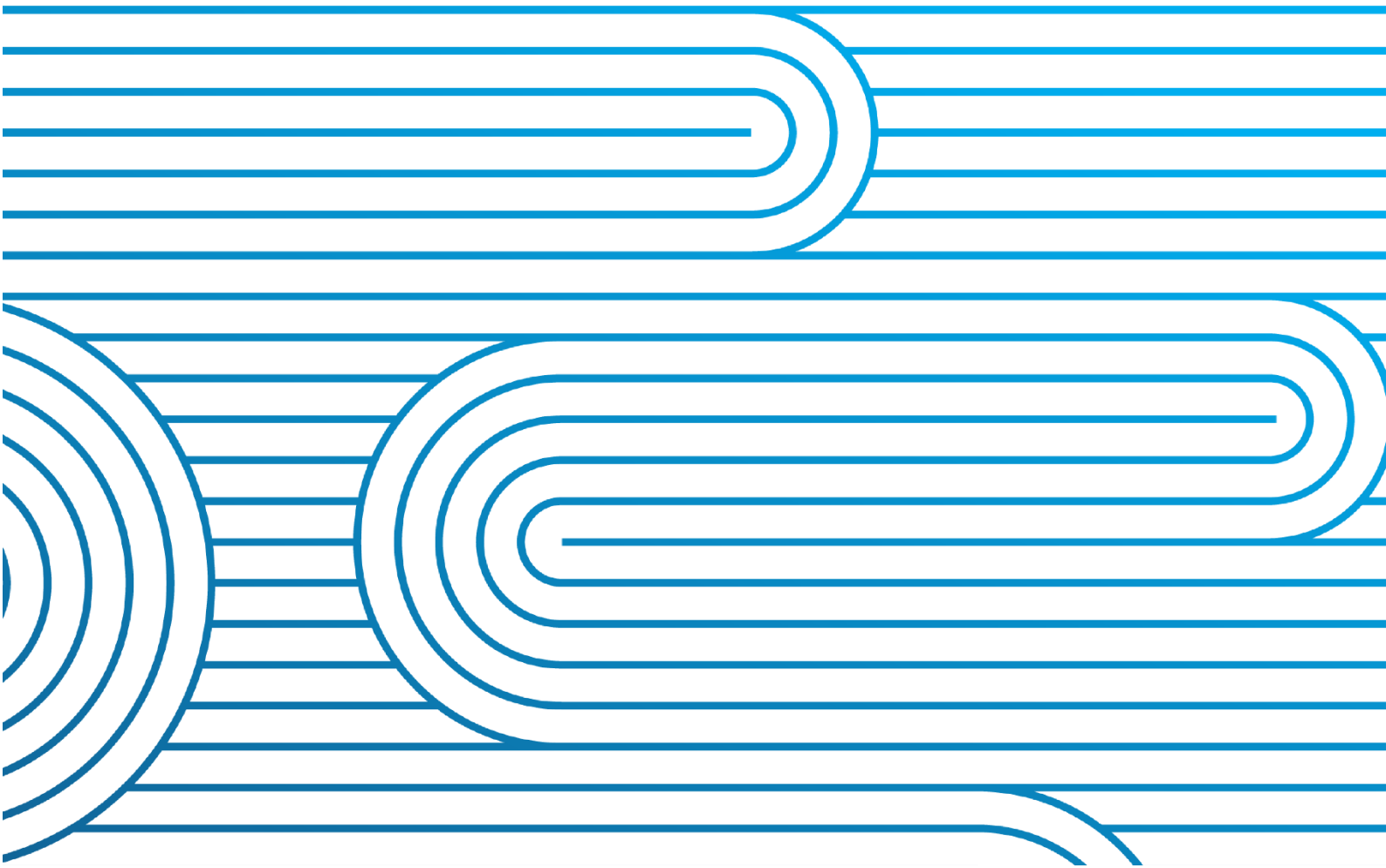
TRANSPOWER

Monthly System Operator and system performance report

for the Electricity Authority

April 2022



Report Purpose

This report is Transpower's review of its performance as System Operator for April 2022, in accordance with clause 3.14 of the Electricity Industry Participation Code 2010 (the Code).

A detailed system performance report (Code obligated) is provided for the information of the Electricity Authority (Authority).

