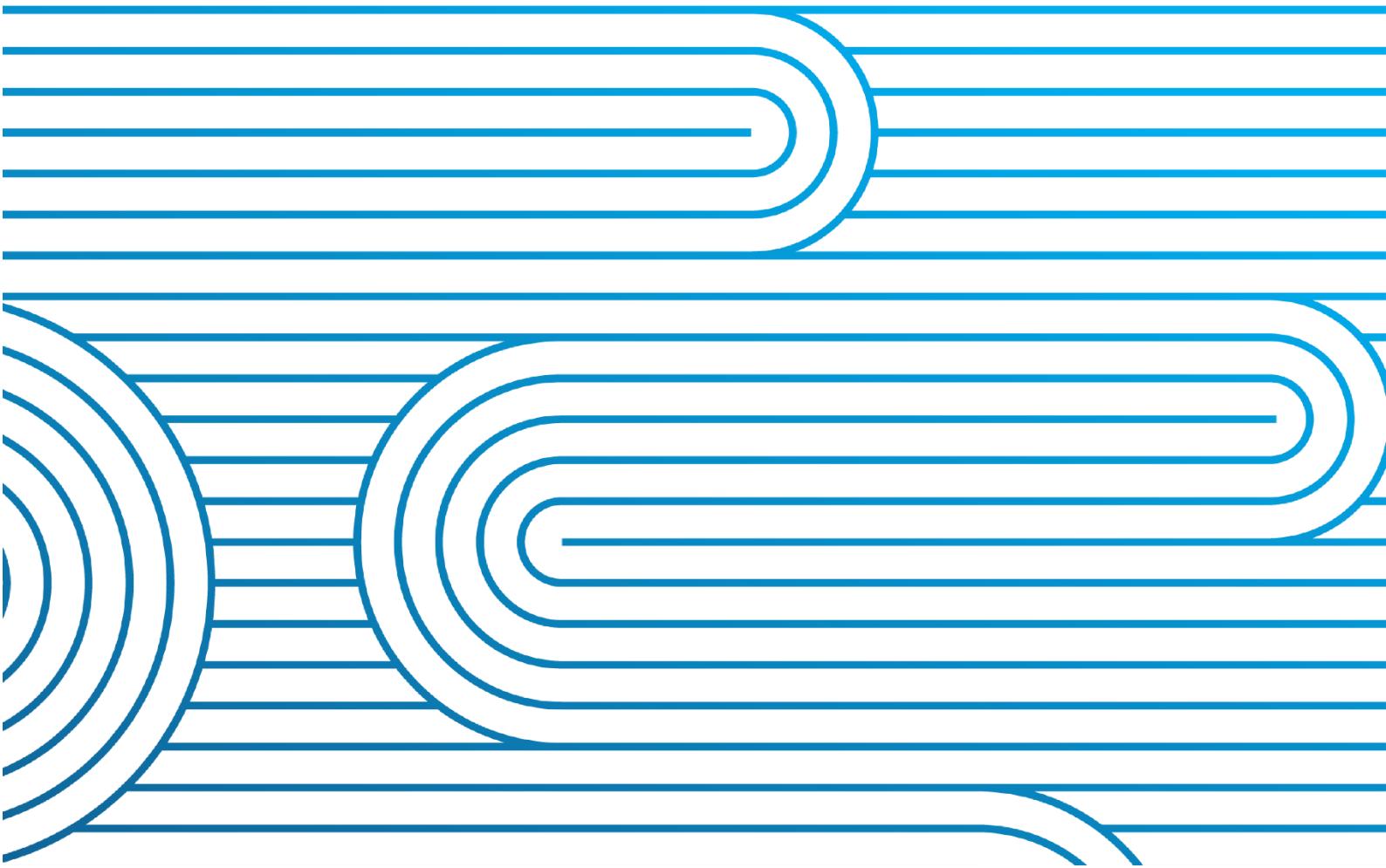
TRANSPOWER

Monthly System Operator and system performance report

for the Electricity Authority

May 2022



Report Purpose

This report is Transpower's review of its performance as System Operator for May 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).

