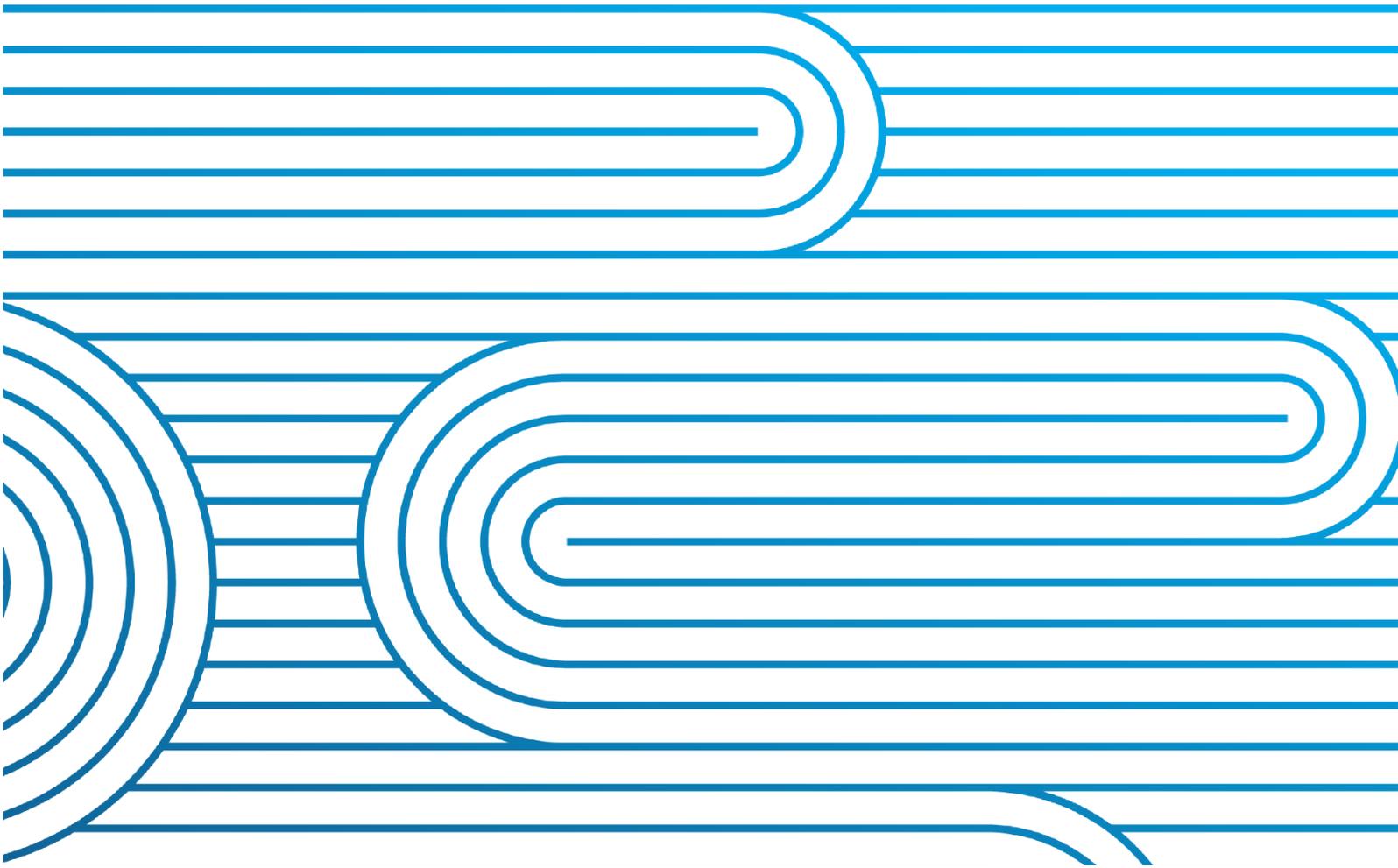


Quarterly system performance information

January to March 2024



Report Purpose

To provide information on ancillary service cost reporting and an overview of notices. These items were previously included in the Quarterly reports written for the Electricity Authority