Contents

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System Operator performance

1 Highlights this month

- Planning is underway for the industry exercise simulating a generation shortfall which will be held on 26 May 2022. This was a recommendation following investigations into the August 9 event.
- All business assurance audits for 21/22 are tracking to plan. A meeting has been arranged in early May with the Authority to talk through the process for agreeing the 22/23 audit plan.
- On 13 April we delivered two information sessions to industry on the draft phase 2 FSR roadmap. In parallel, via the Authority, we are seeking written feedback on these sessions, for which submissions close 10 May 2022.
- Following re-forecasting activity, the Real Time Pricing project is forecasting need for additional budget and the requirement for an extension to some milestone dates. Change request RTP CR007 was submitted to the Electricity Authority to request acceptance of these changes and was declined. A subsequent change request is now being drafted by the project team as requested by the Authority.
- Transpower has engaged IBM to provide consultancy services and support to develop an Operational Excellence roadmap. Recommendations arising from investigations into the 9 August generation shortfall event have been included in the scope of this work, along with resource planning, training and support, continuous improvement, and assurance for critical processes.
- We published two assessments covering a potential North Island generation shortfall (3 May) and voltage stability issues during an Islington-Livingstone outage (9 -13 May).
- Several N-1-G shortfalls are forecast across late-June to mid-August, and one N-1 shortfall is forecast for 26 July. The forecast for the next 6 months shows a total of 29 N-1-G shortfalls, caused by high anticipated demand and several generation outages in both the North and South Island.
- We have been managing regional voltage stability and thermal security issues in Southland during extreme operating conditions in the region. The resulting security issues required careful management by the coordination centre, forward assessments by planning teams and coordination with the grid owner and participants. Conditions improved in the last week of April.
- We have received feedback from our consultation on changes to the SOSFIP and Emergency Management Policy (EMP). Our next steps are to engage with and make recommendations to the Authority.
- National hydro storage is below average, at 83% of average for the time of year; hovering around the 90th percentile of historic ranges. La Niña conditions continue to dominate weather patterns and are expected to continue through May, June and July.
- We have sought an interpretation of the Code on when distribution connected generation must support power system voltage for the system operator. This relates to challenges we are facing as larger generation units (who support frequency) are potentially displaced by smaller units (pipeline connections, who do not have the obligation to assist with this).

2 Customers and other relationships

KPI refresh

The internal aspect of the KPI refresh project continues to make positive progress. We are taking the database of measures, brainstormed with input from across all teams, and are using this to select measures for the two pilot areas. In the next six weeks we will develop draft KPIs for the areas of system events and change delivery. These draft KPIs will be trialled through the next financial year.

In parallel, we have started working on the external-facing aspect of the KPI refresh with the Authority. In this work, we will collaboratively develop and test external measures which provide value in reporting our performance of outcomes for their role as regulator. These measures will be presented at the June EA SOC meeting for approval. This will also provide the input into the interim measures we use in 2022/23 to measure System Operator performance in some of the areas of system operations which the current performance metrics do not cover.

3 Risk & Assurance

COVID-19

We are continuing to experience a rolling impact with individuals impacted over the month by COVID-19 and we have been calling on operators who are close household contacts to positive cases but are RAT testing negative to work shifts under our exemption as a critical service. There is an MBIE process established for using positive asymptomatic operators as a last resort; we have not had to call on this process over the last month.

Control Rooms are progressively reducing restrictions for entry. Transpower colleagues and other visitors with legitimate business reasons can now arrange access to control rooms with local Operations Managers, provided they are wearing a mask and limit the amount of time spent in the area. We are conscious a new strain could require us to reinstate controls and are closely monitoring risk to business continuity.

9 August generation shortfall event

Planning is underway for the industry exercise simulating a generation shortfall which will be held on 26 May 2022. This was a recommendation following investigations into the August 9 event, and will include representation from across the industry and be observed by stakeholders.

We continue to progress and report to our stakeholders on other agreed recommendations from the various independent investigations into the events of 9 August 2021

Business Assurance audits

All business assurance audits for 21/22 are tracking to plan. A meeting has been arranged in early May with the Authority to talk through the process for agreeing the 22/23 audit plan.

Corporate Risk & Assurance have commenced discussions with Deloitte on the scope of the 2021/22 independence threat review with focus on outage coordination.

The annual audit of Scheduling, Pricing, Dispatch (SPD) and the Reserve Management Tool (RMT) was completed by Robinson Bowmaker Paul and delivered to the Authority. No findings or recommendations were noted by RBP (a clean audit result).

4 Compliance

We reported no new System Operator breaches in this reporting period.

We continue to work closely with the Authority on the 9th August breach investigation, which has now been referred to the Rulings Panel.

We have 15 outstanding breaches with the Authority compliance team, covering the period June 2020 to current date.

5 Impartiality of Transpower roles

We have six open items in the Conflict of Interest Register (below). These are being actively managed in accordance with our Conflict of Interest Procedure.

System Operator Open Conflict of Interest Issues		
ID	Title	Managed by
29	**Preparing the Net Benefit test – System Operator involvement:** The System Operator is reviewing how it can provide information for use by the grid owner undertaking a Net Benefit Test.	Operations Planning Manager
31	**Discussions concerning Demand Response:** A System Operator employee is part of a Transpower working group investigating the possible future use of the Transpower demand response platform. The System Operator role is to provide the System Operator perspective on any demand response proposals. Impartiality mitigations have been implemented to ensure the grid owner is not treated more favourably than any other participant with respect to demand response.	SO Market and Business Manager
39	**SO Compliance & Impartiality Manager:** This relates to potential perception and is a role reporting to GM Operations.	GM Operations
40	**General System Operator/Grid Owner dual roles:** This is a general item that will remain permanently open to cover all employees with a dual System Operator/grid owner role. The item documents the actions necessary to ensure impartiality in these circumstances; these items will be monitored to ensure their continue effectiveness.	SO Compliance & Impartiality Manager
41	**General relationship situation:** This is a general item that will remain permanently open to cover all potential conflicts of interest arising under a relationship situation. This item documents the actions necessary to prevent an actual conflict arising and will be monitored by the SO Compliance & Impartiality Manager to ensure their continued effectiveness.	SO Compliance & Impartiality Manager
42	**Mercury KPO upgrade:** The Power Systems Engineer assigned to manage the KPO upgrade previously worked at Mercury. The employee will provide input into the commissioning/testing documentation and will prepare the final compliance documentation for SO sign-off. Controls have been implemented, including management oversight and sign-off of all commissioning/testing documentation.	Power Systems Engineering Assurance Manager

6 Project updates

6.1 Market design and service enhancement project updates

Progress against high value, in-flight market design, service enhancement and service maintenance projects are included below along with details of any variances from the current capex plan.