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System Operator performance

1 Highlights this month

- We have worked with Authority staff to develop performance metrics for 22/23 to evaluate our performance in relation to system events, these will be presented in the SOSPA Performance Metrics and Incentives Agreement at a specially convened SOC meeting on 16 June.
- As part of the KPI refresh we are running two trials during 22/33 for the managing events and project delivery pilots that will provide us with information for the full roll-out in 23/24; the trials are on track to start reporting information for the next financial year.
- We gave the new Transpower directors a tour of the Control Room.
- We hosted an industry exercise (Exercise Shortfall) designed to test improved procedures, tools, and communications put in place after the 9 August 2021 event last year, and to identify further opportunities to improve.
- We completed a control self-assessment for the five lowest scoring critical controls identified in our November 2021 results. Two moved from partially effective to fully effective; three remain partially effective.
- The two remaining business assurance audits relating to secondary risk and outage block mapping are tracking to plan for completion by end of June.
- We are on track to agree the 22/23 audit plan with the Authority before the end of June in line with the SOSPA.
- We submitted two system operator self-breaches; neither identified a market impact.
- Feedback has been received from industry on the draft FSR roadmap. Themes were about opportunities needing to be brought forward, clarity on how FSR fits into the broader Authority work programme and ensuring Authority involvement/ownership is clear.
- RTP Phase 3 development is on track to complete by the end of June except for Stand Alone Dispatch (SAD) which will complete in July. The Authority have approved a change request which contains the project milestone and date changes but deferred any request for additional budget until July/August once the actual expenditure is forecast to exceed a threshold closer to the currently agreed budget.
- We have received feedback from the consultation on changes to the SOSFIP and Emergency Management Policy (EMP). We will make our recommendation to the Authority who sign off on any changes (details in the main report).
- La Niña conditions continue to dominate weather patterns and are expected to continue through June and July. However, our modelling shows to cross the risk curves we would need an unprecedented dry sequence or infrastructure breakdown.
- During the Maui outage, Methanex has reduced its consumption by 100 TJ/day matching the drop in production. This has meant gas generation has not been heavily impacted by the outage.
- Contact's TCC outage has been pushed until November, this will allow TCC to run through to the end of August, covering of the bulk of the winter periods where NZGB had highlighted shortfalls. The June NZGB analysis is showing improved generation margins for July and August. However, the report is still showing shortfalls (N-1-G) for the second half of June and July.
- Although outage numbers are dropping as we approach winter, potential shortfalls are driven by outages, but also partly by the record peak demands we saw last year in end June and August.

2 Customers and other relationships

KPI refresh

We are working with the Authority to develop and test measures which provide value in reporting our performance of outcomes for their role as regulator. Metrics for next year have been tentatively agreed and further discussions are ongoing regarding how these are weighted towards incentives. The final, mutually agreed, metrics will be presented in the SOSPA Performance Metrics and Incentives Agreement at a specially convened SOC meeting on 16 June.

In preparation for the full roll-out of the new performance metrics in 23/24, we are running two trials this year for the managing events and project delivery pilots to learn lessons. These trials are on track to start reporting information for the next financial year (22/23).

3 Risk & Assurance

COVID-19

Control Rooms are progressively reducing entry restrictions. Last month, we were able to offer tours for new directors and access to Transpower colleagues and other visitors with legitimate business reasons. We are conscious a new strain could require us to reinstate controls and are closely monitoring risk to business continuity.

Generation shortfall event

On 26 May, we hosted an industry exercise designed to test improved procedures, tools, and communications put in place after the 9 August 2021 event last year, and to identify further opportunities to improve. More than 40 people participated from 20 lines companies and direct-connect customers, along with observers from the Authority, MBIE, and other interested stakeholders.

A debrief with participants, held on 9 June, was regarded as highly successful and worthwhile by all participants. Feedback from participants expressed support for being able to practice operational and communications exercises which gave them a chance to test their internal processes. A report will be provided before the end of June.

Southland low generation

During the last few months, we have been managing regional voltage stability and thermal security issues in Southland during extreme operating conditions in the region. There is no longer a need to manage the situation as hydro storage levels in Southland are now back to their normal ranges, with consistent inflows replenishing generation.

Control self-assessment

A control self-assessment was completed for the five lowest scoring critical controls identified in our November 2021 results. Two critical controls; “change management” and “people management”, moved from partially effective to fully effective. The remaining three controls; “Connected asset & system monitoring”, “Monitoring & evaluate future operating environment” and “Stakeholder management”, remain

partially effective. Management have agreed improvement activities to lift effectiveness, such as:

- addressing procedural gaps relating to performing assessment of Asset Capability Statements.
- establishing a 5-year cyclic review plan in line with the Code and Policy Statement which looks at not only existing credible events but starts to consider other credible events that are being introduced due to the changing generation mix and configuration of the grid.

Business assurance audits

The managing conditional offers audit has been completed with an 'effective' outcome established by the auditor. The audit established two low risk findings for management action relating to developing a definition for a conditional offer and establishing an end-to-end procedure. Two remaining audits relating to secondary risk and outage block mapping are tracking to plan for completion by end of June.

We are on track to agree the 22/23 audit plan with the Authority before the end of June in line with the SOSPA.

4 Compliance

We submitted two system operator self-breaches in this reporting period.

The first related to the incorrect modelling of the NSY_ROX circuit for one trading period in the forward schedules on 14 December 2021. The System Operator had not completed change activities to model the increased rating of the circuit. The error was corrected in real time and there was no market impact.

