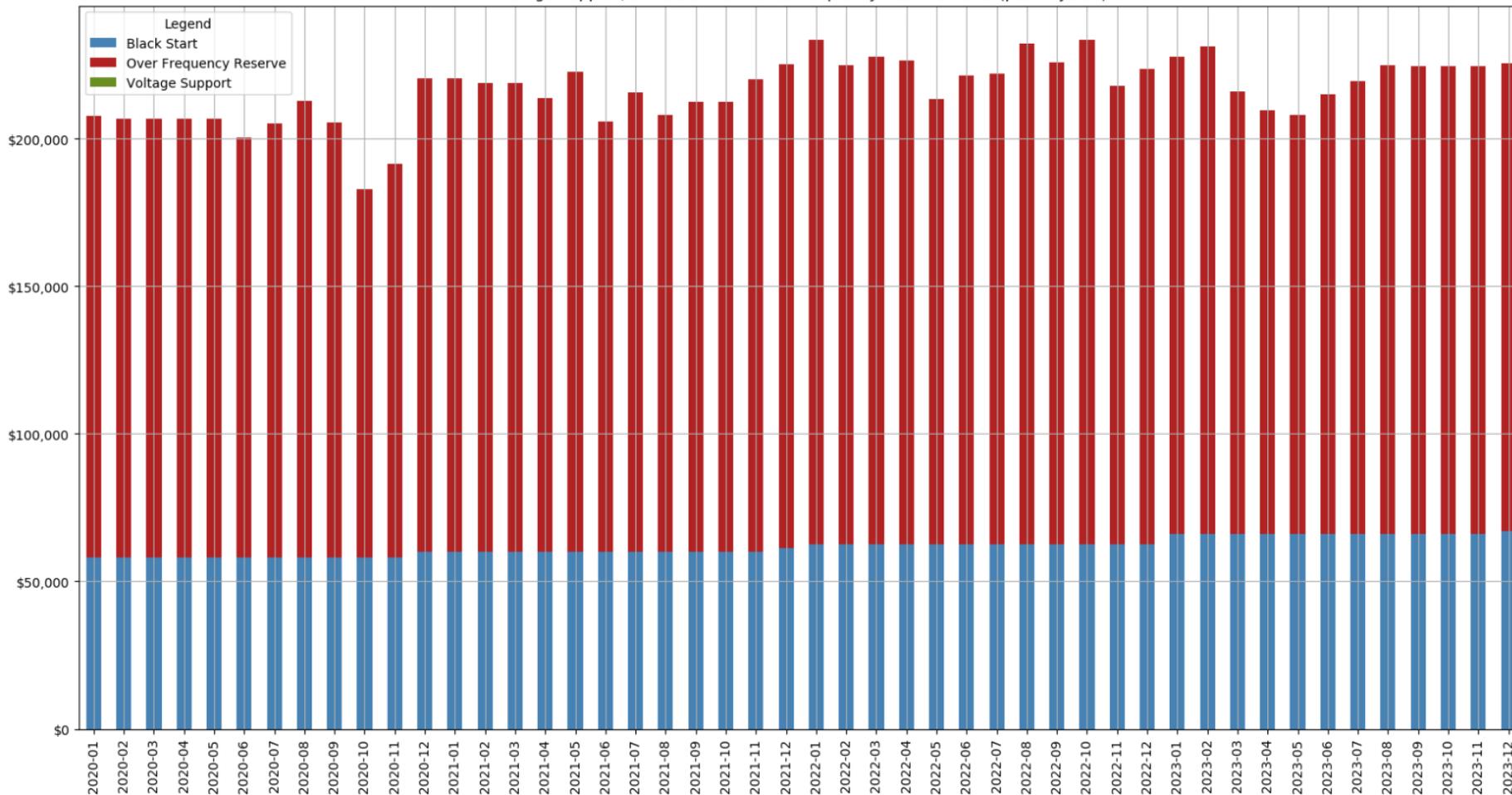
The AC Extended Contingent Event (ACECE) was reduced from 384 MW to 256 MW on 9 November because of planned outages of Manapouri U1 and U6 which reduced the maximum number of units connected to a single busbar. Several commissioning risks were classified as secondary risks during the quarter including Rotohiko Battery, Kaitaia Solar Farm and Harapaki Wind Farm. Piripaua G4 and Kaiwera Downs Wind Farm were removed as secondary risks as they completed their respective commissioning phases.

¹ The “HVDC risk subtractor” is the value used in the market system to model the under frequency Instantaneous Reserves (IR) required for a HVDC Contingent Event (the loss of a HVDC pole). It represents the overload capability of the HVDC pole which remains in service.



There was no real change to frequency keeping costs this quarter, however the proportion of constrained off costs were lower and market offer costs increased.

Voltage Support, Black Start and Over Frequency Reserve Costs (past 4 years)