Future Security and Resilience (FSR) Programme

On 13 April we delivered two information sessions to industry on the draft phase 2 FSR roadmap. In parallel, via the Authority, we are seeking written feedback on these sessions, for which submissions close 10 May 2022. When submissions have been assessed a final roadmap will be produced which will mark the conclusion of Phases 1 and 2.

The Authority has provided a high-level indication of 1 FTE of funding for phase 3 FSR in FY23, which is approximately one quarter of the initial estimated resource requirements for FY23 work outlined in the phase 2 FSR roadmap. Dialogue with the Authority to confirm the scope to be delivered and the impact on both the roadmap and ability for the System Operator to meet future principle performance objectives in underway. The delivery of the next stages of FSR (phase 3) have been incorporated into the Transpower big rock 'Electricity system operations of the future'.

Real-Time Pricing (RTP)

Phase 2 of this project was successfully deployed into production on 24 March 2022 with no defects raised post-deployment.

Following re-forecasting activity, the Real Time Pricing project is forecasting need for additional budget and the requirement for an extension to some milestones. Change request RTP CR007 was submitted to the Electricity Authority requesting to increase the total approved budget from $17.6m to $19.32m, the re-allocation of some scope from phase 3 to phase 4, and that phase 4 deployment moves from 6 February to 20 April 2023. At the Authority RTP Steering Committee on the 14 April 2022 the Authority declined the change request (CR007), wanting to defer the approval escalation of additional budget to the board to July/August, once the actual expenditure exceeds a threshold closer to the currently agreed budget. The Authority have requested a subsequent change request to be provided to approve changes to project milestones and scope phasing.

Operational Excellence

Transpower has engaged IBM to provide consultancy services and support to develop an Operational Excellence roadmap. Recommendations arising from investigations into the 9 August generation shortfall event, have been included in the scope along with resource planning, training and support, continuous improvement, and assurance for critical processes.

Deliverables are expected to include:

1. Identification and review of our critical processes and training, including global best practice consideration.

2. Recommendation of a governance framework to govern critical processes, training processes, assurance processes and resource planning processes.
3. Development of a prioritised operational excellence roadmap to address opportunities identified.
4. Identify and document recommended approaches to change management and any other risks that may represent barriers to a successful implementation of the operational excellence roadmap.

The scope is currently being defined through a series of discovery workshops led by a combined IBM/Transpower project team. Relevant findings and recommendations will be shared as part of our regular reporting.

Industry consultation on the Security of Supply Forecasting and Information Policy (SOSFIP)

We have received feedback from our consultation on changes to the SOSFIP and Emergency Management Policy (EMP). Our next steps are to engage with and make recommendations to the Authority.

This consultation follows the MartinJenkins 2021 dry year review, and proposes to:

- Treat demand response for electricity and gas equally in the modelling by requiring evidence of formal contracts to support assumptions
- Publish risk curves but not "status" curves to avoid current industry confusion caused by publishing two sets of curves, requiring a medium probability demand forecast be used in the analysis
- Make other minor clarifications in terminology and triggers for daily reporting.

7 Technical advisory hours and services

Technical advisory hours and a summary of all technical advisory services (TAS) to which those hours related (SOSPA 12.3 (d) refers) will be provided in the next quarterly report.

8 Outage planning and coordination

Outage planning – near real time

Outage numbers were high in April, with dips covering public holiday periods. Our information shows a reduction in outages as we approach colder weather and anticipate higher peak demands.

We published two assessments covering a potential North Island generation shortfall (3 May) and voltage stability issues during an Islington-Livingstone outage (9 -13 May). In real-time we saw sufficient margins for 3 May, and at the time of writing the Islington-Livingstone outages are also progressing with carefully managed load, generation and voltage management.

We have published an updated Southland import stability constraint and a new constraint to cover a Kawerau T12 outage.

New Zealand Generation Balance (NZGB) analysis

There are significant changes to the generation balance since the last report, with several N-1-G shortfalls now across late-June to mid-August, and a N-1 shortfall on 26 July.

The forecast for the next 6 months shows a total of 29 N-1-G shortfalls, caused by high anticipated demand and several generation outages in both the North and South Island. Last year's record peaks demands are contributing to the June to August data, as are some generation outages, but particularly the tentative outage of Contact's Taranaki Combined Cycle unit during July and August. Whilst these shortfalls assume 'worst-case' peak loads, we will continue to provide information on these and provide assessments to industry as we approach these periods.

Southland low hydro coordination

In the last two months we have been managing regional voltage stability and thermal security issues in Southland during extreme operating conditions in the region. Lake Manapouri and Lake Te Anau dropped into their low operating ranges in April, resulting in unusually low generation from Manapouri – which dropped to 0 MW at times in early April. The resulting security issues required careful management by the coordination centre, forward assessments by planning teams and coordination with the grid owner and participants. The security issues required a request for an urgent grid reconfiguration, development of constraints, advice and coordination of outages, and communication with participants and stakeholders. Conditions improved in the last week of the month following increased inflows, enabling us to advise the grid owner that the grid reconfiguration was no longer required and wind back our assessment workloads. We continue to monitor the situation.