The second related to the incorrect modelling of circuit breaker LTN CB 212 during the model change process on 3 November 2021 when we incorrectly modelled the circuit breaker as normally open when it should have been modelled as normally closed. The issue was corrected in real time and it only affected two forward schedules with no identified market impact.

There was no correlation between the separate modelling errors. The delays in reporting the self-breaches were due to the ongoing investigations into the modelling errors.

Regarding the 9 August event, the system operator and the Authority sought and obtained directions from the Rulings Panel as follows:

- A directions conference will be set for a date after 15 August 2022.
- In the interests of the efficient and appropriate determination of the proceeding the System Operator and Authority will continue discussions to streamline the issues for determination.
- The System Operator and the Authority held an initial meeting on 8 June.

5 Impartiality of Transpower roles

We closed two items in this reporting period.

- Item 31 related to a System Operator employee participating in a Transpower demand response working group. The employee's participation in this working group has now ended.
- Item 39 related to the SO Compliance and Impartiality role. The Transpower legal team has implemented a Legal Protocol to manage the separate provision of legal advice to the System Operator and the Grid Owner.

We have four 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
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

Feedback has been received from industry on the draft FSR roadmap. Themes from industry feedback were about opportunities needing to be brought forward, clarity on how FSR fits into the broader Authority work programme, and ensuring Authority involvement/ownership is clear (parties are concerned outcomes will be biased towards the system operator). An overview of the feedback was provided by the Authority to the Security and Reliability Council on 1 June.

Responses to the feedback and updates to the roadmap have been developed. These will be tabled with the Authority for its 12 July Board meeting.

Work is ongoing to finalise the scope of works for next financial year.

Real-Time Pricing (RTP)

Phase 3 development is on track to complete by the end of June except for Stand Alone Dispatch (SAD) which will complete in July. Testing is well under way and throughput continues to increase with the challenges of resource turnover in the testing team continuing to be mitigated through upskilling and provision of support. Planning for technical deployment and business change is well progressed.

The Authority have approved change request (CR008) which contains the project milestone and date changes. The Authority have deferred any request for additional budget until July/August once the actual expenditure is forecast to exceed a threshold closer to the currently agreed budget. Our current forecast to complete the project is $19.32m (including risk allowances) compared to an approved budget of $17m.

Operational Excellence

Transpower has engaged IBM to provide consultancy services and support to develop an Operational Excellence roadmap to maintain Grid & Systems Operations Excellence now, and into the future. 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.

The first stage to understand available information was completed in May. The team are now working on Phase 2 of this engagement to determine current state via a series of workshops, interviews and surveys, the analysis of a select number of process documents, and reference to benchmarking material.

The internal governance team has been expanded to include more IST representation as a result of the importance of tools in our processes.

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

We published a consultation on changes to the SOSFIP and Emergency Management Policy (EMP) on 29 March 2022. These are System Operator policy documents incorporated by reference into the Code. They set out how the System Operator prepares for and publishes information regarding national hydro storage, including the Electricity Risk Curves (ERCs) which are the trigger for policy mechanisms such as Official Conservation Campaigns and the Customer Compensation Scheme. This consultation follows the MartinJenkins 2021 dry year review.

Feedback has been received and a recommendation made to the Authority who sign off on any changes. The System Operator recommends that electricity and gas demand response be split into types. Type 1, response that can respond to short term price signals; and type 2, response that requires long lead times to stop and/or start. The System Operator recommends that type 1 response be included in the calculation

of the risk curves at all times; and type 2 is only included if there is a formal arrangement in place.

These changes would have small impact on the Electricity Risk Curve calculation this year as there is already substantial formal arrangements in place for type 2 response. We expect Authority support for the recommendation.

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 are dropping as we approach winter. We published an NZGB assessment covering a series of mainly South Island outages during June as we were seeing potential shortfalls. These potential shortfalls are driven by outages, but also partly by the record peak demands we saw last year in end June and August, which we are using in our assessments.

New Zealand Generation Balance (NZGB) analysis

The June NZGB analysis is showing improved generation margins for July and August. The May Report flagged several potential shortfalls in July and August. Since then, there were significant changes to the generation balance from generators deferring outages, with the most significant change being to Contact's Taranaki Combined Cycle outage which was scheduled for this period but will now take place in November.

However, the report is still showing shortfalls (N-1-G) for the second half of June and July.