Contents

Report Purpose ii

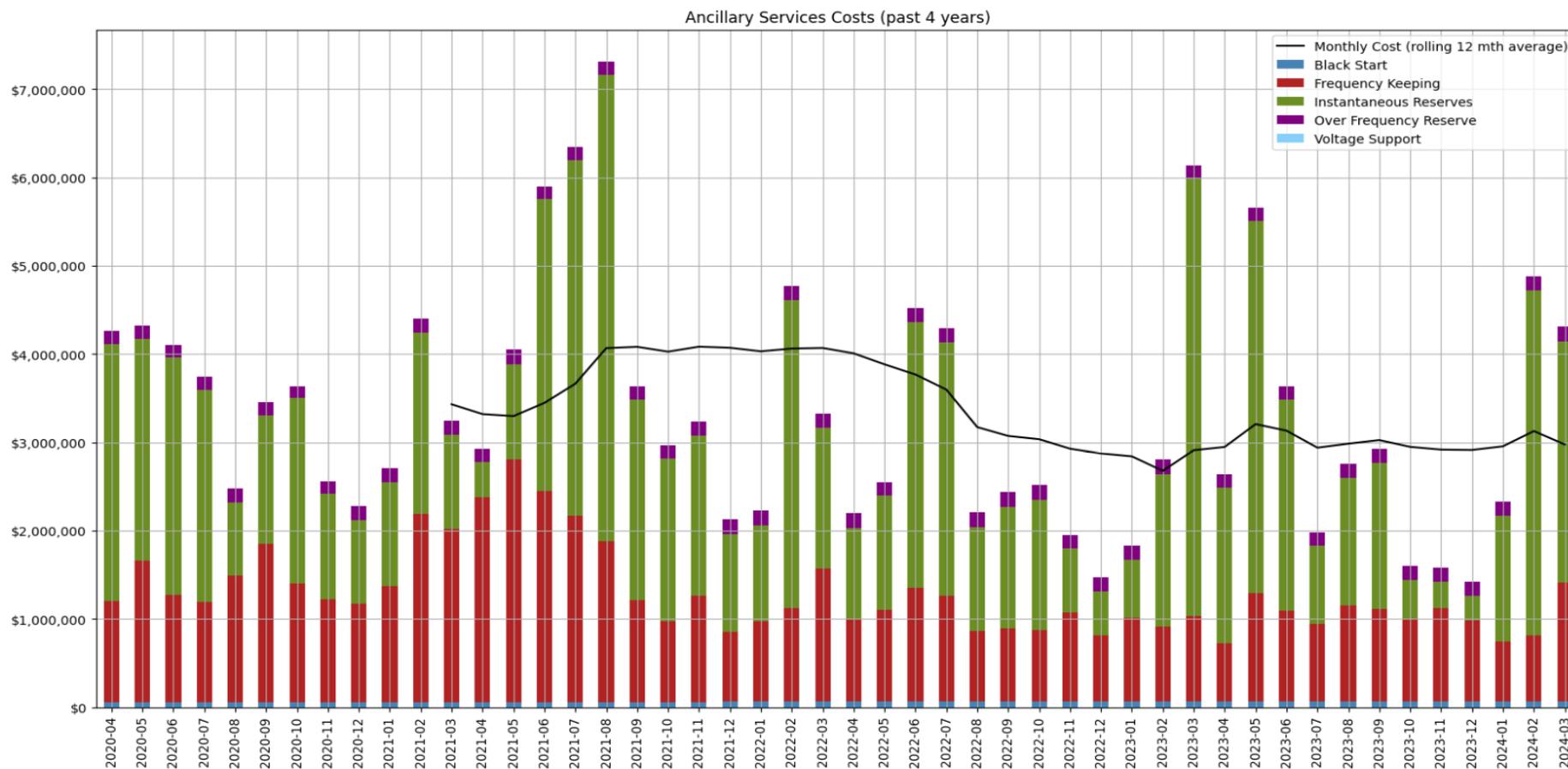
1 Ancillary service costs..... 4

2 Frequency fluctuations..... 11

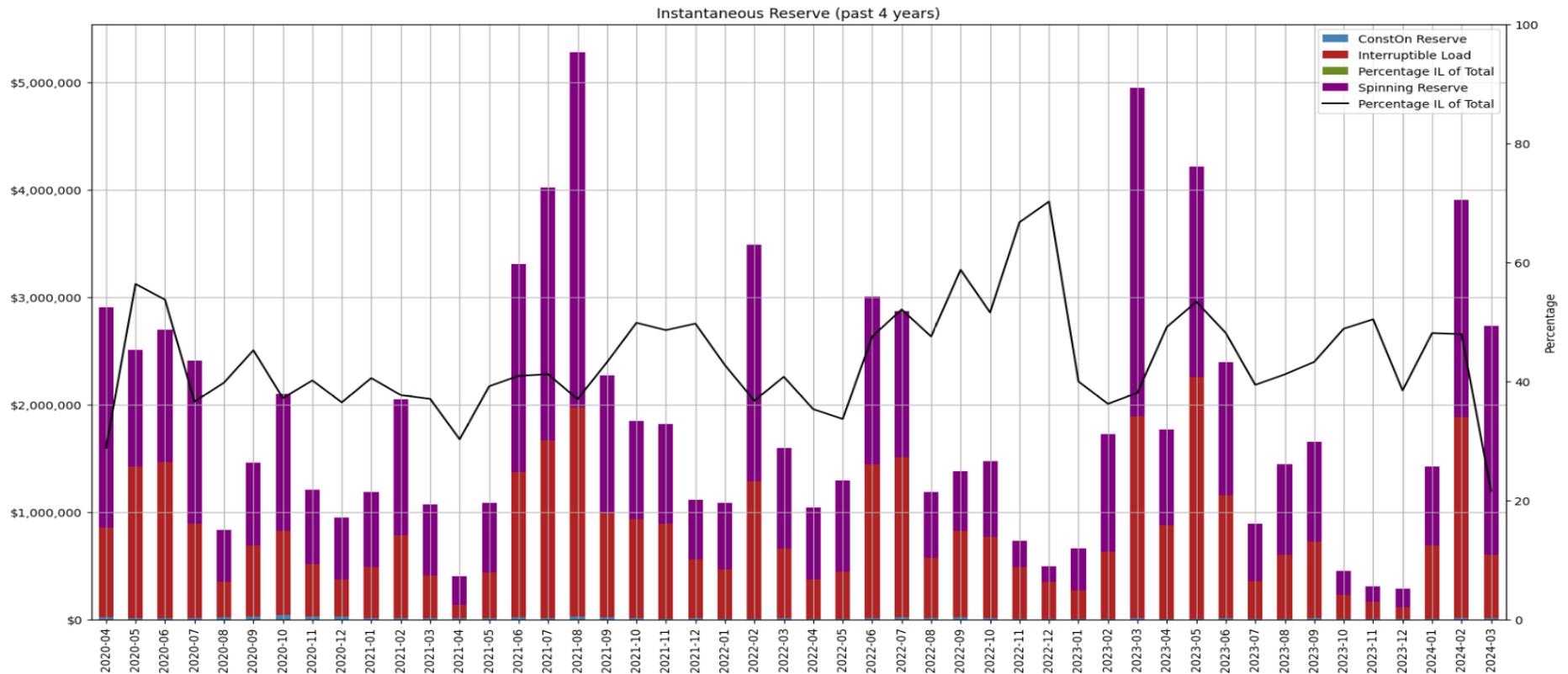
3 Security notices 15

4 Grid emergencies 15

1 Ancillary service costs

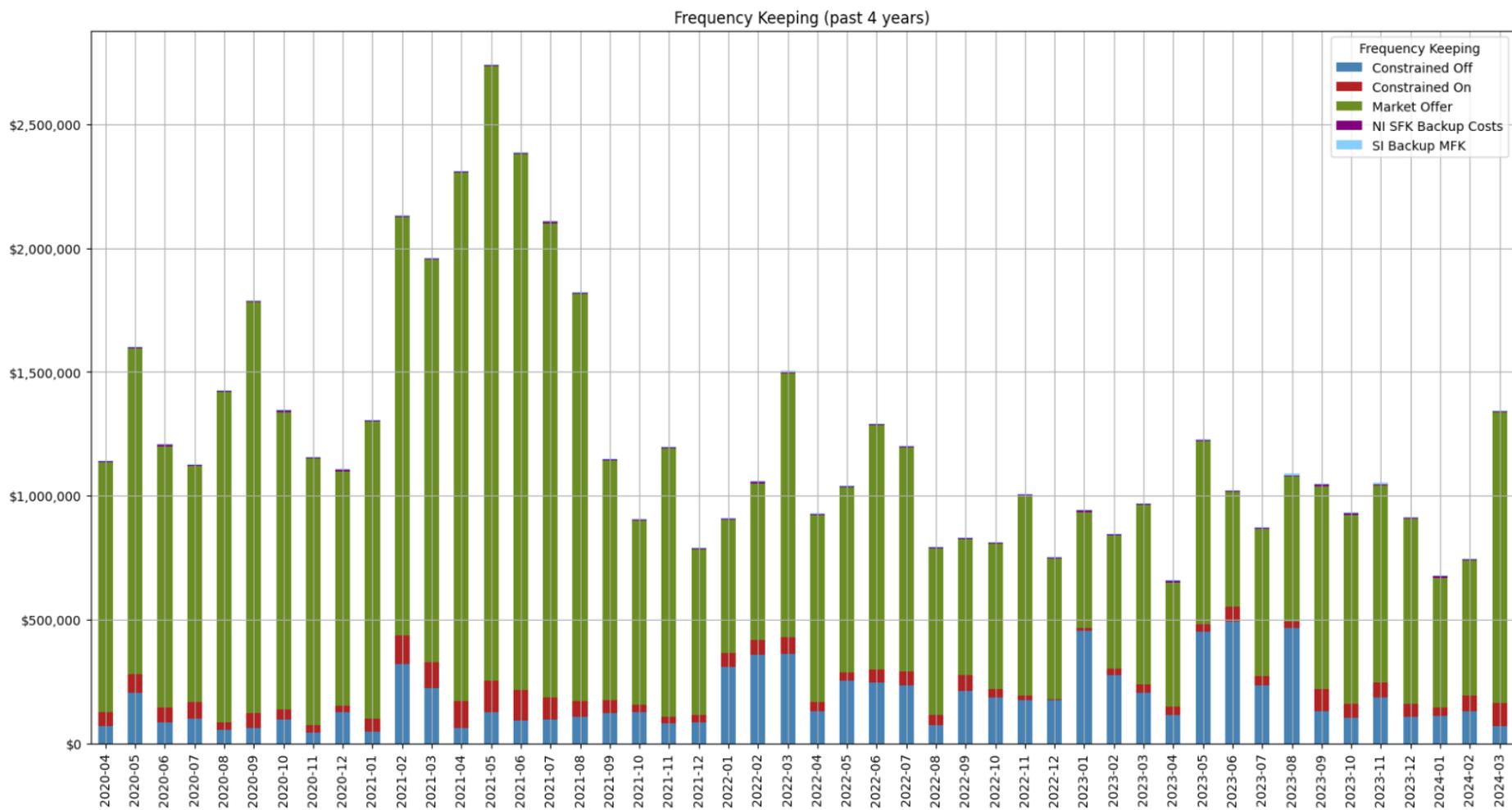


The overall ancillary service costs have increased this quarter compared to the previous few months. The main factor contributing to this is an increase in the instantaneous reserve costs which is shown in more detail in the next graph.