9 Power systems investigations and reporting

No items to report.

10 Performance metrics and monitoring

System Operator performance against the performance metrics for the financial year as required by SOSPA 12.3 (a) will be provided in the next quarterly report.

11 Cost-of-services reporting

The cost of services reporting for 2020/21 was delivered to the Authority on 22 December 2021. The next cost of services reporting, for 2021/22 will be delivered to the Authority before the end of 2022.

12 Actions taken

A full list of actions taken regarding the System Operator business plan, statutory objective work plan, participant survey responses and any remedial plan, as required by SOSPA 12.3 (b) will be provided in the next quarterly report.

System performance

13 Security of supply

National hydro storage is below average, at 83% of average for the time of year; hovering around the 90th percentile of historic ranges. La Niña conditions continue to dominate weather patterns and are expected to continue through May, June and July.

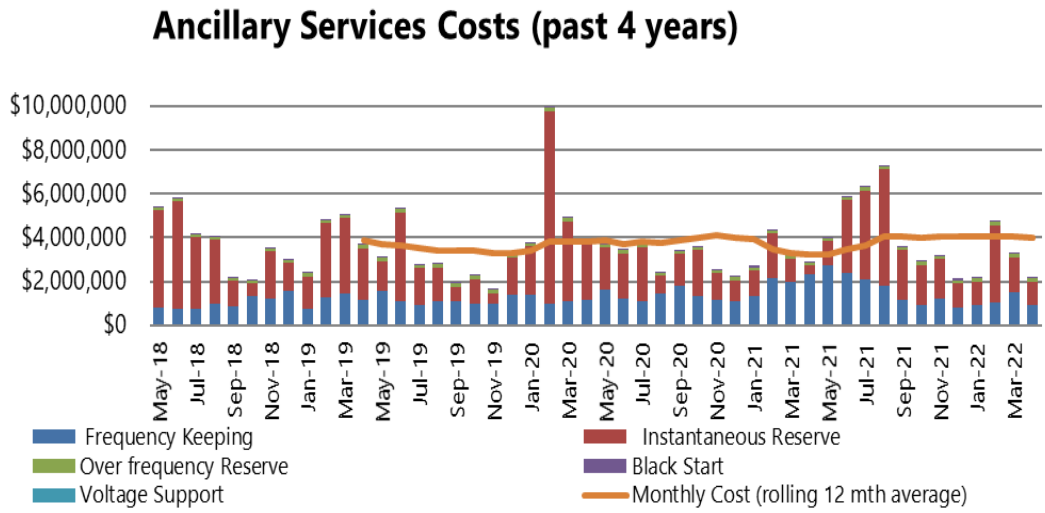
Lower South Island lakes have recovered from the low levels that saw generation reduced from both Manapōuri and Te Anau in early April. Lake levels are now comfortably within their main operating ranges, following a steady run of small inflow events.

A planned outage of the Maui gas production facility is expected to take place from 10 May to 10 June 2022. Following this we expect a material increase in gas production.

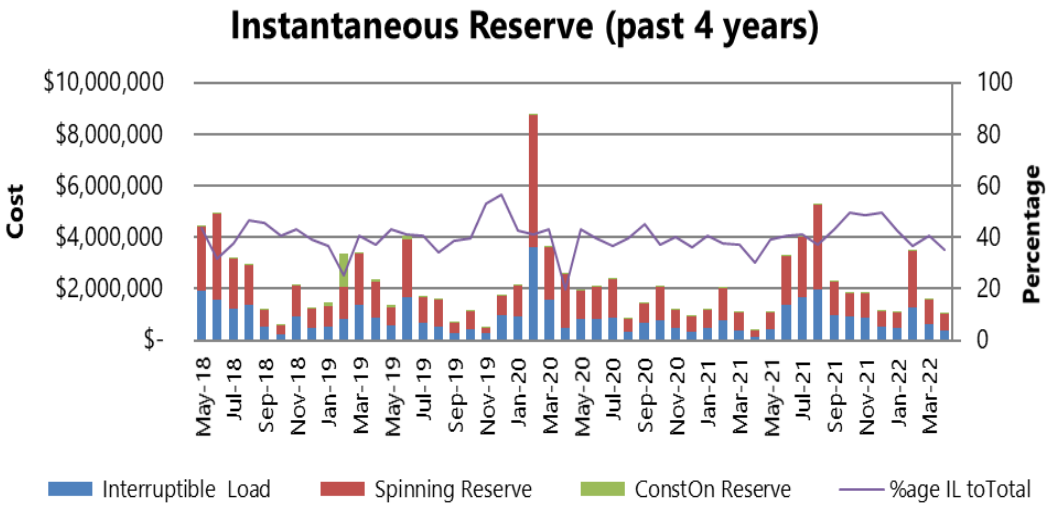
TCC has experienced an issue limiting its running hours in closed cycle mode to 2000 hours. A 5 week outage will take place from 17 July to 21 August to fix the issue, however this will leave a 400 hour gap between now and 17 July were TCC may only be able to run in open cycle mode at a capacity of approximately 100 MW.