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

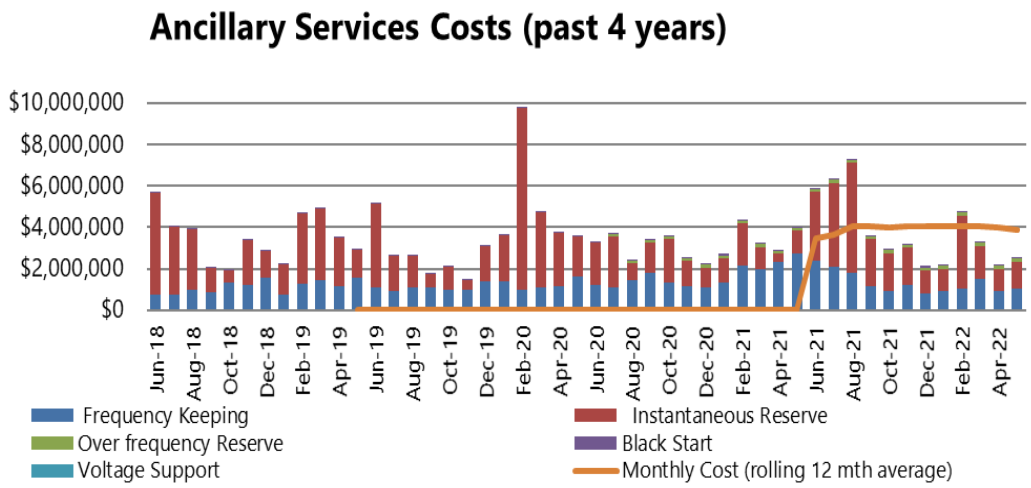
La Niña conditions continue to dominate weather patterns and are expected to continue through June and July, but come commentators are indicating the trend is losing strength. National hydro storage is below average, at 80% of average for the time of year and continues to hover around the 90th percentile of historic ranges. While this is below average, we are now at a time of year where this level of storage would be sufficient to get through winter and into spring when the risk drops away. Our modelling shows to cross the risk curves we would need an unprecedented dry sequence or infrastructure breakdown.

A planned outage of the Maui gas production facility has taken place and is expected back by 20 June, 14 days later than initially advised. This type of delay for large outages is not uncommon. In response Maui's outage Methanex has reduced its consumption by 100TJ/day matching the drop in production from Maui. This has meant gas generation has not been heavily impacted by the outage. Following the Maui outage, we expect a material increase in gas production.

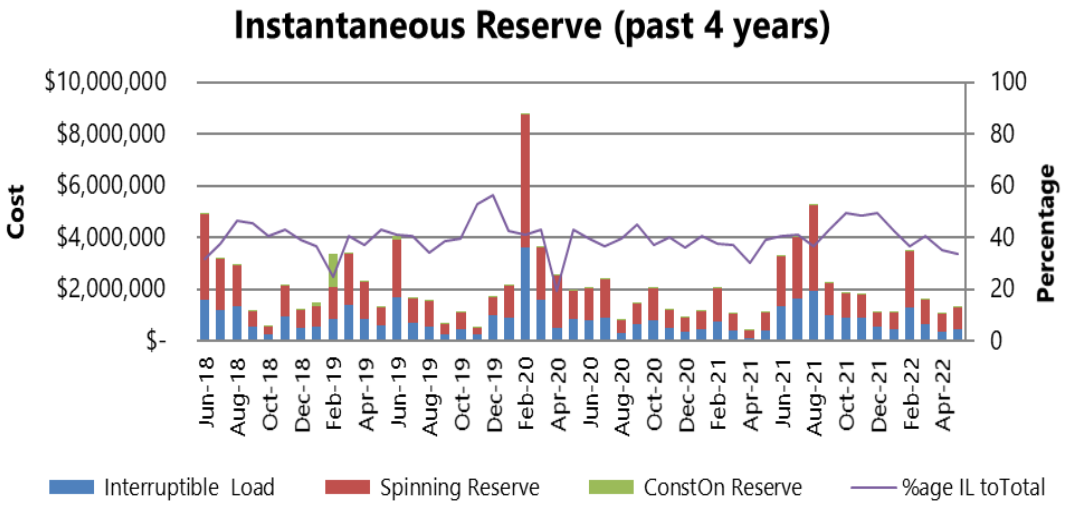
Contact Energy's Taranaki Combined Cycle Plant at Stratford (TCC) has experienced an issue limiting its running hours in closed cycle mode. The 5-week outage, scheduled from 17 July to 21 August, to fix the issue has been pushed out to November. However, GE (manufacturers of the generator) have approved Contact to run TCC for an additional 700 hours. This will allow TCC to run through to the end of August, covering of the bulk of the winter periods.