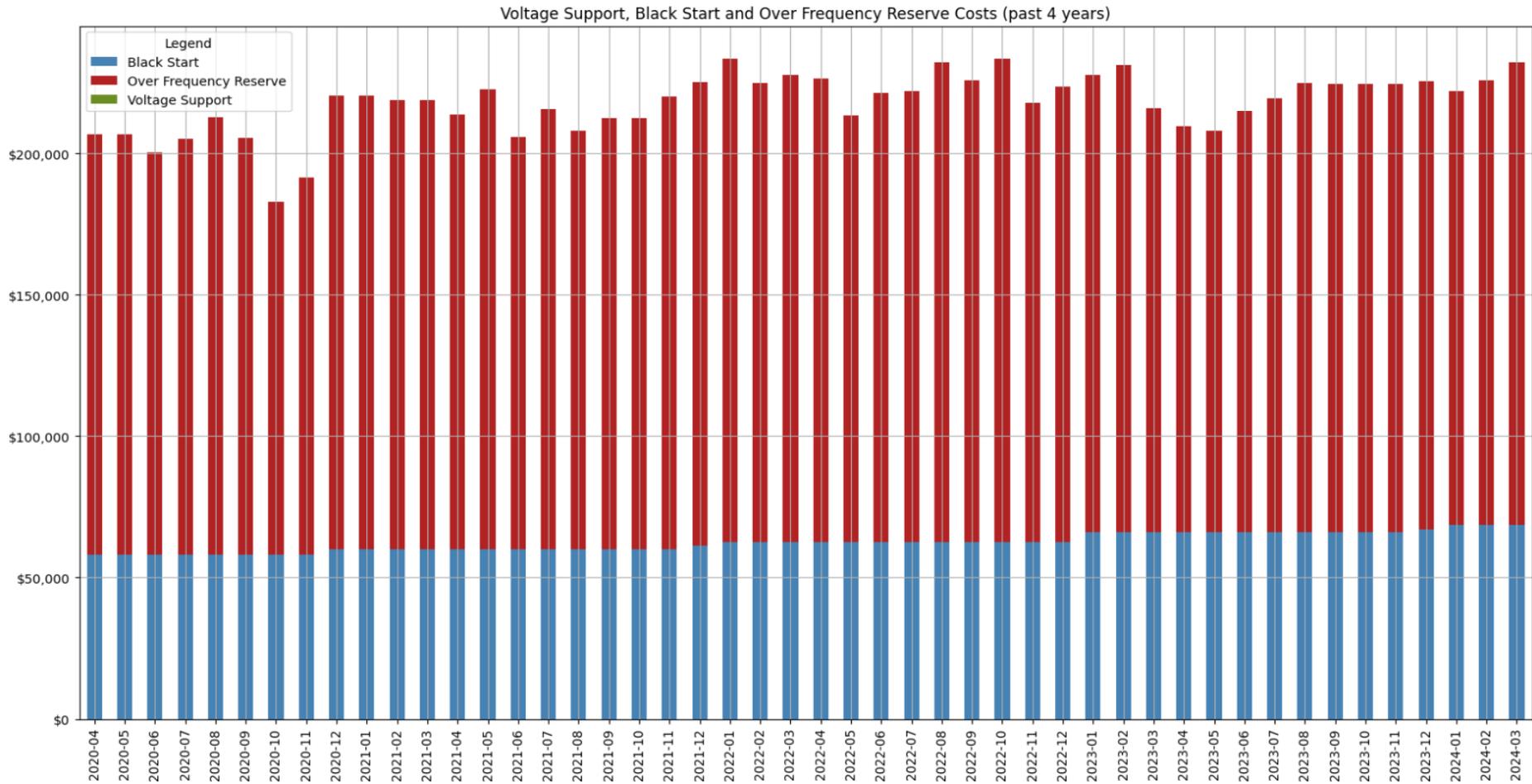


Several factors contributed to higher instantaneous reserve costs this quarter. The two main factors were the HVDC outages in mid-February to mid-March and the return of Huntly unit 5 to the market at the end of January, both of which drove the need for more reserves. Other contributors to the higher costs were higher demand from February onwards and lower than average South Island hydro storage levels. Additional secondary risks as a result of commissioning also affected price as various generators and energy resources entered and left their commissioning phases.

Fast Instantaneous Reserve (FIR) prices spiked on January 23 due to a circuit outage in the North Island which caused the risk to be set by the combined output of five windfarms (~370 MW). At times of lower demand/generation, the amount of free reserves on the system is lower, this results in more reserves needing to be procured and higher prices.



There was a slight reduction in frequency keeping costs this quarter, driven mainly by a reduction in constrained off costs (see section 13.1 for details).

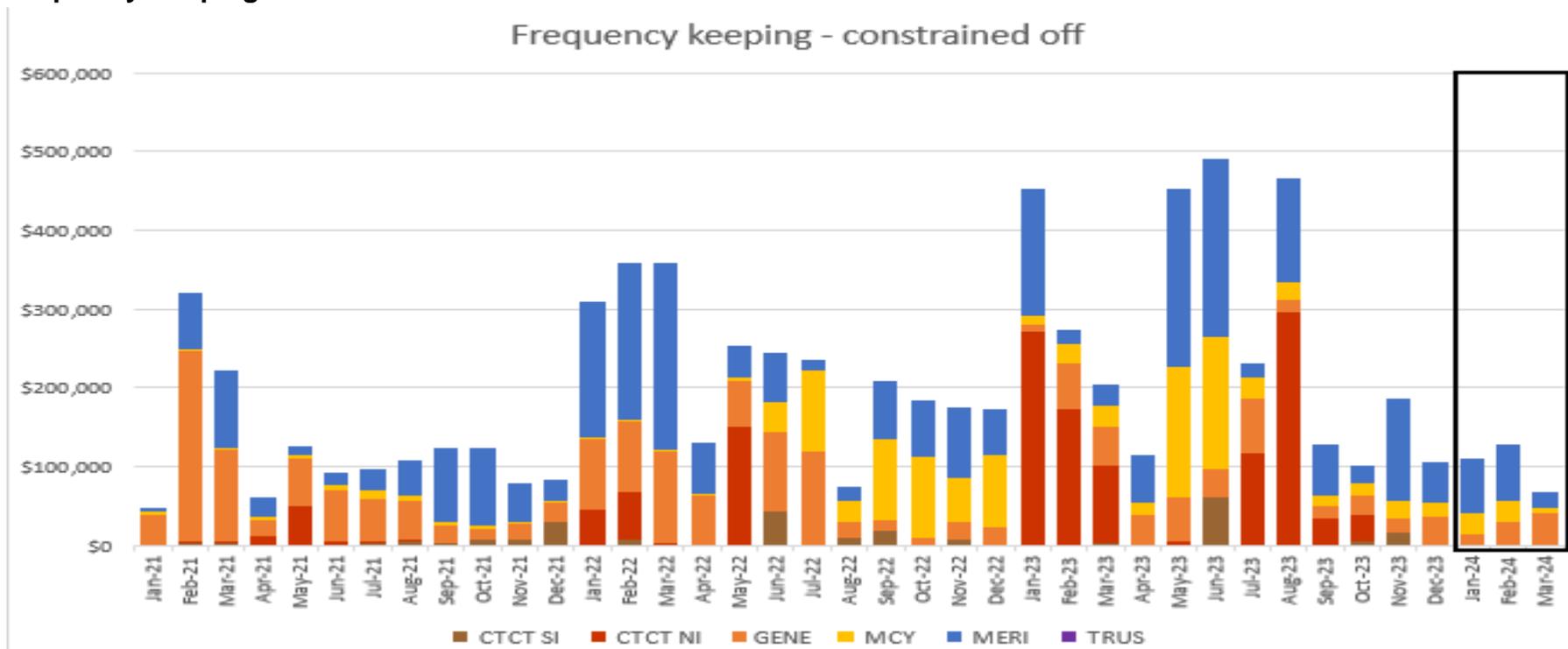


Increased costs this quarter are associated with the new Black Start (North Island) procurement contracts which took effect on 15 December and inflation adjustments for the remaining Black Start (South Island) contracts. Over Frequency Reserve costs increased this quarter as inflation adjustments were applied, however they remained stable over the quarter.