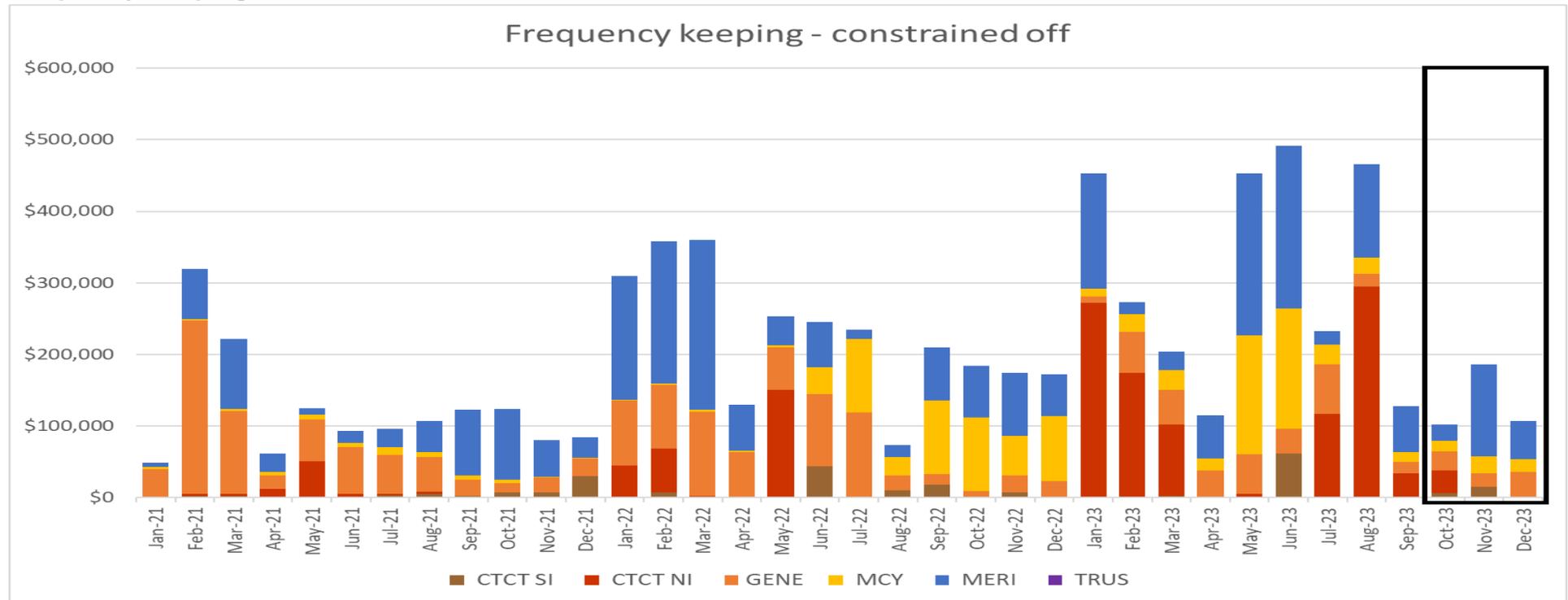


Over Frequency Reserve costs were stable this quarter. Increased costs in December are associated with the new Black Start (North Island) procurement contracts which took effect on 15 December.

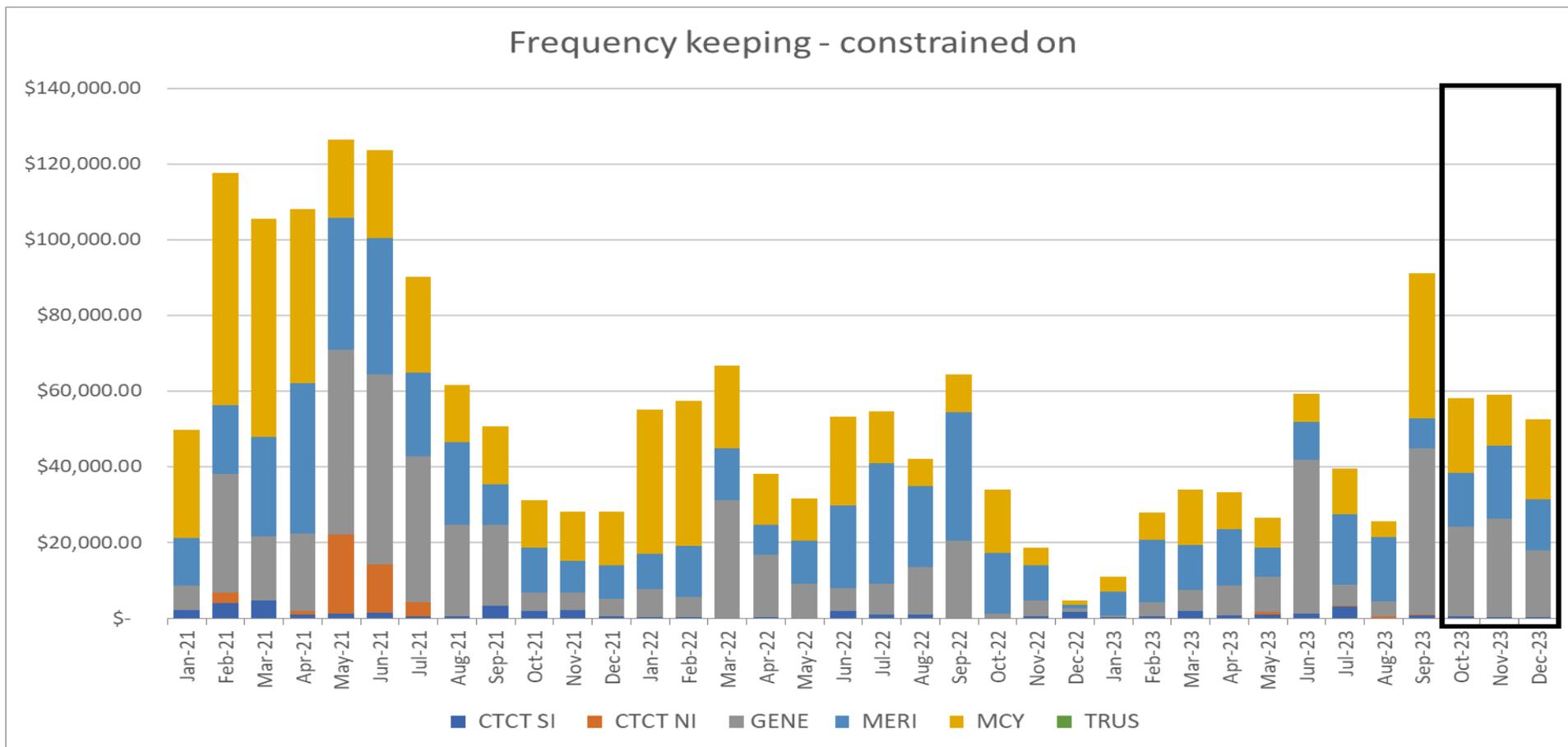
13.1 Constrained on/off costs

Note: Where there is a high payment, as opposed to in increasing/decreasing trend, it will often relate to payments over a small number of trading periods.

