MONTHLY SYSTEM OPERATOR AND SYSTEM PERFORMANCE REPORT

FOR THE ELECTRICITY AUTHORITY

Transpower New Zealand Limited

October 2020

Keeping the energy flowing

TRANSPOWER

Transpower New Zealand Limited The National Grid

Report Purpose

This report is Transpower's review of its performance as system operator for October 2020, 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

- The proposal for the SOSPA reset has been agreed and awaiting approval from the Authority Board in December. Transpower's Board has approved the proposal.
- Both the North and South Island hydro storage positions are close to average as a result of spring inflows and lower demand. Pohokura gas field production continues to decline, down by 25 per cent since May. The Pohokura situation does not have an immediate impact on security of supply risks as we head into summer but is an area we are actively monitoring and modelling.
- The risk control self-assessment review is well advanced and on track for completion in November. Two of the annual SOSPA audits have been completed with both indicating "effective" process are in place.
- We reported one breach during October relating to a failure to publish a schedule on time; this was due to an ongoing market system issue for which a permanent solution to the defect is being sought.
- High workloads are being observed and are expected to continue through to the end of the year as a result of the warmer weather and a large number of outages being planned.
- Tiwai exit stability studies are nearing completion. The report is expected to be completed in November. We have also started the assessment of South Island over-frequency arming. We have been consulting with industry on use of 10-minute offload times to support the CUWLP work which are proposed to be implemented late-November.
- Real Time Pricing (RTP) continues to progress slightly ahead of its development schedule. Transpower supported the Authority with the first industry workshop on RTP in October, with others planned through the next few months.
- Dispatch Service Enhancements (DSE): One participant has transitioned to their new platform and two are currently transitioning. We have been notified by a further participant of their intention to transition one of their sites this calendar year, and the other sites in the first quarter of the next calendar year – this is outside the planned transition timeframe and we have advised the Electricity Authority accordingly.

2 Customers and other relationships

SOSPA 2 reset

The SOSPA negotiations are complete, awaiting Board sign-off. We were advised during the month by the Authority that they will be submitting the SOSPA reset proposal to their December board meeting – a month later than originally planned. Transpower's Board approved the proposal at their November meeting.

Vector drop load testing

We held a constructive meeting with representatives from the Vector network management team on 29 October regarding the instruction to drop load at Mt Roskill on 8 June 2020 and general communication between our respective control rooms.

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This meeting was deferred due to the second lockdown in Auckland and highlighted the importance of maintaining strong relationships at an operational level.

3 Risk & Assurance

Risk bowtie and critical controls

We have started the control-self assessment process. The operations teams made assessments of their control environments; the senior leadership team will now confirm their critical control's effectiveness. The process will be completed in November.

Business process audits

The first two SOSPA audits - Managing insufficient generation offers and reserve deficits; Markets Security of Supply (Follow-up Review) - have been provided to management for their response. Both audits identified the processes as being "effective" with only minor findings for consideration.

4 Compliance

We reported one system operator self-breach in October.

On 14 and 27 September, the automatic 00:00 NRSL schedules failed to complete within the time period specified in the Code, namely by the end of the trading period after the trading period in which the system operator commenced preparing the schedules. The schedules were completed manually and subsequently published.

The cause of both issues is a defect in a component of the market system, which tracks the progress of workflow as it solves market schedules. There was no market or operational impact, as a result of the breach, and the Transpower IST team is working on a permanent solution to the defect.

We have seven outstanding breaches with the Authority compliance team.

5 Impartiality of Transpower roles

No items were opened in the register during October.

We have six open items in the register that are being actively managed in accordance with our Conflict of Interest procedure.

System Operator Open Conflict of Interest Issues		
ID	Title	Managed by
27	**System operator employee partner to work for grid owner:** The partner of a system operator employee started work with the grid owner. Confidentiality obligations have been explained to both employees and will be monitored to prevent a conflict of interest arising.	SO Power Systems Group Manager
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	SO Market and Business Manager

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System Operator Open Conflict of Interest Issues		
ID	Title	Managed by
	owner is not treated more favourably than any other participant with respect to demand response.	
33	**Sharing working space during lockdown:** A staff member sharing work-space with their partner who works for another industry participant. Both parties are managing the conflict accordingly to maintain the confidentiality of information.	Grid and Systems Operations Manager
39	**New SO Compliance & Impartiality Manager:** This relates to potential perception; the person filling this role also works for Transpower's legal team on a part-time basis. Workstreams will be allocated accordingly.	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

6 Project updates

6.1 Market design and system enhancement project updates

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

Real Time Pricing (RTP)

Phase 1: Detailed solution design, build and functional test continues to progress well. Detailed design has completed with the build projected to complete in mid-November. Functional testing continues to the end of November. As expected, there is some volatility in dates for the individual phase 1 build elements, but the overall phase 1 build continues to be slightly ahead of schedule.

The RTP and Market System Simplification (MSS) project teams will deploy changes together into a May release of the market system to mitigate risk and optimise testing activities between the projects.