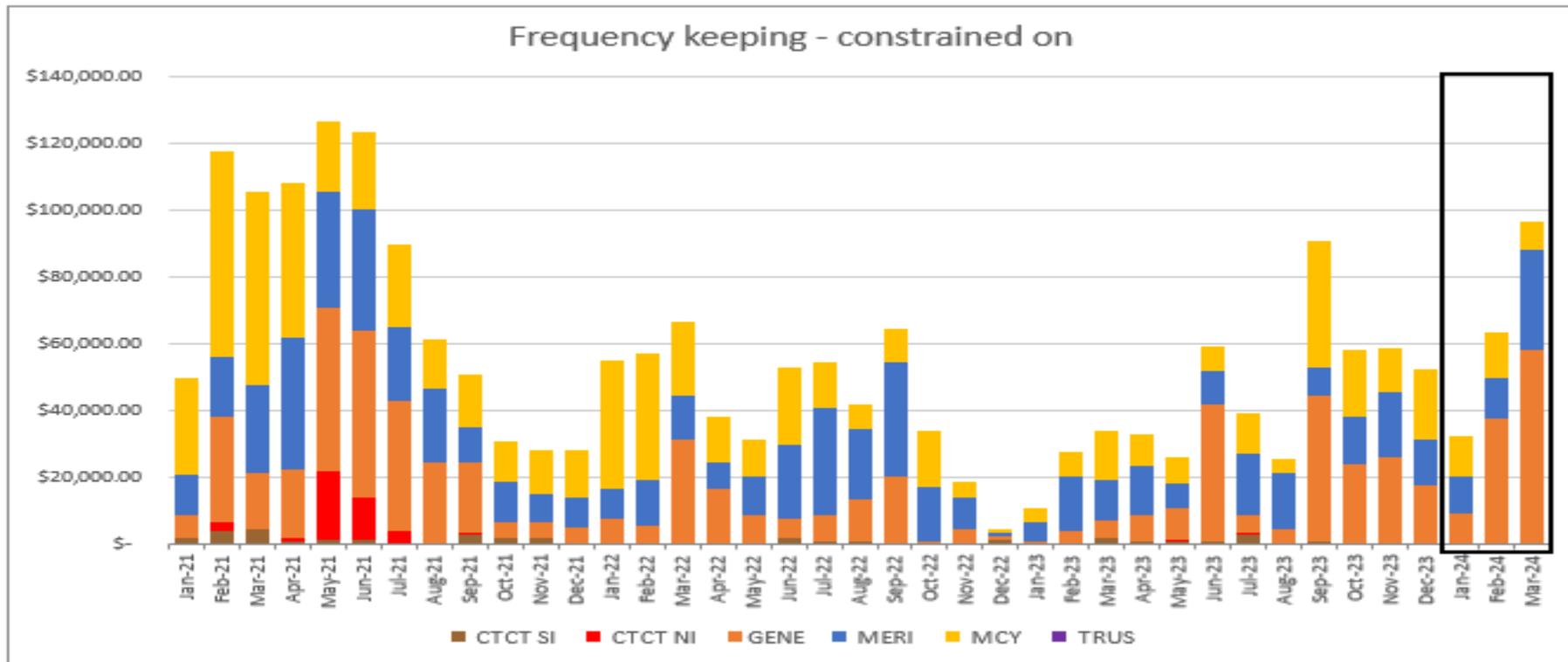
13.1 Constrained on/off costs

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

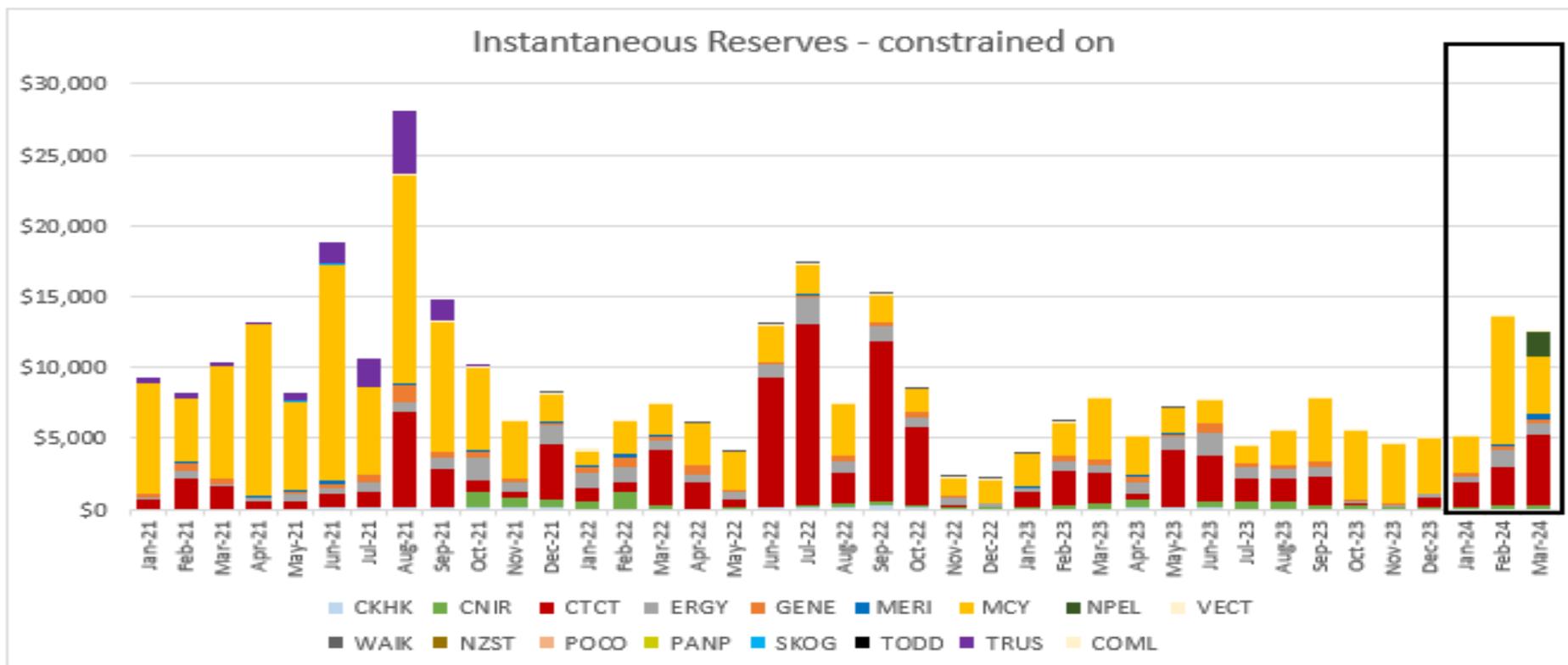


Constrained off costs have fallen this quarter. Some of the decrease in constrained off costs can be attributed to the Stratford peakers remaining out of the frequency keeping market, reducing payments for Contact Energy in the North Island.



Constrained on costs increased steadily this quarter. Some of these increased costs can be attributed to Huntly unit 5 returning to service at the end of January, increasing payments to Genesis in the North Island, and Manapouri unit 1 returning to service in February, increasing payments for Meridian in the South Island.

Instantaneous Reserves



Costs increased this quarter coinciding with HVDC outages when reserves must be procured within the receiving island. Costs remained relatively low.