Frequency Keeping

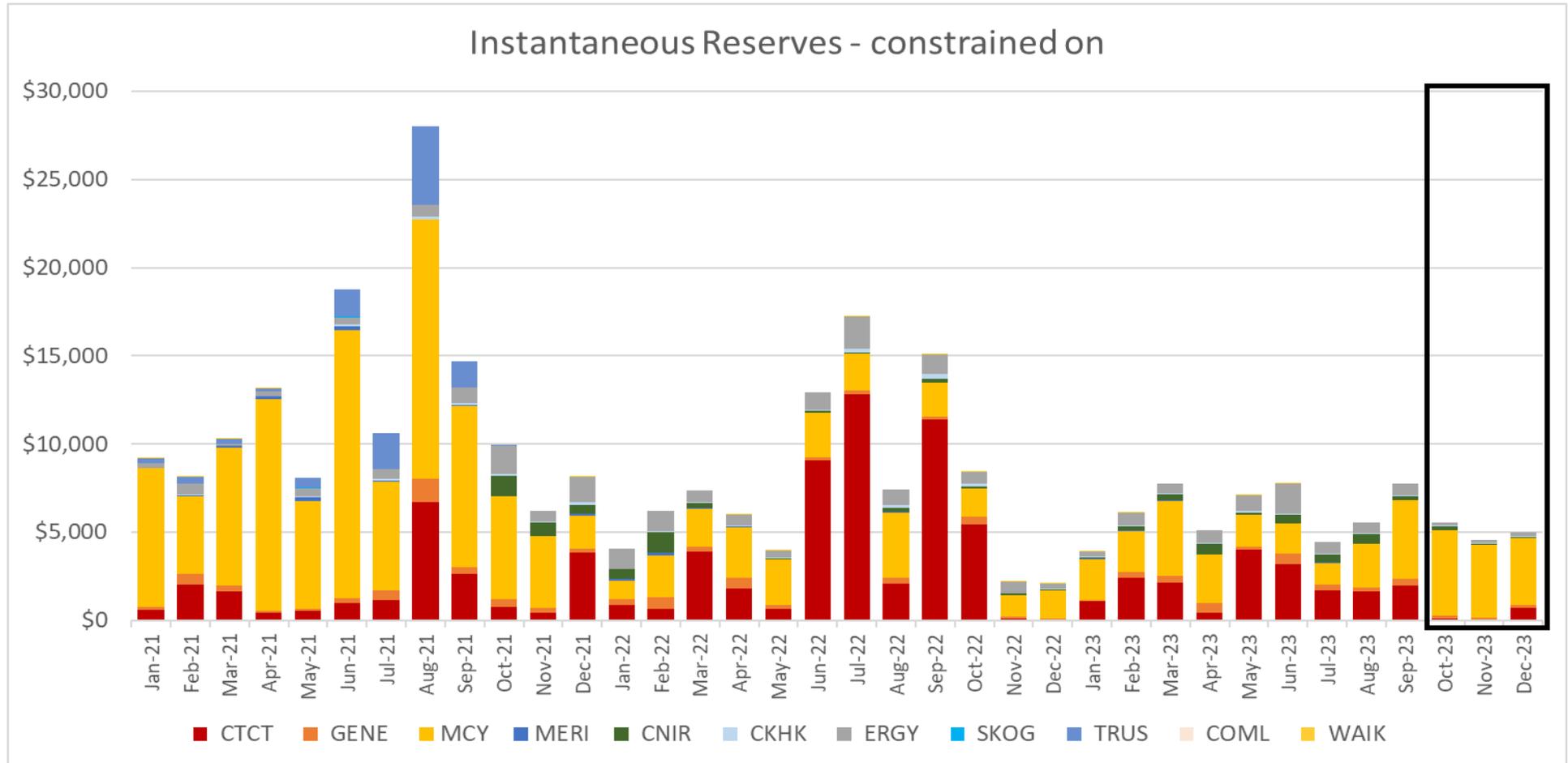


Constrained off costs have fallen this quarter. Some of the decrease in constrained off costs can be attributed to the second Stratford peaker going on outage, removing it as a frequency keeper and reducing costs for Contact Energy in the North Island.



Constrained on costs increased this quarter however the costs were similar in each of the three months across the quarter. Some of these consistent costs across the quarter can be attributed to this quarter’s stable market prices. However overall, these costs are still relatively low compared to other ancillary service costs.

Instantaneous Reserves



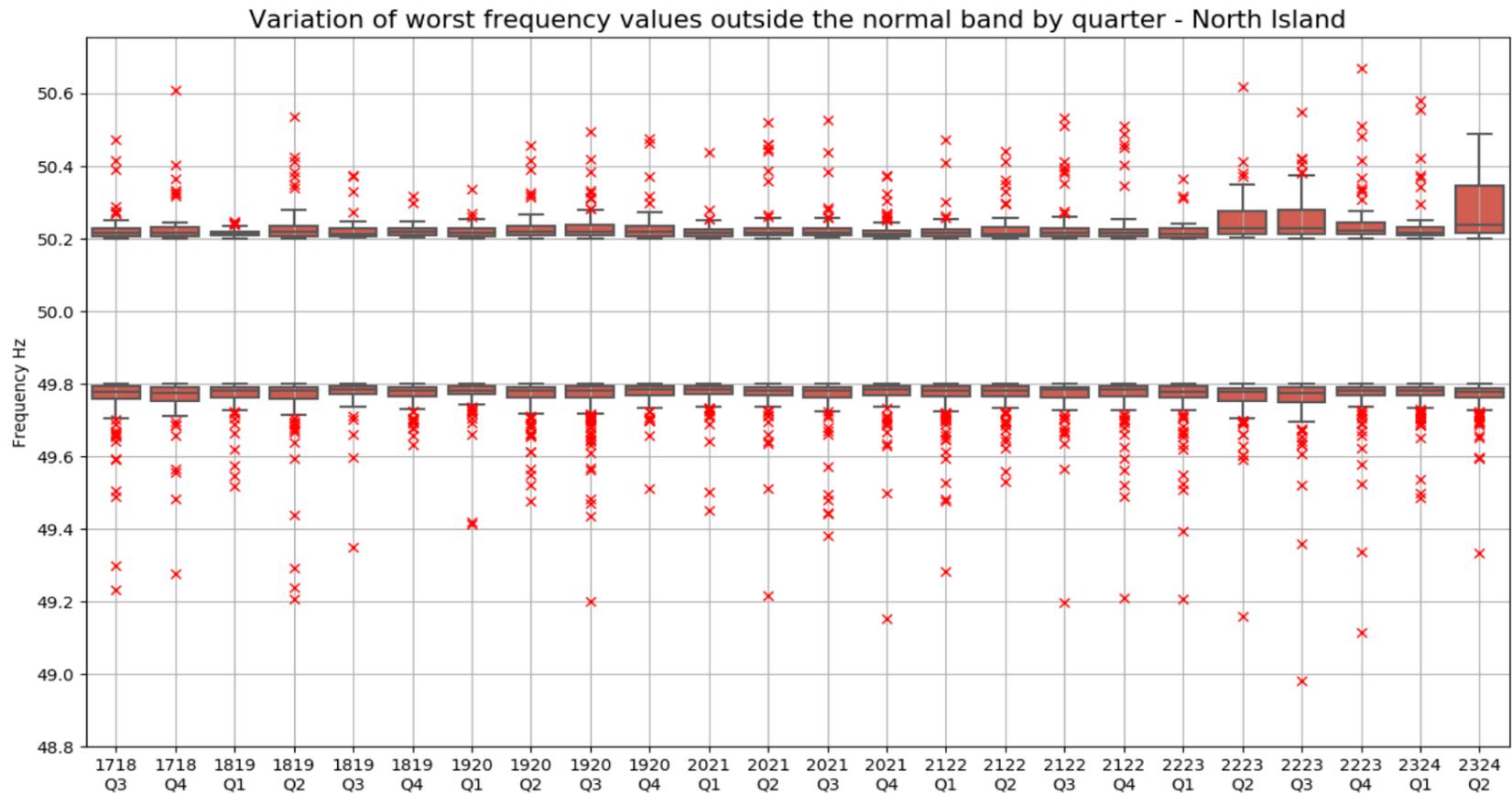
Costs were steady this quarter and remained low.