Phase 2: Preparatory work continues to develop the design and requirements.

Business change engagement is continuing within Transpower's Operations division, with communication and engagement strategies being agreed with each of the teams. Development of training for phase one is underway and necessary updates to operational procedure documents will begin in November.

The Transpower project team supported the Electricity Authority in the first of the series of industry engagement groups in October, which went well. The next session will be in late-November and from now on these will start to focus on the finer detail of the market and participant impacts of the changes.

Dispatch Service Enhancements (DSE)

October and early November have been a busy period, progressing those participants yet to transition to the new dispatch platforms. One participant transitioned into production on 5 November. Pre-commissioning testing has been progressing with two further participants. We have been notified by a further participant of their intention to

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transition one of their sites this calendar year, and the other sites in the first quarter of the next calendar year – this is outside the planned transition timeframe and we have advised the Electricity Authority accordingly.

Situational Intelligence

There was a slight delay for Release 1 which was deferred by a few weeks from early-October to 22 October due to unrelated market system issues. Release 2 and 3 have subsequently been re-planned for 26 November and 26 January respectively.

Extended Reserves (AUFLS)

The business case for the Extended Reserves (AUFLS) Portal was approved in late October. The high-level design and detailed planning are now underway.

Sensitivity Schedules

The three-month proof of concept finished at the end of October. We received nine feedback forms with the majority supporting the initiative. We are now collating the feedback and will decide whether to progress this as a market design proposal to the Authority.

7 Technical advisory hours and services.

Technical advisory hours and a summary of technical advisory services 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

There have been a high number of outages in October (908) and we are seeing extremely high outage numbers in November and December, with associated workload implications for security assessments.

The cable joint fault for Pakuranga-Whakamaru resulted in around 10 weeks of Upper North Island outages required reassessment and some rescheduling.

CUWLP outages and operational impacts

The system operator continues to provide analysis and support to industry for the Clutha and Upper Waitaki Lines Project (CUWLP) outages. We have sought industry feedback on the use of 10-minute offload times (to allow additional grid capacity to be realised) and this proposal will be implemented for the outages commencing 23 November.

The system operator also published the frequency management constraint to industry. This constraint will only be used when there is a risk of separating the Southland area from the main grid in the event of a fault.

Transpower in our roles as system operator and grid owner will present to the Energy Trader Forum on 12 November, providing an update on both the project and outages (grid owner) and the latest security assessment (system operator).

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NZGB analysis

This month's New Zealand Generation Balance (NZGB) report forecasts no N-1-G[1] generation shortfalls for the next six months. Applying a low gas assumption, N-1-G shortfalls are forecast in mid-April 2021. The shortfalls in April 2021 coincide with the Huntly Unit 5 outage and several other smaller North Island hydro generation outages.

The system operator has adjusted NZGB so that it uses 2019 load data for all forecasts in the 2021 calendar year (instead of 2020 load data). This is to remove the impact of COVID-19 from the load profile.

9 Power systems investigations and reporting

Operational impact of Tiwai exit

South Island Transient (Rotor Angle) Stability Analysis: All preparation works, including generator model building, study scenarios and contingency definition, have been completed. We expect to finish our simulations in November.

South Island Over-Frequency performance analysis: This study assesses the adequacy of over-frequency arming generators in the South Island post the Tiwai Exit. This will ensure we procure enough over-frequency generators to avoid constraining the HVDC north flow. Preparation works on generator model building, study scenarios and contingency definition have been completed. We expect to finish our simulations in November.

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

This will be provided to the Authority in late-November 2020.

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.

[1] The N-1-G balance is the system's capacity to cover, over the peak, the loss of the largest risk-setter if the next largest risk setter were also to become unavailable

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System performance

13 Security of supply

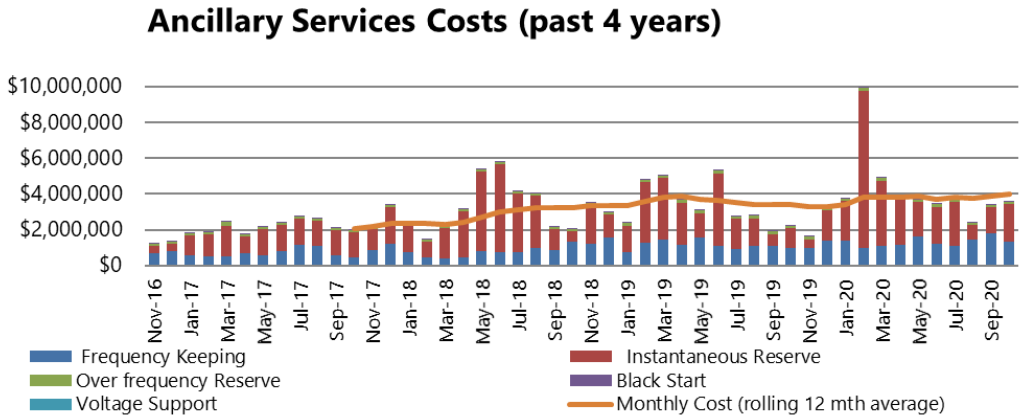
During October, the hydro storage increased (off the back of expected spring inflows), and demand reduced (due to longer, warmer days); these factors resulted in lower prices at Haywards.