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

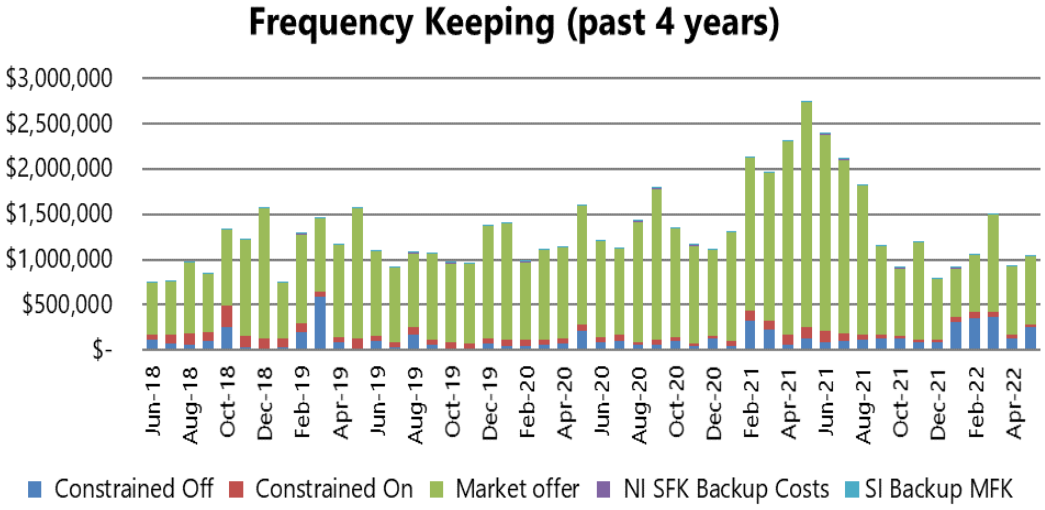
14 Ancillary services



This month's ancillary services costs were $2.55 million, an increase of $352k (16% increase) from the previous month. Instantaneous reserve and frequency keeping costs have both increased compared to the previous month; instantaneous reserve costs increased by $253k (24% increase) while frequency keeping costs increased by $112k (12% increase).

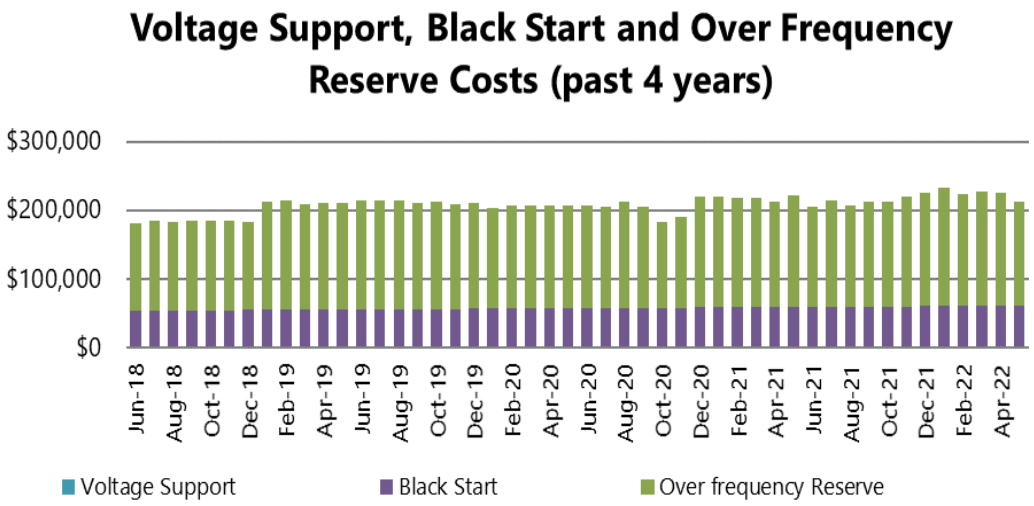


This month's instantaneous reserve costs were $1.29 million, an increase of $253k (24% increase). In contrast to last month, overall quantities of both fast and sustained reserves were lower than the previous month in the South Island while both fast and sustained reserves quantities were higher in the North Island. The average prices per megawatt of North and South Island reserves were all higher than the previous month though the average price per MW of sustained reserves were only marginally higher.



This month's frequency keeping costs were $1,042 million, an increase of $112k on the previous month (12% increase). North Island and South Island frequency keeping costs both increased this month; in the North Island by $78k (15% increase) and in the South Island by $34k (9% increase).

Constrained off costs increased by $124k (95% increase) while the constrained on costs decreased by $7k (17% decrease). High constrained off costs were the result of high energy prices paid to stations providing frequency keeping in the North Island.



Over frequency decreased slightly this month to $151k as there were less over frequency reserves available in both the South and North Islands. Black start costs remained at $62k this month. There are currently no voltage support costs.

15 Commissioning and Testing

No update.