2 Frequency fluctuations

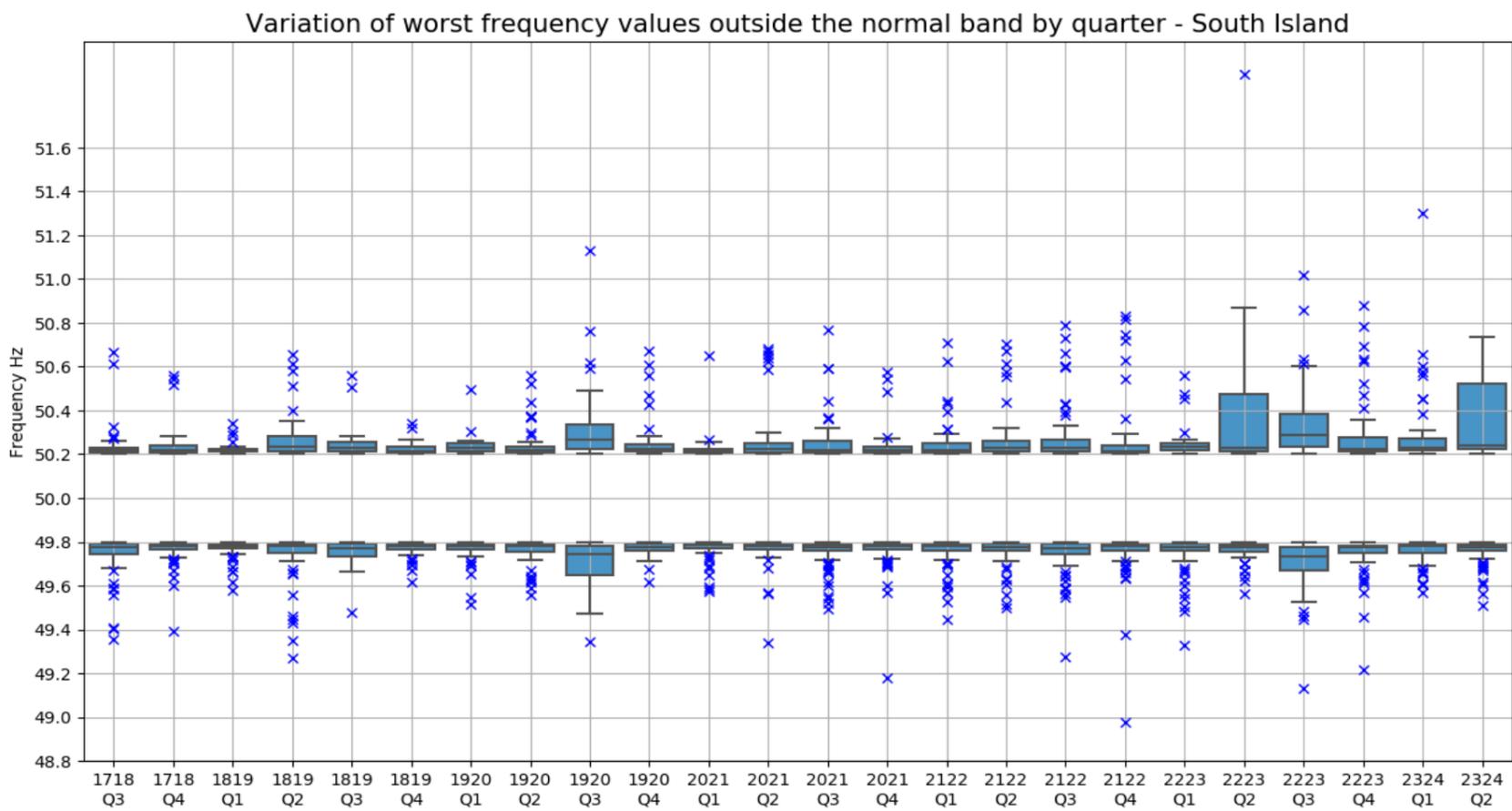
2.1 Maintain frequency in normal band (Frequency value)

The following charts show the distribution of the worst frequency excursion outside the normal band (49.8 to 50.2 Hz) by quarter since Q3 2017/18, including the reporting period.

North Island



South Island



Note: These box and whisker charts show the distribution of data. The “box” represents the distribution of the middle 50% of the data, the “whiskers” indicate variability, and outliers are shown as single data points.