NewPower Energy Limited's (NPEL's) Rotohiko Battery Energy Storage System (BESS) is now being offered into the reserves market. Rotohiko BESS was commissioned late last year with a capacity of 35 MWh. The BESS is the first utility-scale BESS to offer both sides of the battery into the reserves market:

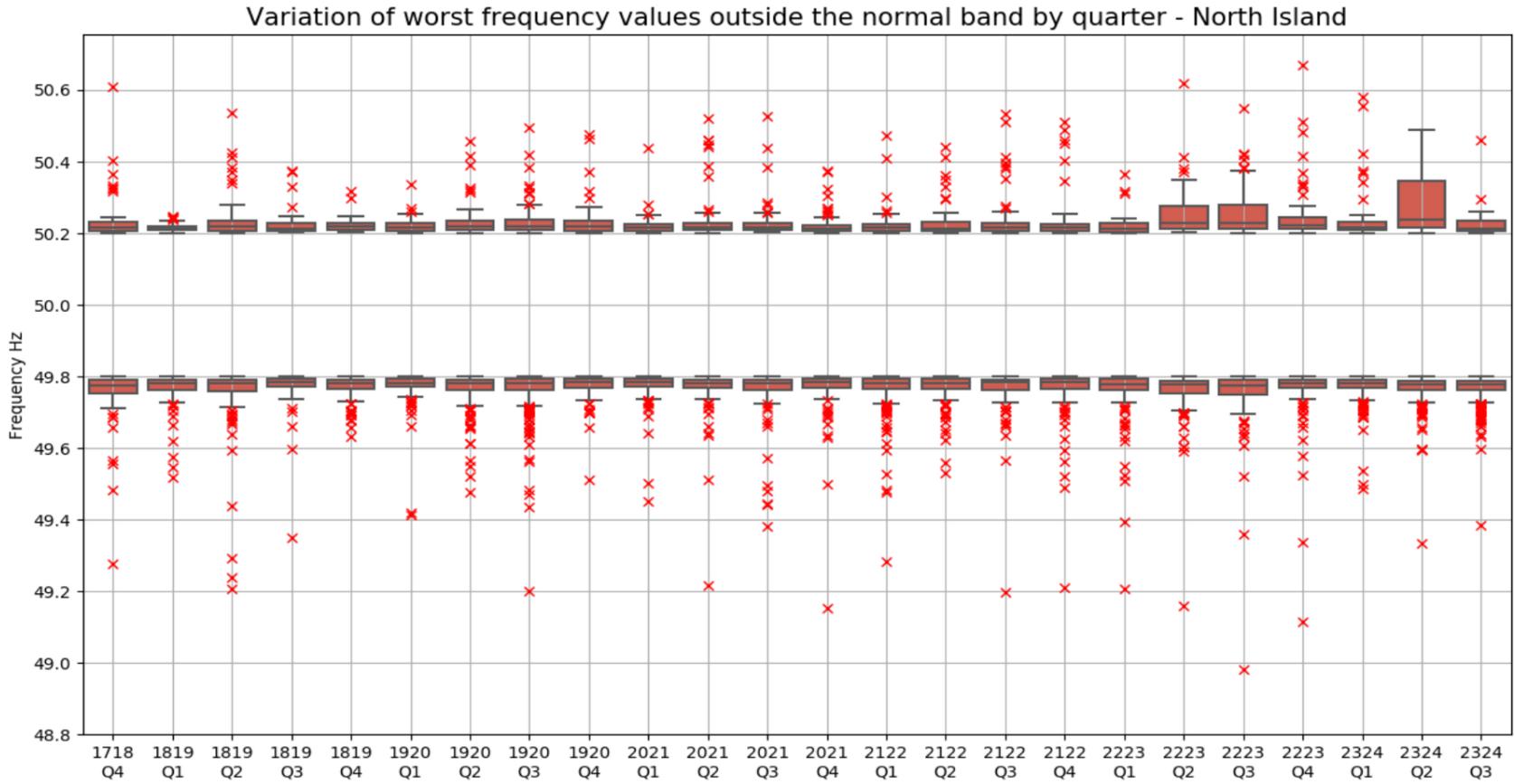
- injection from the battery is offered as generation reserves and the BESS can offer generation reserve while both charging and discharging.
- while charging the battery is offered as interruptible load as the battery can stop charging instantaneously.

2 Frequency fluctuations

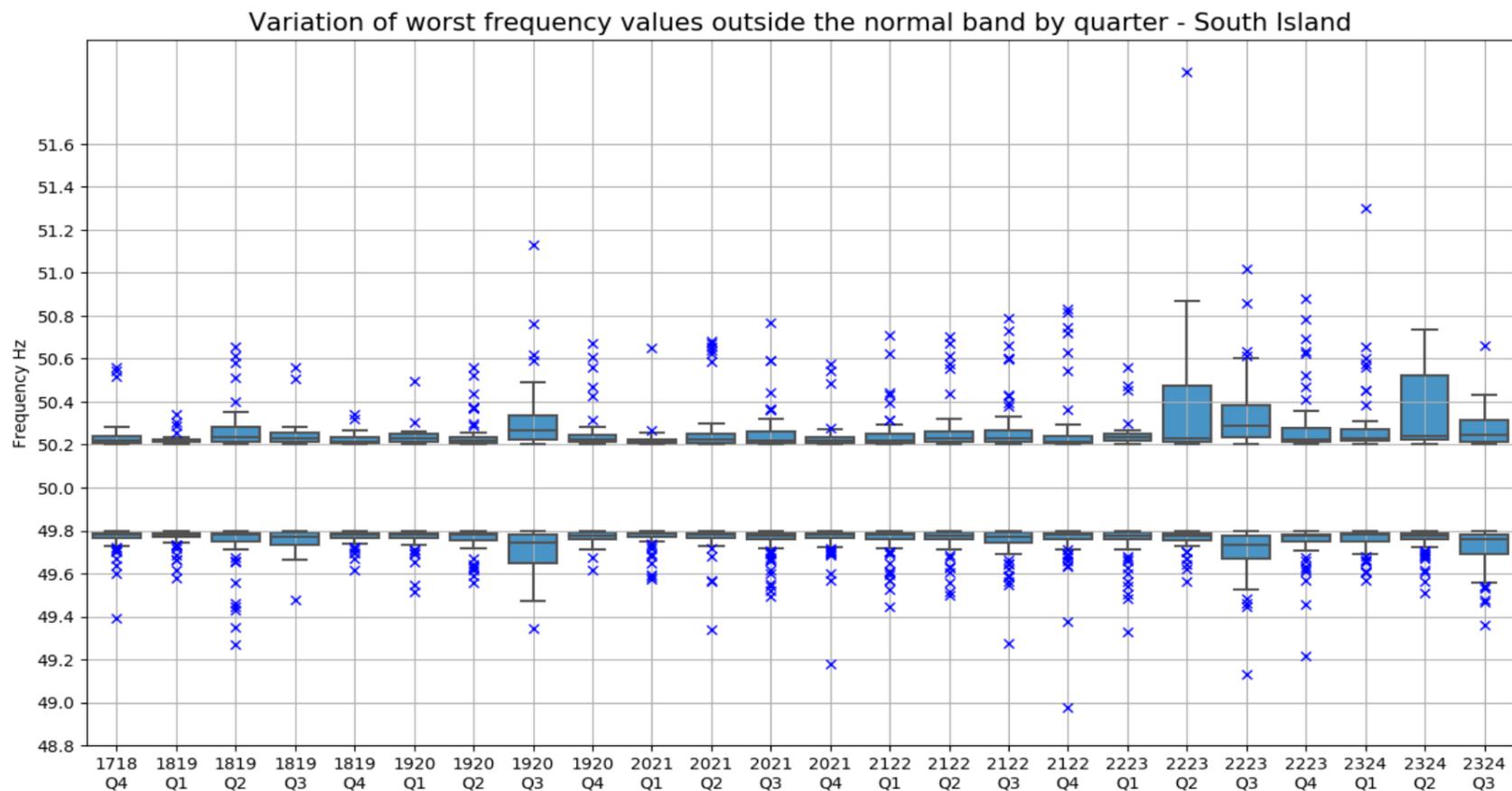
2.1 Maintain frequency in normal band (Frequency value)

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 ± 0.5 Hz of the normal band this quarter:

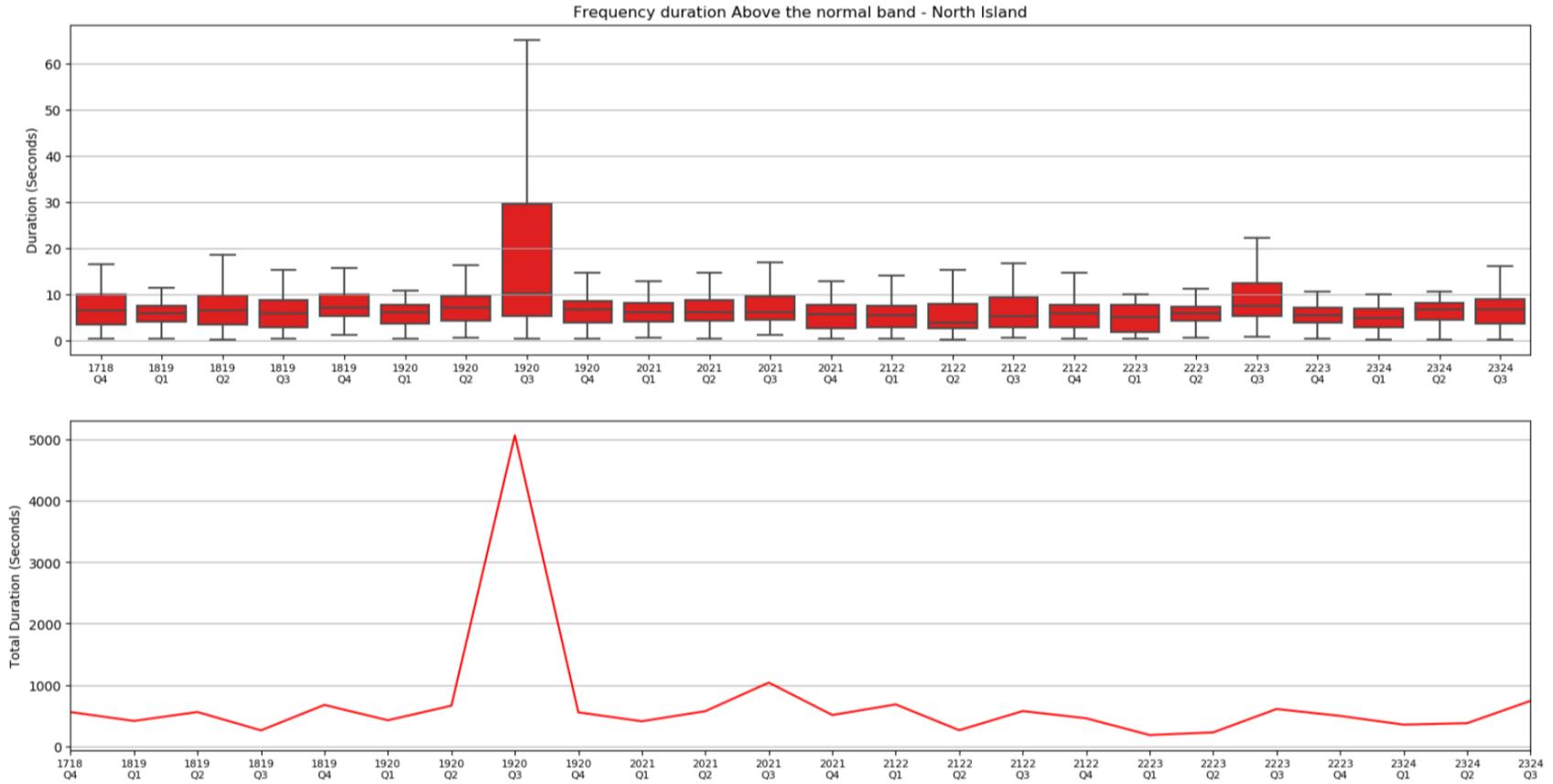
	Above	Below
January	TWI Potline (s) – 27/1	
February		
March		TWI Potline (S) – 3/3, HVDC Pole 3 Shutdown (south flow) – 10/3, HLY generation tripping (N/S) – 14/3

Recover quickly from a fluctuation (Time)

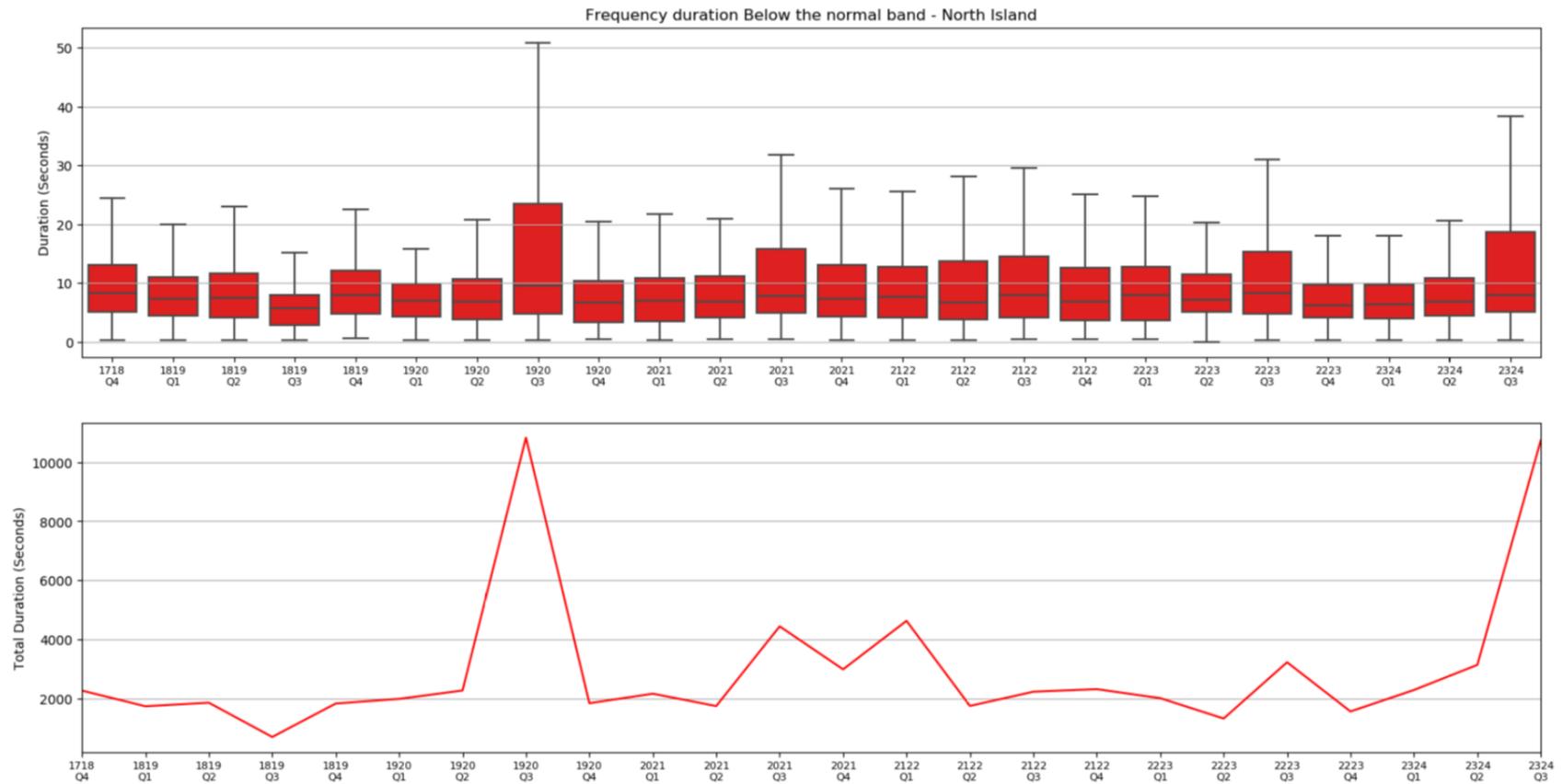
The following charts show the median and total duration of all the momentary fluctuations above and below the normal band for each island. The information is shown as a 4-quarter rolling average to illustrate trends in the data.