Prices continue to sit around $200/MWh underpinned by low hydrology, and upward pressure on thermal fuels and carbon.

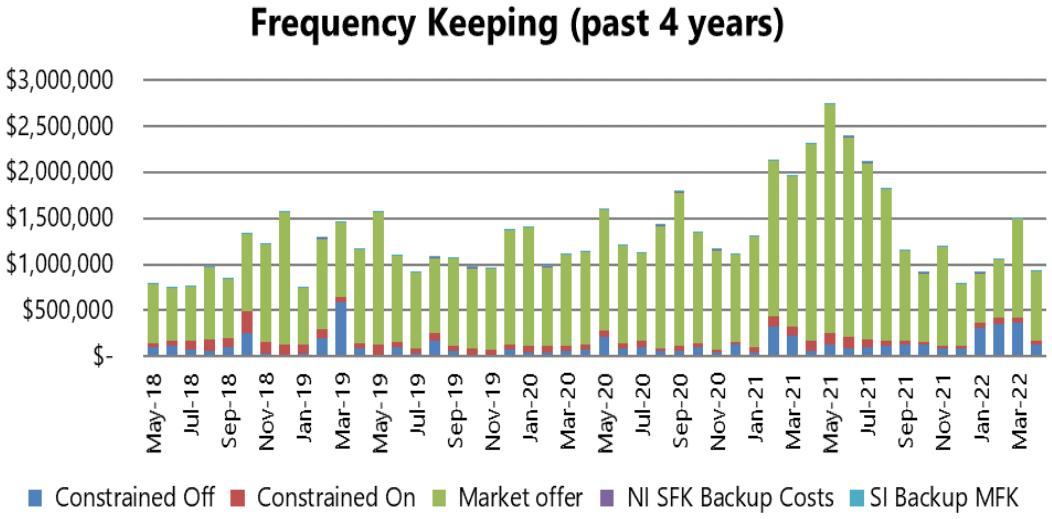
14 Ancillary services



This month's ancillary services costs were $2.20 million, a decrease of $1.13 million (34% decrease) from the previous month. Continuing the trend from last month, both instantaneous reserves and frequency keeping costs have decreased compared to the previous month; instantaneous reserves costs have decreased by $553k (35% decrease) while frequency keeping costs decreased by $574k (38% decrease).

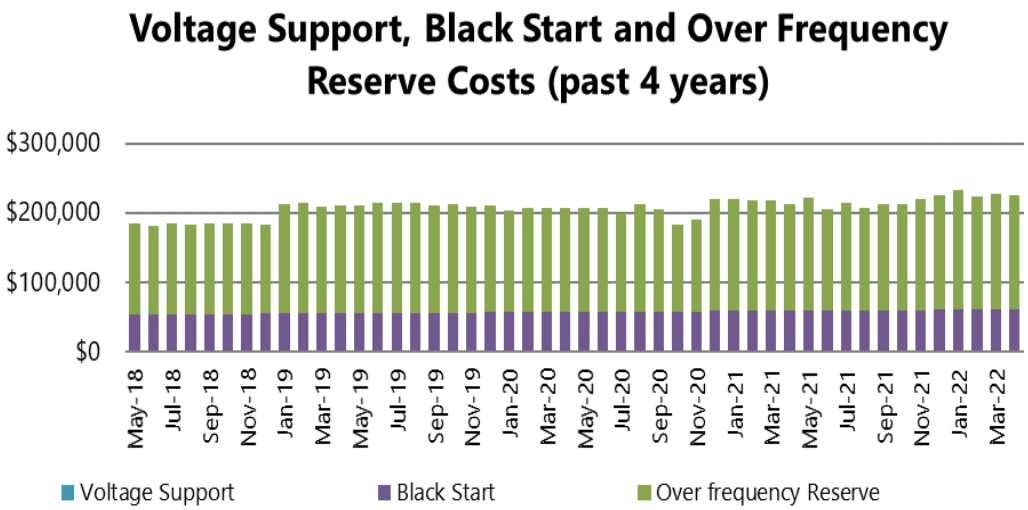


This month's instantaneous reserve costs were $1.04 million, a decrease of $553k (35% decrease). Overall quantities of both fast and sustained reserves were higher than the previous month in the South Island while both fast and sustained reserves were lower in the North Island. The average prices per megawatt of North Island and South Island reserves were all lower than the previous month, the average price of sustained reserves more than halved.



This month's frequency keeping costs were $930k, a decrease of $574k on the previous month (38% decrease). North Island frequency keeping costs decreased by $390k ($42%) and South Island frequency keeping costs decreased by $183k (32%).

Constrained off costs decreased by $230k (64% decrease) and the constrained on costs decreased by $28k (43% decrease). Previously high constrained off costs were the result of high energy prices paid to stations providing frequency keeping.



Over frequency decreased slightly this month to $164k as there were less South Island over frequency reserves available. Black start costs remained at $62k this month. There are currently no voltage support costs.

15 Commissioning and Testing

We have sought an interpretation of the Code around when distribution connected generation must support power system voltage for the system operator. We have also advised the Authority of challenges we are facing now that larger generation units who have previously supported frequency have the potential to be displaced by smaller units (looking to connect) who do not have the same obligations to assist with this.