16 Operational and system events

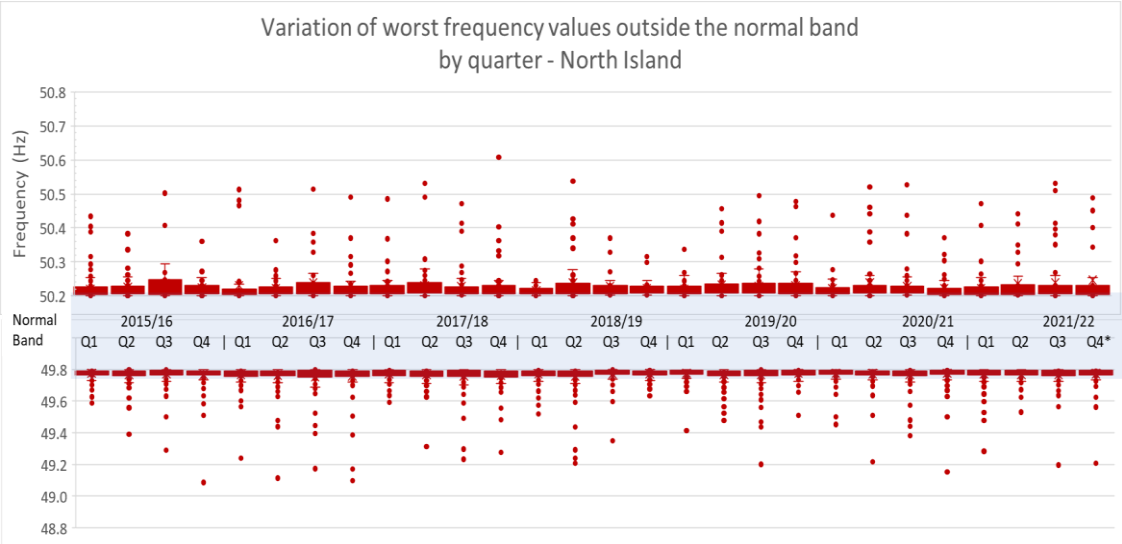
No operational and system events to note this month.

17 Frequency fluctuations

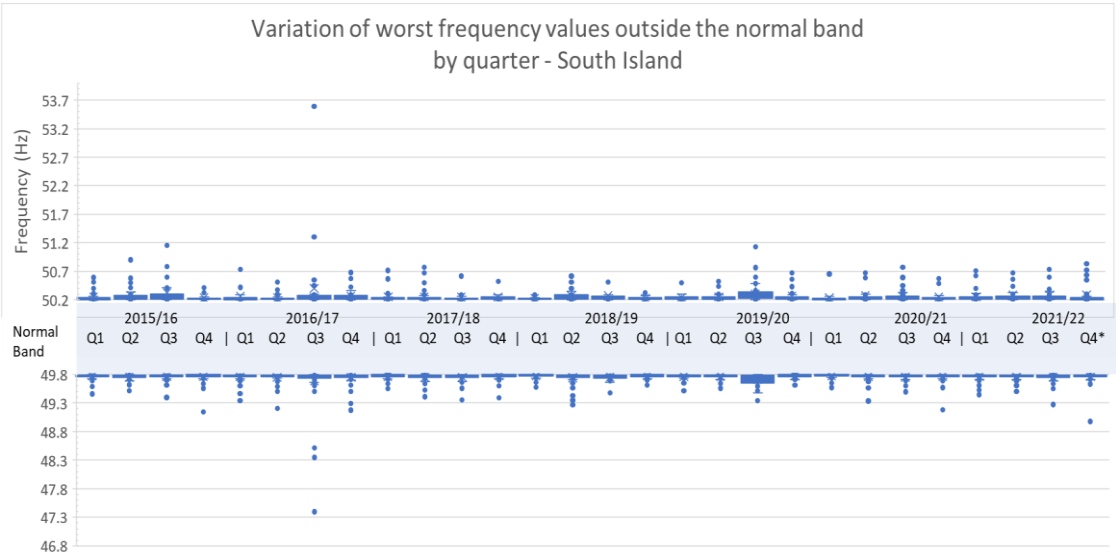
17.1 Maintain frequency in normal band (Frequency value)

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



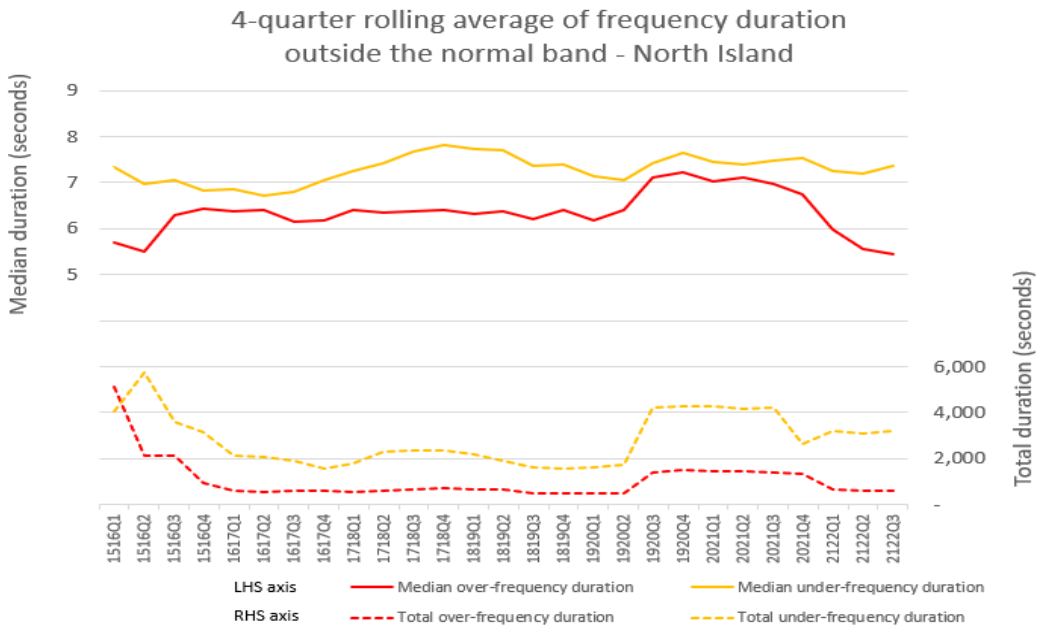
*2021/22 Q4 contains data for April and May only