Excursions outside the normal band this quarter:

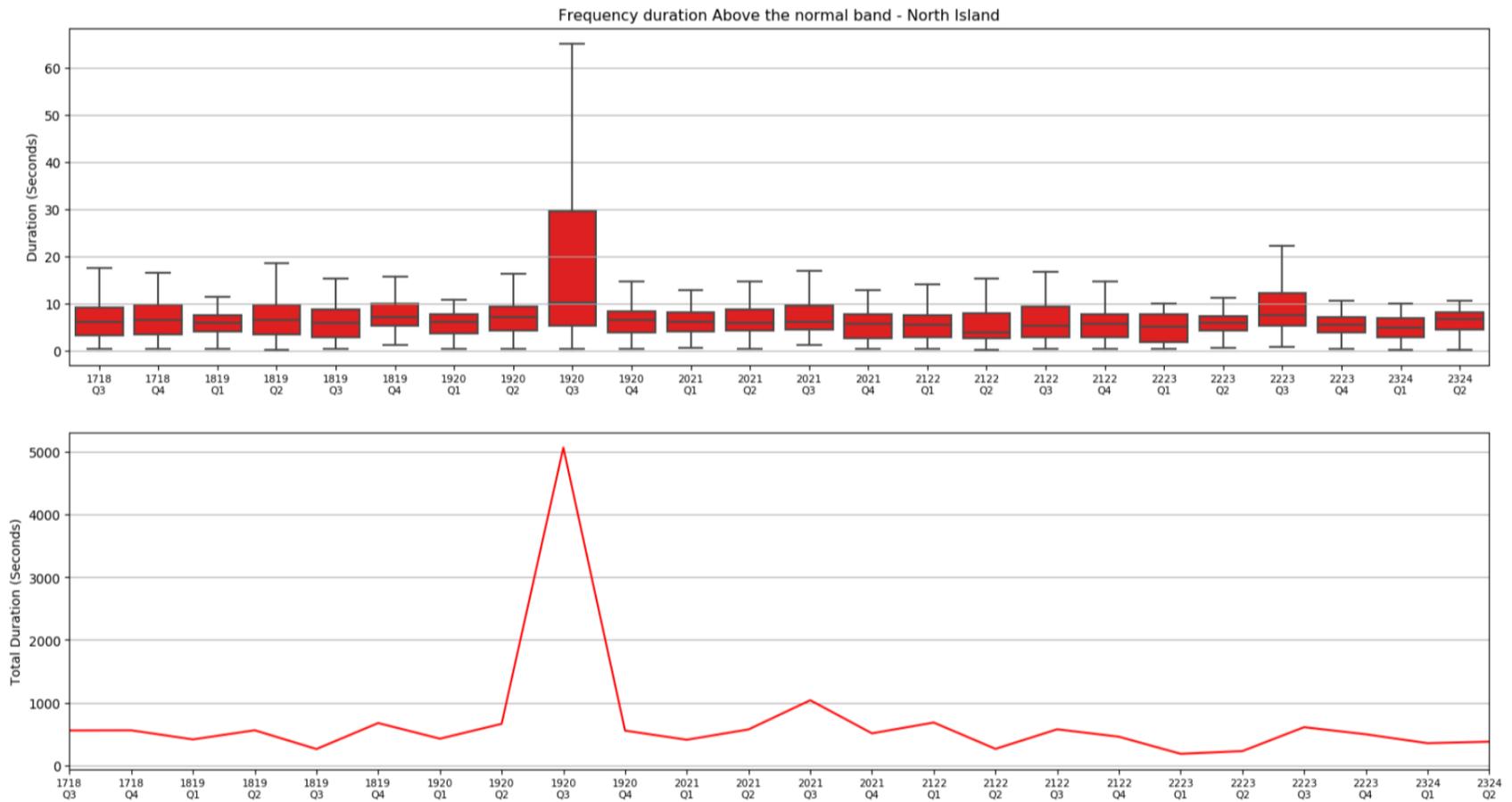
	Above	Below
October	ROX_TMH 2 A/R, ~150 MW of SI load dropped off (S) – 2/10 7 x Tiwai Potline (S) – 11/10 (5), 13/10 and 24/10	
November	Tiwai Potline (S) – 4/11	
December	HLY generation runback (N) – 22/12 5 x Tiwai Potline (S) – 14/12, 20/12, 25/12, 30/12 and 31/12	

Recover quickly from a fluctuation (Time)

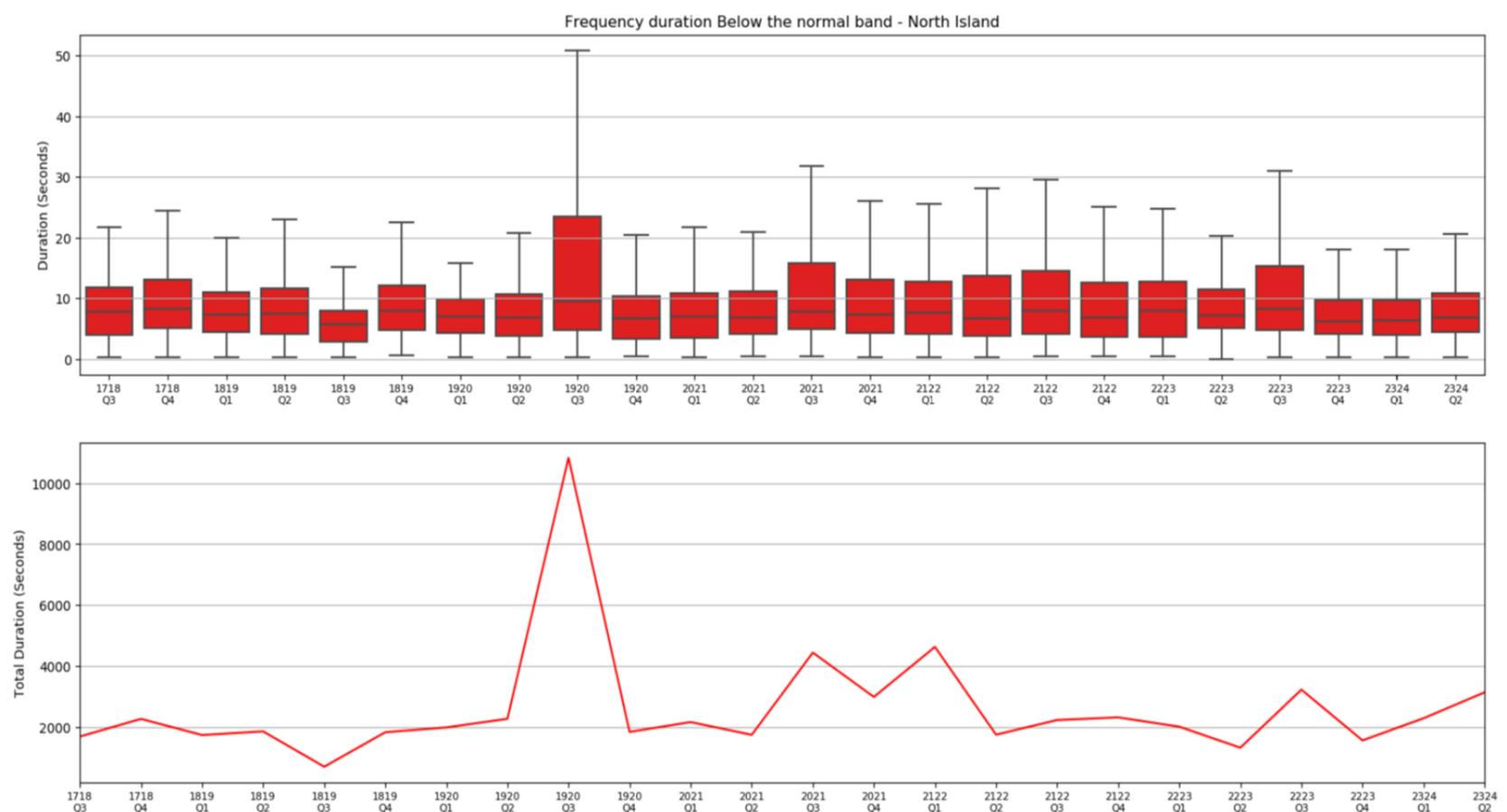
The following charts show the median and total duration of all the momentary fluctuations above and below the normal band for each island. The information is shown as a 4-quarter rolling average to illustrate trends in the data.