16 Operational and system events

Southland Low Generation

In the last two months we have been managing regional voltage stability and thermal security issues in Southland as a result of extreme operating conditions in the region, which caused Lake Manapouri and Lake Te Anau to drop into their low operating ranges, and resulted in unusually low generation from Manapouri – at times dropping to 0 MW in early April 2022. Resulting security issues have required careful management by the coordination centre, forward assessments by planning teams and coordination with the Grid Owner and participants. They also required a request for an urgent grid reconfiguration, development of constraints, advice and coordination of outages, and communication with participants and stakeholders.

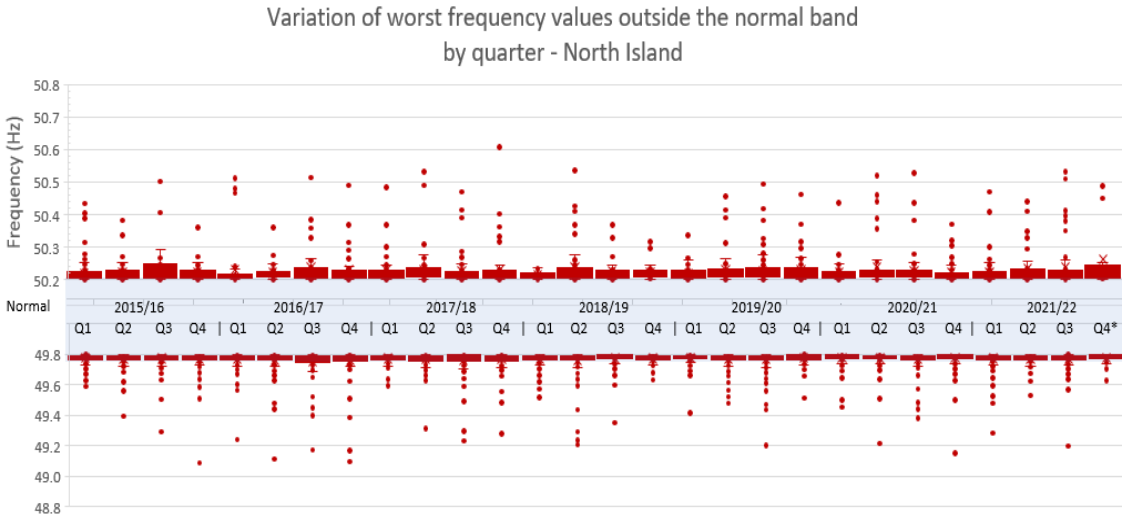
Conditions improved in the last week of April, following increased inflows. This has enabled Transpower to advise the Grid Owner that grid reconfiguration was no longer required, and to wind back assessment workloads. We continue to monitor the situation.

17 Frequency fluctuations

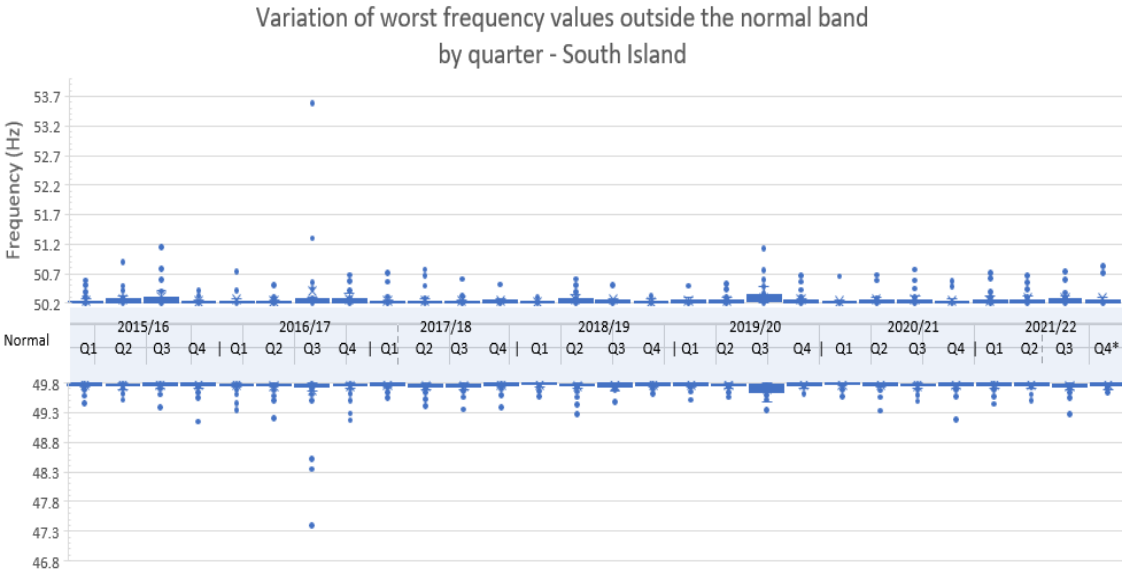
17.1 Maintain frequency in normal band (Frequency value)

The following charts show the distribution of the worst frequency excursion outside the normal band (49.8 to 50.2 Hz) during the reporting period.