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.

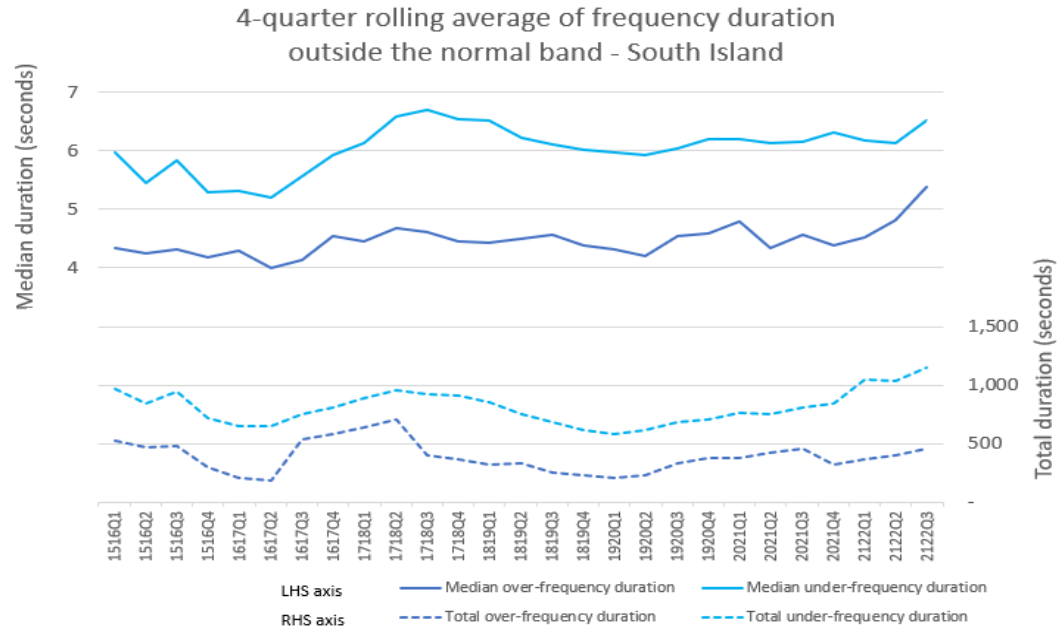
17.2 Recover quickly from a fluctuation (Time)