North Island

Above the normal band



Below the normal band

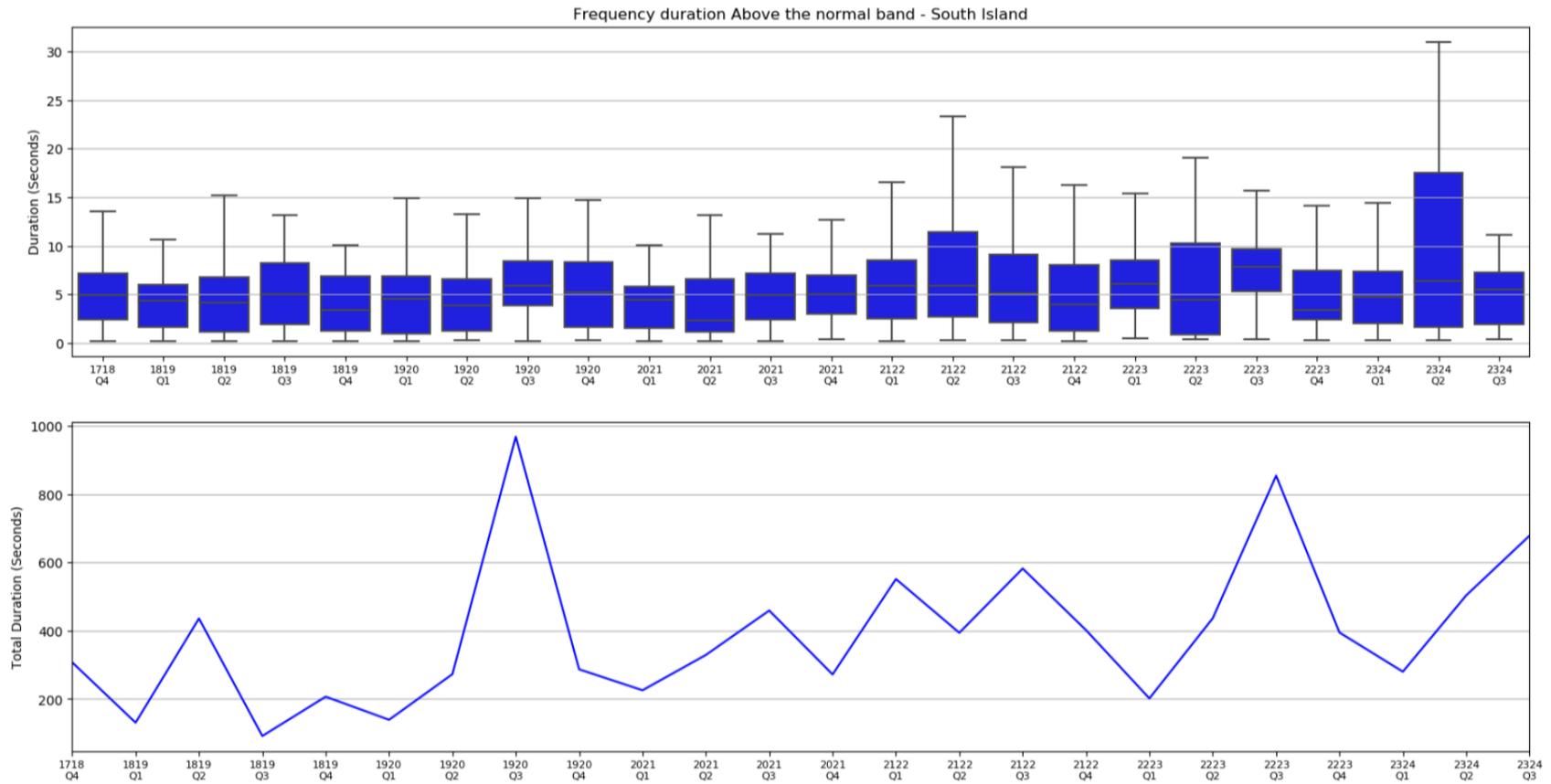


Excursions ± 0.5 Hz of the normal band this quarter:

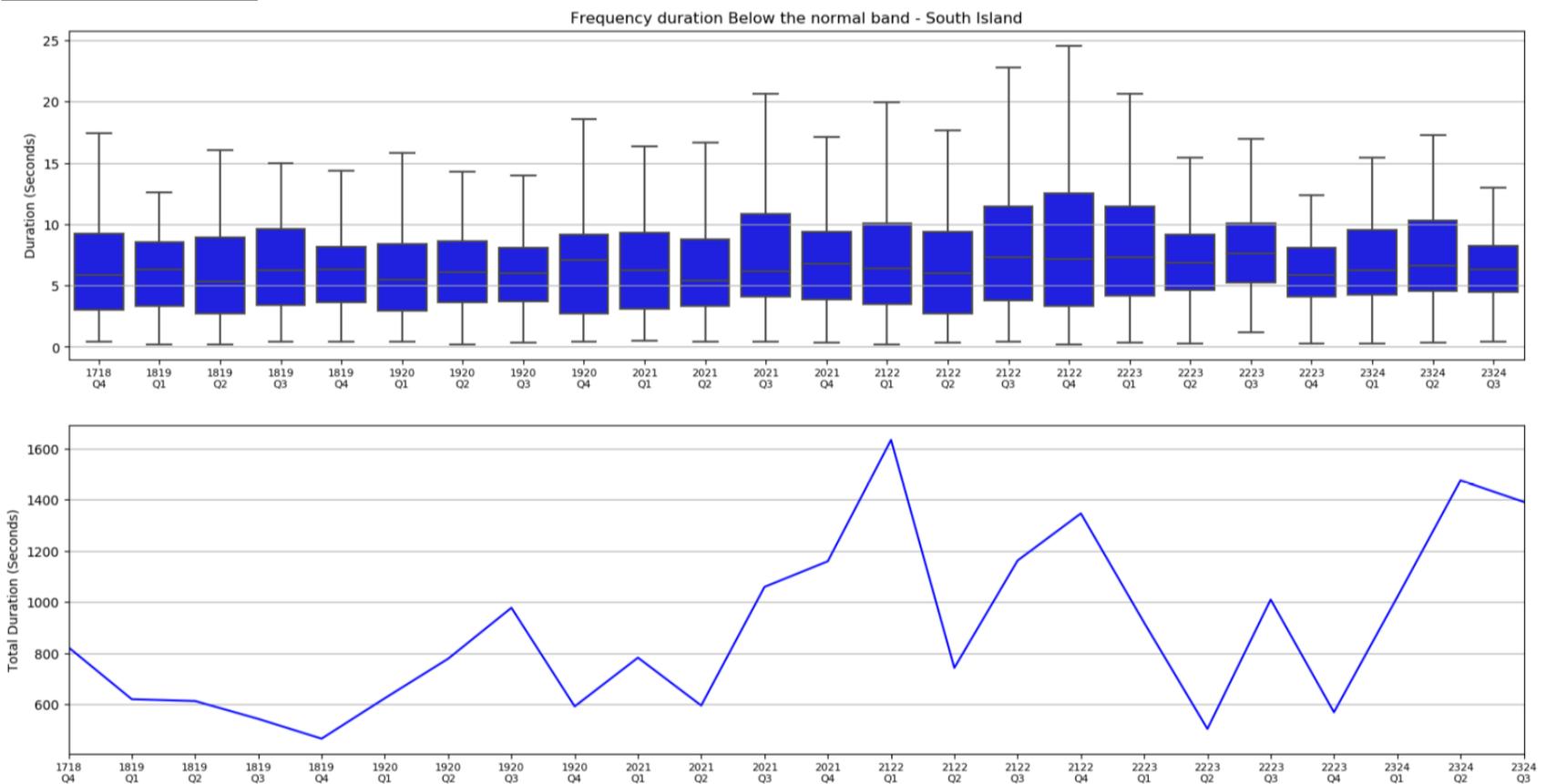
	Above	Below
January	TWI Potline (s) – 27/1	
February		
March		TWI Potline (S) – 3/3, HVDC Pole 3 Shutdown (south flow) – 10/3, HLY generation tripping (N/S) – 14/3