North Island



South Island



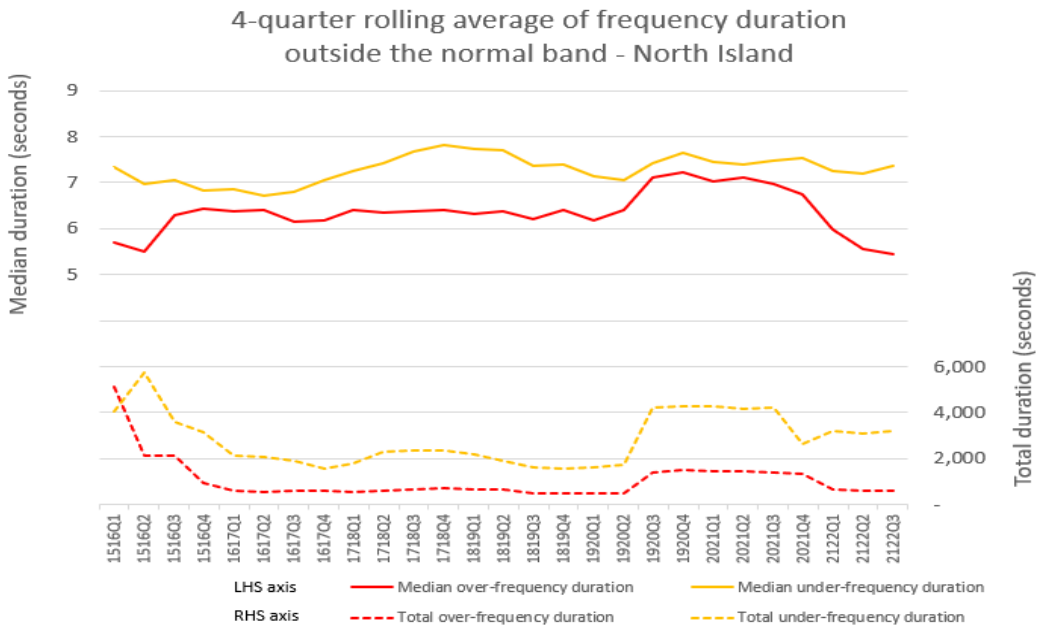
*2021/22 Q4 contains data for April only

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.

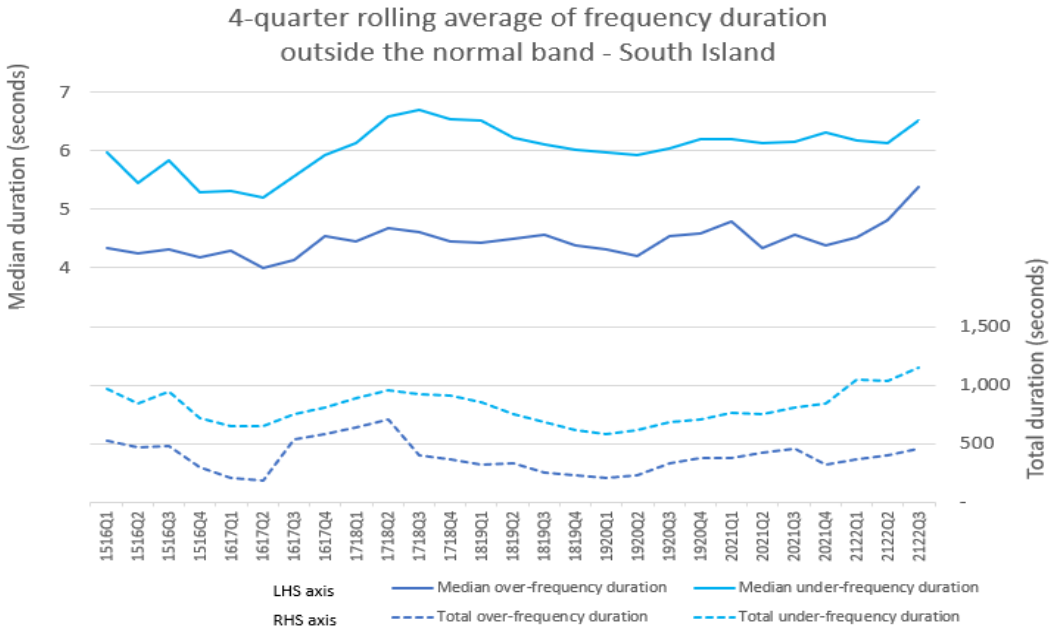
17.2 Recover quickly from a fluctuation (Time)