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

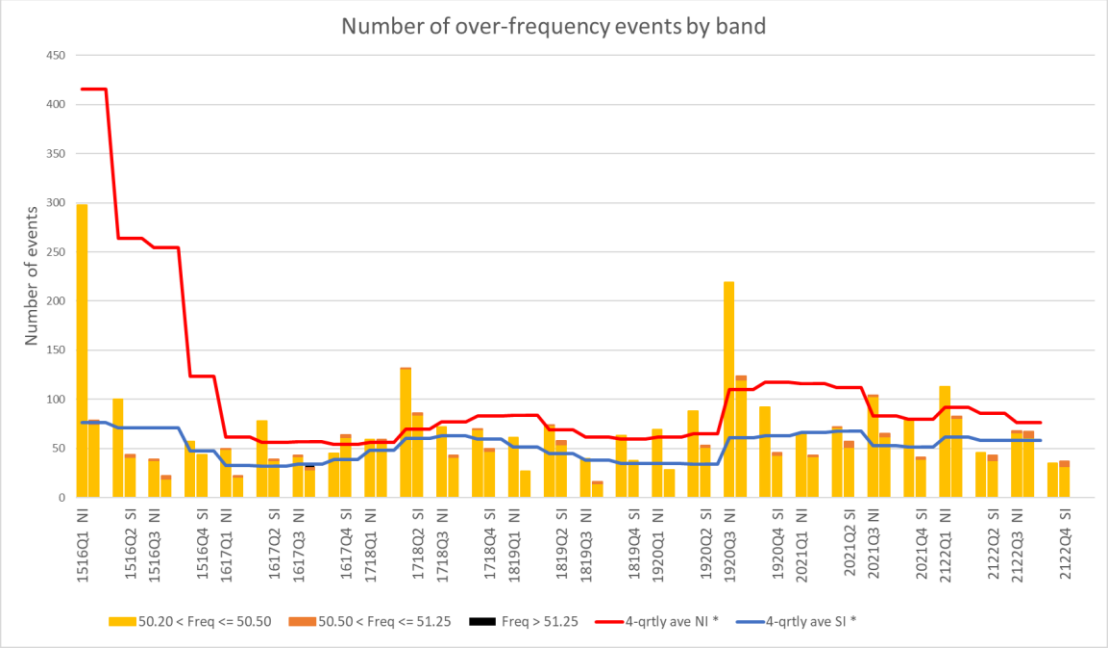


*These graphs have not been updated since 2021/22 Q3; they will only be updated at the end of each quarter

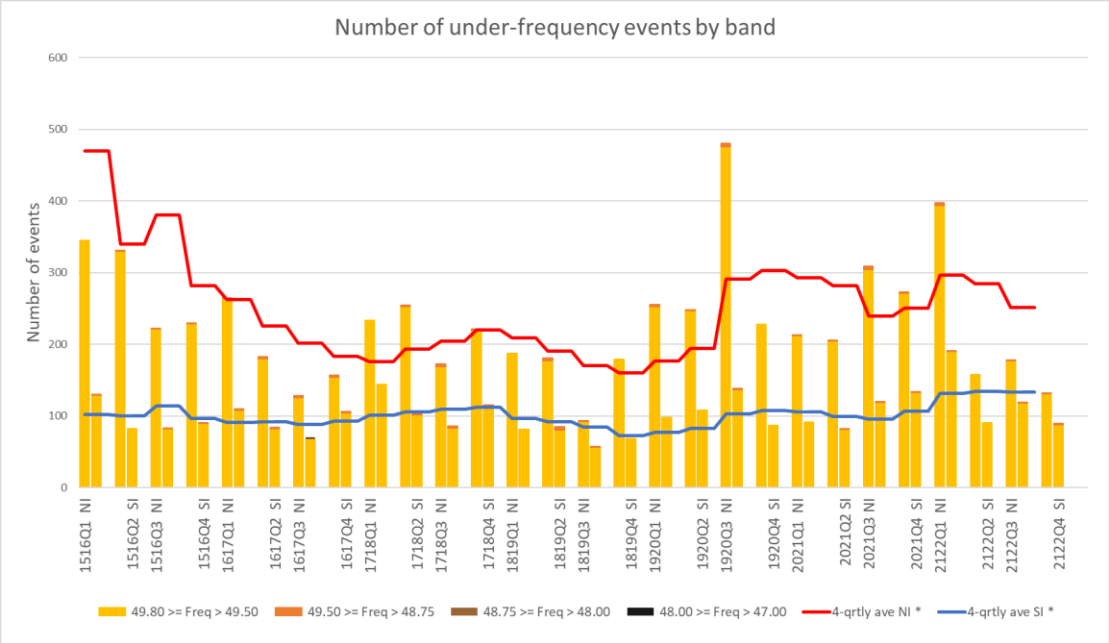
17.3 Manage frequency and limit rate of occurrences during momentary fluctuations (Number)

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

20 Grid emergencies

None to report.

Appendices

Appendix A: Discretion

Event Date and Time	Description
1/05/2022 18:56	ARG1101 BRR0 Required for switching of planned outage - BLN_STK_1, ARG_KIK_1. BRR not currently clearing Last Dispatched MW: 0
4/05/2022 0:02	MAN2201 MAN0 Discretion added to bring MAN down by 180MW to allow for TWI Line 1 reduction line restoration Last Dispatched MW: 605
4/05/2022 0:06	ARG1101 BRR0 Added discretion to 0MW to allow for ARG_KIK_1 RTS - offers are priced high enough BRR not being dispatched or scheduled for this TP anyway Discretion extended to 13:00 as requested by SC - NGOC extended outage due to failover.
4/05/2022 23:47	MAN2201 MAN0 Last Dispatched MW: 605
13/05/2022 4:27	ARG1101 BRR0 ARG-KIK_1 RTS close ARG 174 Last Dispatched MW: 9
13/05/2022 4:47	SFD2201 SFD21 tripped Last Dispatched MW: 104
14/05/2022 0:43	MAN2201 MAN0 MCC SCADA Test. Last Dispatched MW: 576
15/05/2022 18:42	ARG1101 BRR0 Planned outage requires the generation off. Last Dispatched MW: 9
18/05/2022 5:42	ARG1101 BRR0 Last Dispatched MW: 10
21/05/2022 11:30	ROT1101 Last Dispatched MW: 6.5