North Island

Above the normal band



Below the normal band

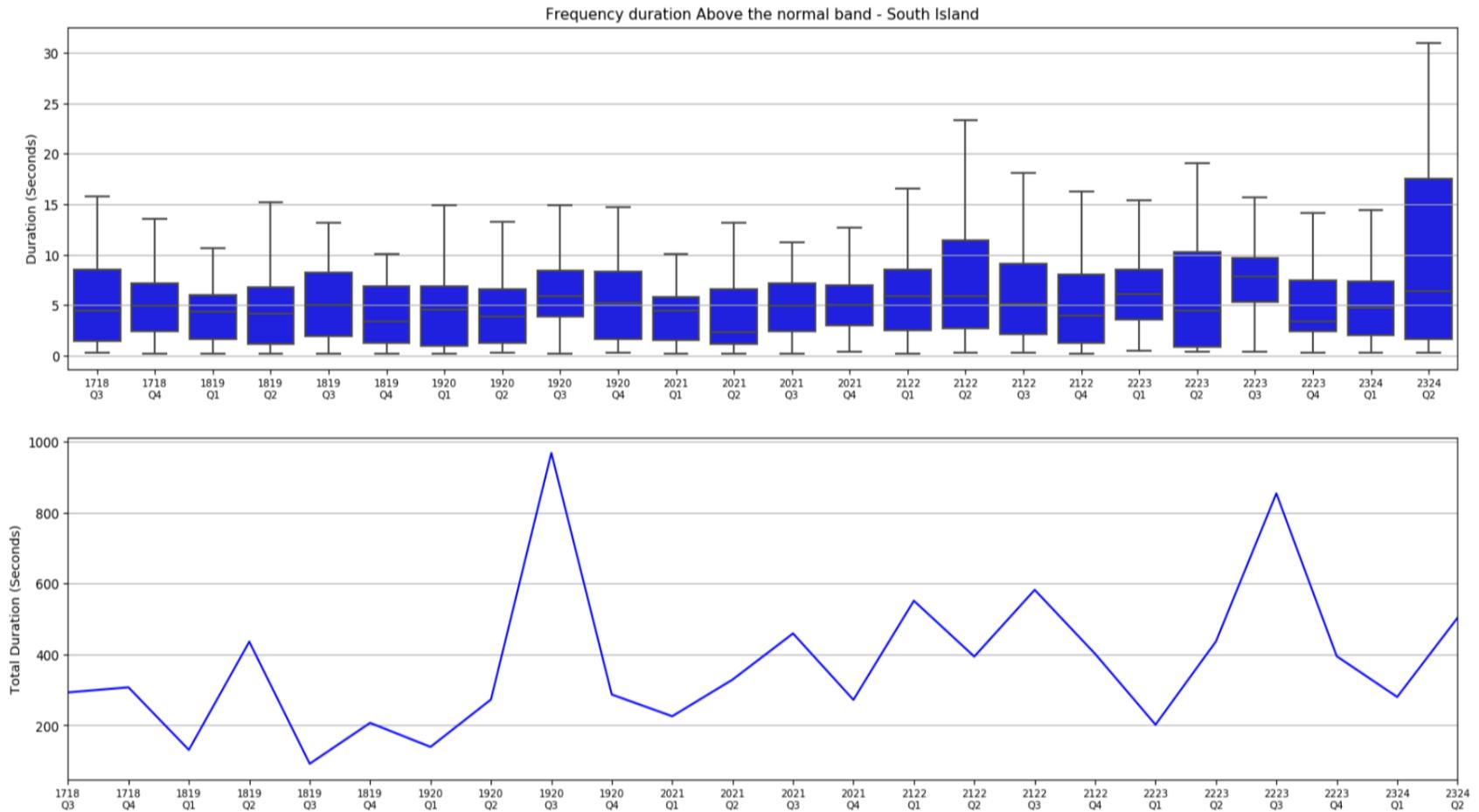


Excursions outside the normal band this quarter:

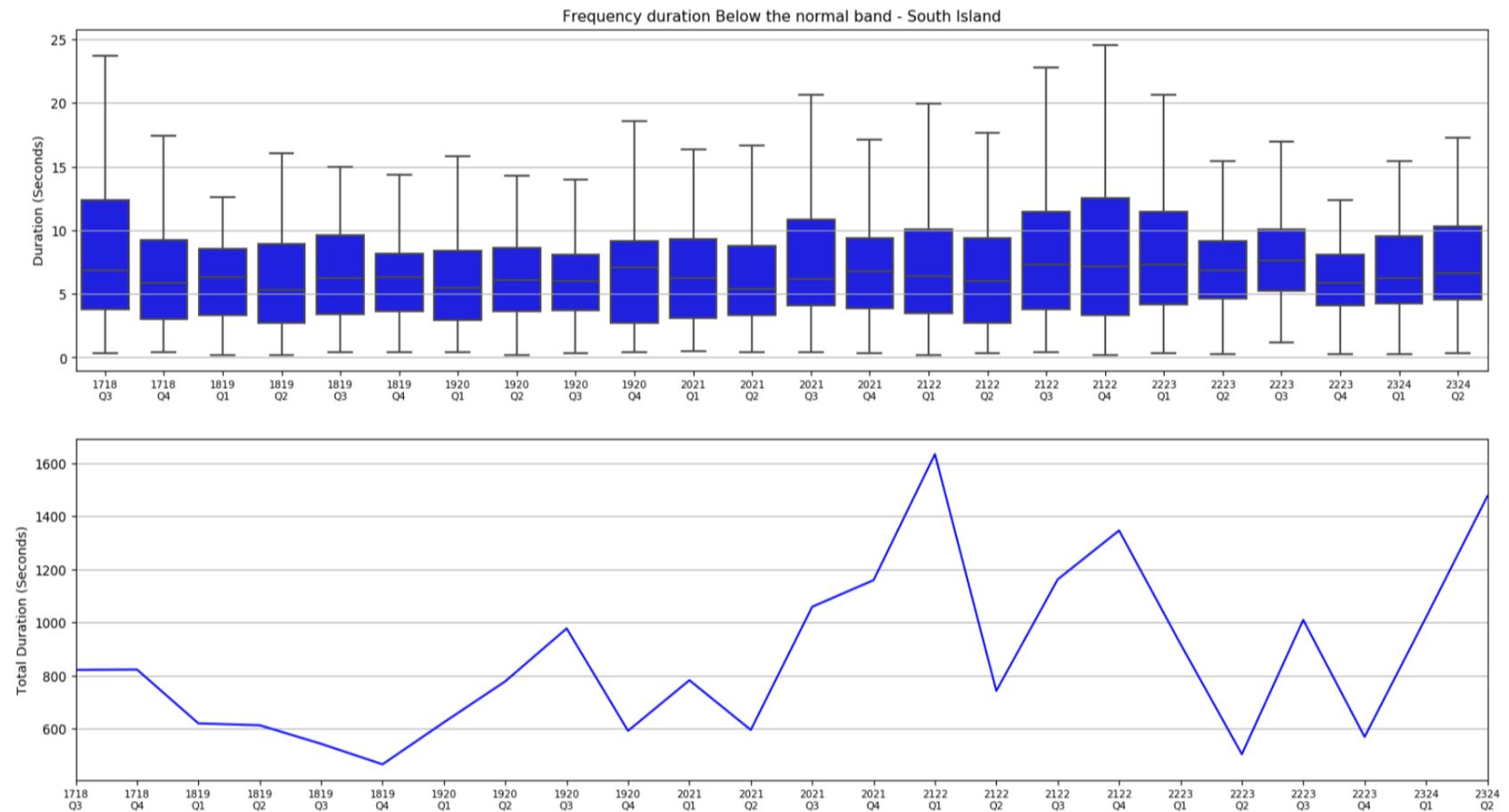
	Above	Below
October	ROX_TMH 2 A/R, ~!50 MW of SI load dropped off (S) – 2/10 7 x Tiwai Potline (S) – 11/10 (5), 13/10 and 24/10	
November	Tiwai Potline (S) – 4/11	
December	HLY generation runback (N) – 22/12 5 x Tiwai Potline (S) – 14/12, 20/12, 25/12. 30/12 and 31/12	

South Island

Above the normal band



Below the normal band



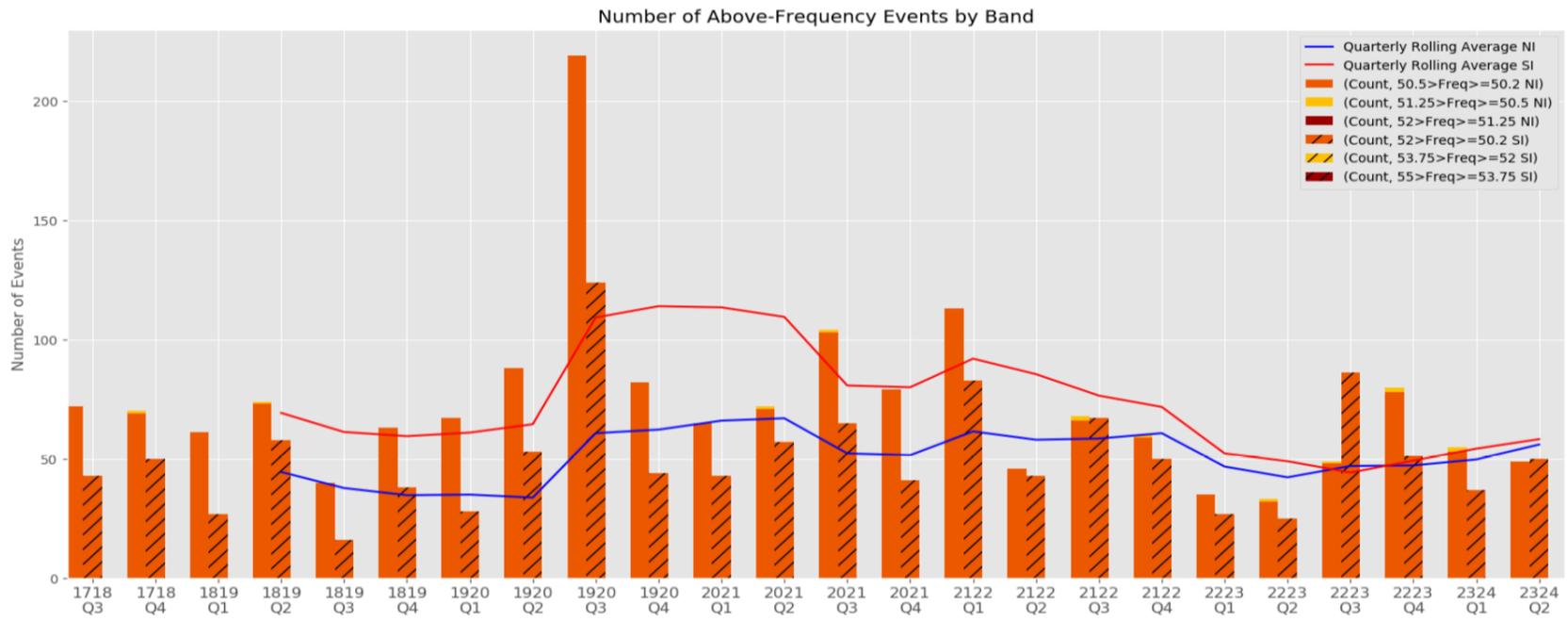
Excursions outside the normal band this quarter:

	Above	Below
October	ROX_TMH 2 A/R, ~!50 MW of SI load dropped off (S) – 2/10 7 x Tiwai Potline (S) – 11/10 (5), 13/10 and 24/10	
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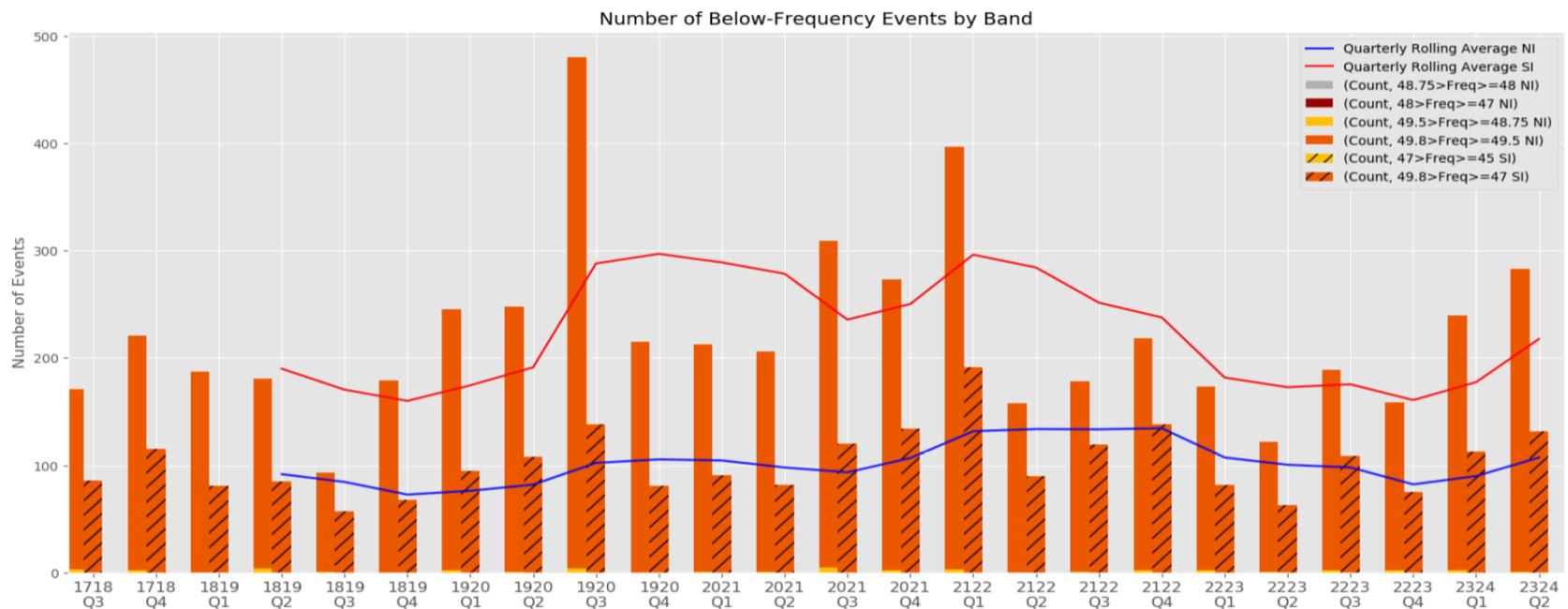
2.2 Manage frequency and limit rate of occurrences during momentary fluctuations (Number)

The following charts show the number of momentary fluctuations outside the frequency normal band, grouped by frequency band, for each quarter since Q3 2017/18. Information is shown by island, including a 4-quarter rolling average to show the prevailing trend.

Over-frequency events



Under-frequency events



Excursions outside the normal band this quarter:

	Above	Below
October	ROX_TMH 2 A/R, ~150 MW of SI load dropped off (S) – 2/10 7 x Tiwai Potline (S) – 11/10 (5), 13/10 and 24/10	
November	Tiwai Potline (S) – 4/11	
December	HLY generation runback (N) – 22/12 5 x Tiwai Potline (S) – 14/12, 20/12, 25/12, 30/12 and 31/12	

Reporting against Code clause 7.2E:

North Island	52>x≥51.25	51.25>x≥50.5	49.5>x≥48.75	48.75>x≥48	48>x≥47
2022					
Oct	0	1	1	0	0
Nov	0	0	0	0	0
Dec	0	0	0	0	0
2023					
Jan	0	0	1	0	0
Feb	0	0	0	0	0
Mar	0	1	1	0	0
Apr	0	1	0	0	0
May	0	0	0	0	0
Jun	0	1	2	0	0
Jul	0	1	2	0	0
Aug	0	1	0	0	0
Sep	0	0	0	0	0
Oct	0	0	0	0	0
Nov	0	0	0	0	0
Dec	0	0	1	0	0

South Island	55>x≥53.75	53.75>x≥52	47>x≥45
2022			
Oct	0	0	0
Nov	0	0	0
Dec	0	0	0
2023			
Jan	0	0	0
Feb	0	0	0
Mar	0	0	0
Apr	0	0	0
May	0	0	0
Jun	0	0	0
Jul	0	0	0
Aug	0	0	0
Sep	0	0	0
Oct	0	0	0
Nov	0	0	0
Dec	0	0	0

3 Security notices

The following table shows the number of Warning Notices, Grid Emergency Notices and Customer Advice Notices issued over the last 12 months.

Notices issued	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	-	-	1	-	-	-	1	-	-	-	-	-	-
Warning Notice	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer Advice Notice	17	11	4	14	12	9	11	12	10	15	10	12	7

4 Grid emergencies

The following table shows grid emergencies declared by the System Operator October to December 2023.

Date	Time	Summary Details	Island
		None this quarter	