South Island

Above the normal band



Below the normal band



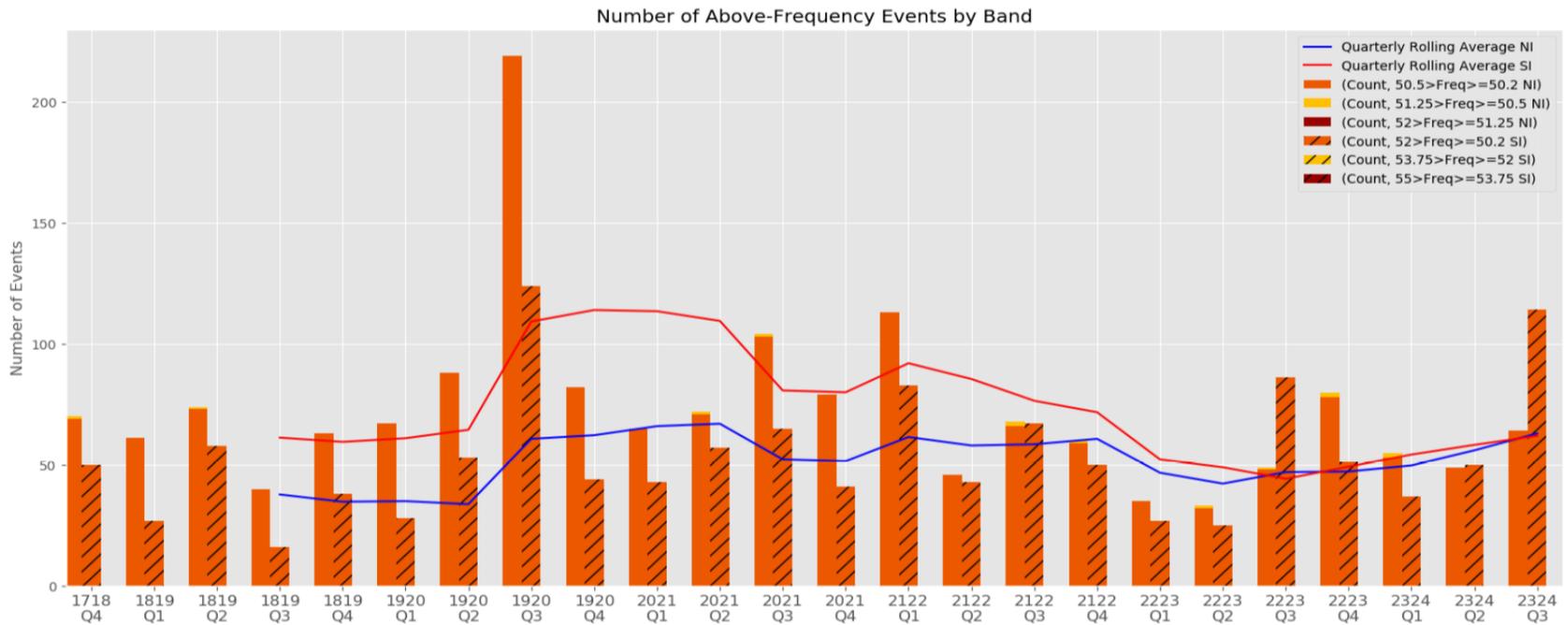
Excursions ± 0.5 Hz of the normal band this quarter:

	Above	Below
January	TWI Potline (s) – 27/1	
February		
March		TWI Potline (S) – 3/3, HVDC Pole 3 Shutdown (south flow) – 10/3, HLY generation tripping (N/S) – 14/3

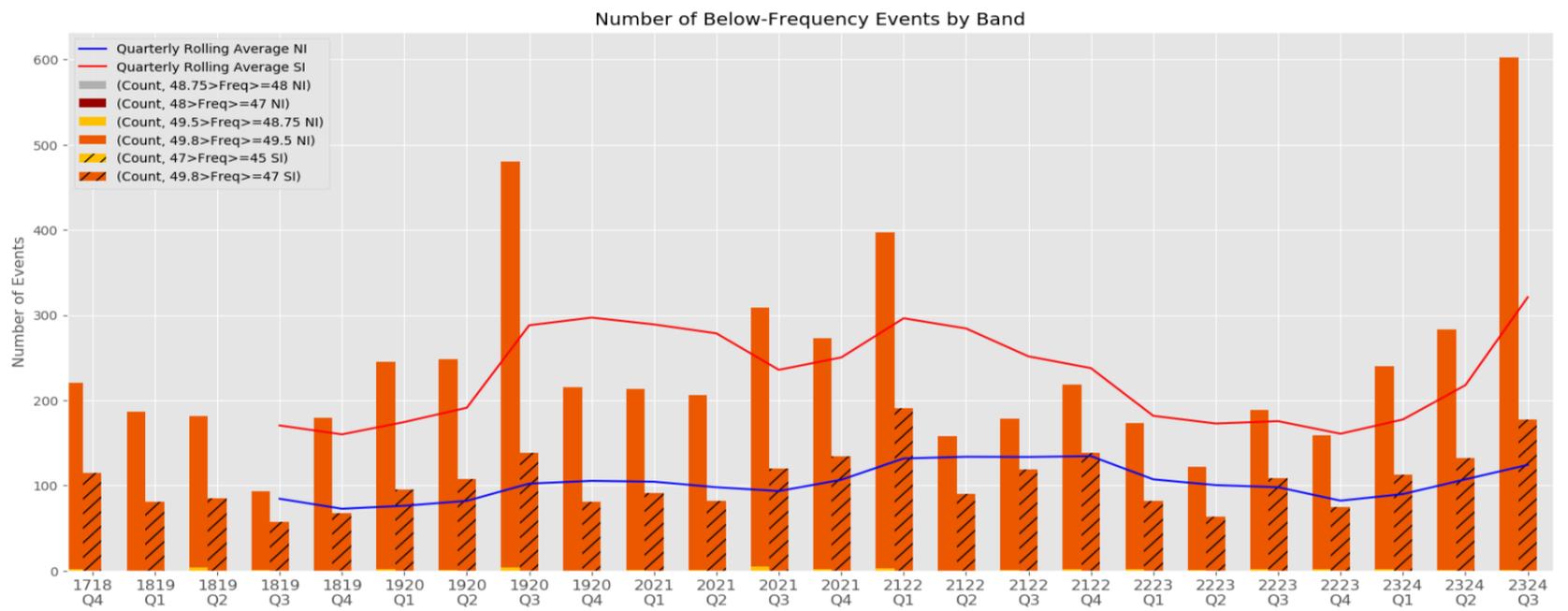
2.2 Manage frequency and limit rate of occurrences during momentary fluctuations (Number)

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 ± 0.5 Hz of the normal band this quarter:

	Above	Below
January	TWI Potline (s) – 27/1	
February		
March		TWI Potline (S) – 3/3, HVDC Pole 3 Shutdown (south flow) – 10/3, HLY generation tripping (N/S) – 14/3

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
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
2024					
Jan	0	0	0	0	0
Feb	0	0	0	0	0
Mar	0	0	1	0	0

South Island	55 > x ≥ 53.75	53.75 > x ≥ 52	52 > x ≥ 51.25	51.25 > x ≥ 50.5	49.5 > x ≥ 48.75	48.75 > x ≥ 48	48 > x ≥ 47	47 > x ≥ 45
2023								
Jan	0	0	0	0	1	0	0	0
Feb	0	0	0	0	0	0	0	0
Mar	0	0	0	1	1	0	0	0
Apr	0	0	0	1	0	0	0	0
May	0	0	0	0	0	0	0	0
Jun	0	0	0	1	2	0	0	0
Jul	0	0	0	1	2	0	0	0
Aug	0	0	0	1	0	0	0	0
Sep	0	0	0	0	0	0	0	0
Oct	0	0	0	0	0	0	0	0
Nov	0	0	0	0	0	0	0	0
Dec	0	0	0	0	1	0	0	0
2024								
Jan	0	0	0	0	0	0	0	0
Feb	0	0	0	0	0	0	0	0
Mar	0	0	0	0	1	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	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-
Warning Notice	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer Advice Notice	11	4	14	12	9	11	12	10	15	10	12	7	1	10	9

4 Grid emergencies

The following table shows grid emergencies declared by the System Operator January to March 2024.

Date	Time	Summary Details	Island
		None this quarter	