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



South Island

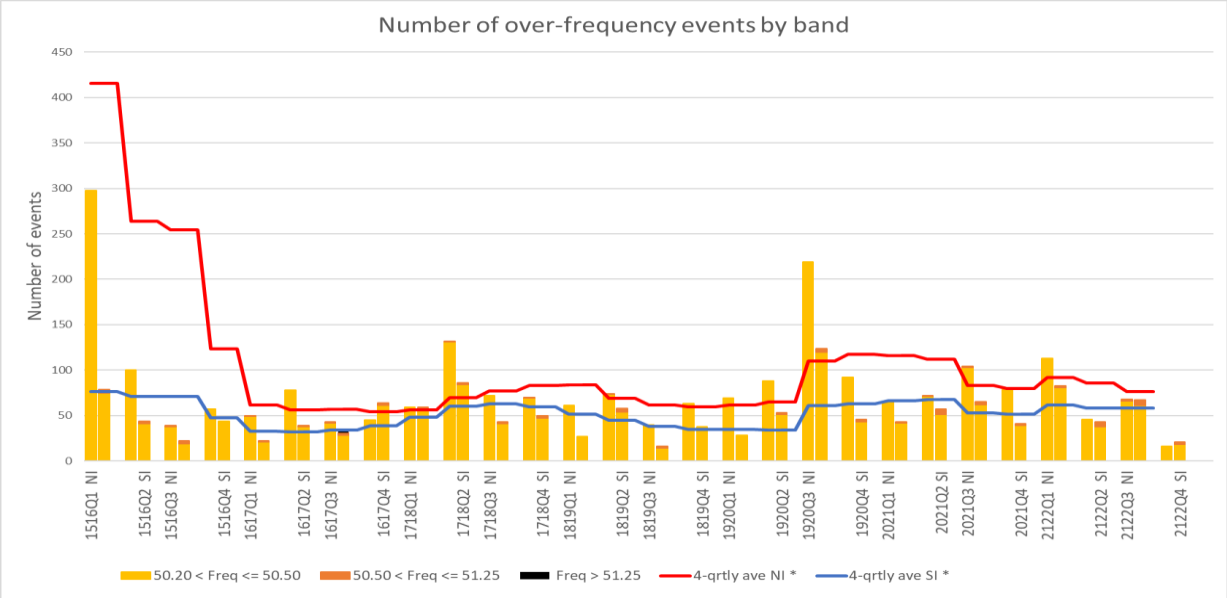


*These graphs have not been updated since 2021/22 Q3; they will only be updated at the end of each quarter

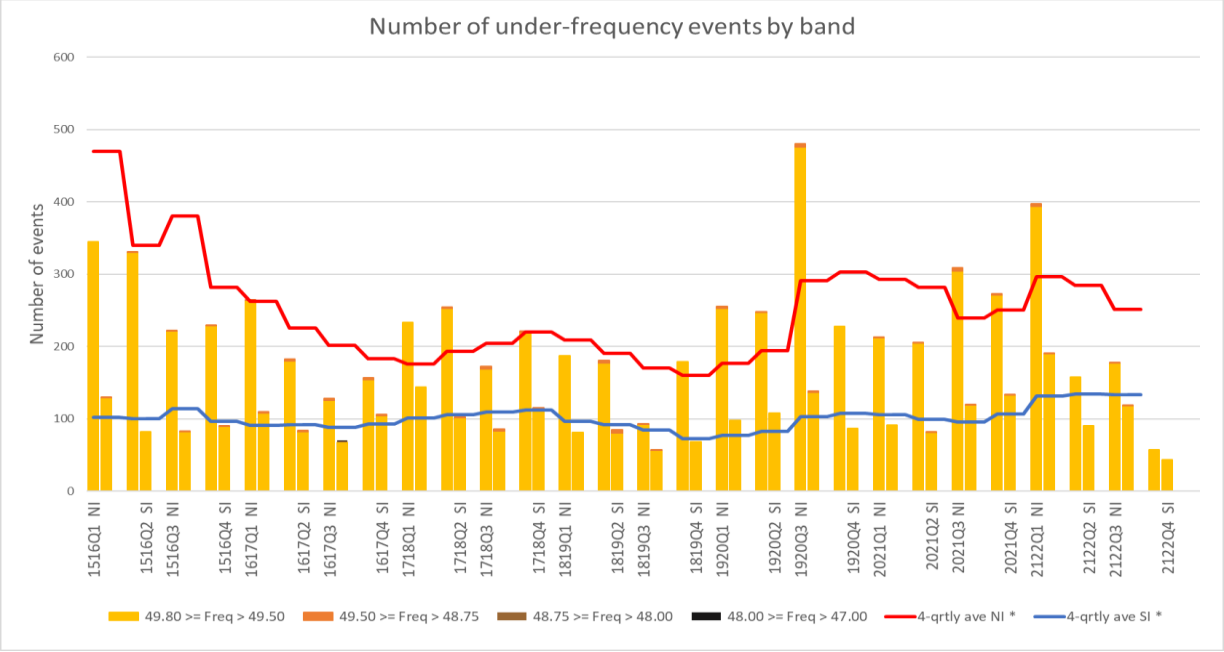
17.3 Manage frequency and limit rate of occurrences during momentary fluctuations (Number)

The following charts show the number of momentary fluctuations outside the frequency normal band, grouped by frequency band, for each quarter since Q1 2015/16. The information is shown by island, including a 4-quarter rolling average to show the prevailing trend.

Over-frequency events



Under-frequency events



* 4-quarterly rolling averages for NI and SI are only updated at the end of each quarter.

17.4 Manage time error and eliminate time error once per day

There were no time error violations in the reporting period.

18 Voltage management

Grid voltages did not exceed the Code voltage ranges during the reporting period.

19 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	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22
Demand Allocation Notice	-	-	-	-	1	-	--	--	-	-	-	-	-
Grid Emergency Notice	-	-	1	-	4	2	--	2	-	-	-	-	-
Warning Notice	-	-	-	1	4	-	--	--	-	-	-	-	-
Customer Advice Notice	8	14	14	11	42	34	9	7	5	7	9	15	14

20 Grid emergencies

None to report.

Appendices

Appendix A: Discretion

Event Date and Time	Description
21/04/2022 11:42	MKE1101 MKE1: MKE generation tripped. Discretioned to zero MW to enable secure dispatch solution. Last Dispatched MW: 83.8