South Island hydro storage is now above the historical average level for only the second time since May. Lake Manapouri has been spilling during the month, although this has begun to ease. By the end of the month, the North Island storage had continued its strong recovery from earlier in the year, lifting from 93 per cent to 99 per cent of average; the South Island storage rose from 100 per cent to 109 per cent of average.

The National Institute of Water and Atmospheric Research (NIWA) has indicated a La Niña event is probable this summer. This system can bring more north-easterly winds resulting in more rainfall to the north east of the North Island and reduced rainfall to the lower western parts of the South Island.

Gas production from the Pohokura gas field has been declining at a rate of around 0.5 TJ/day since early September and is now at 147 TJ/day, down from a production level of 200 TJ/day in May. This will not have an immediate impact on security of supply risks as we head into summer. If the rate of production decline continues this may significantly constrain the ability of the gas generation fleet to respond to security of supply issues should they arise in autumn and winter next year. The extent of the impact will depend on several uncertain factors including spring and summer inflows, gas supply from Pohokura and other fields, coal and gas storage positions and the availability or otherwise of Huntly's three Rankine units. This is an area we are actively monitoring and modelling.

14 Ancillary services



This month's ancillary services costs were $3.6 million, a small increase of $175k (5 per cent increase) from last month. The overall increase is a result of an increase in

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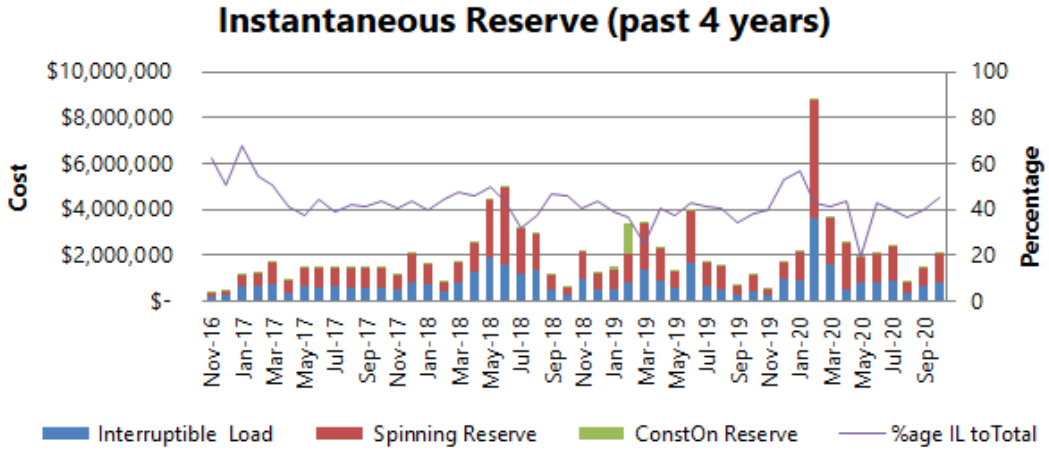
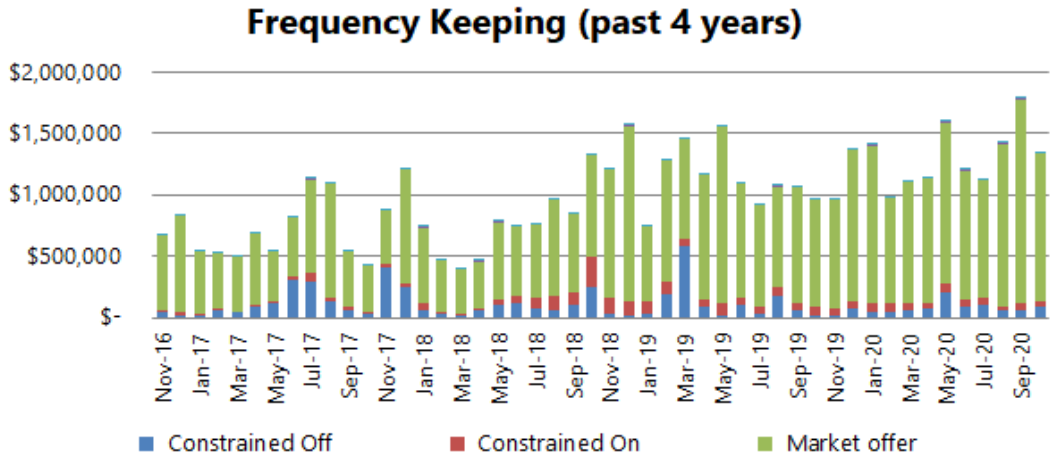
instantaneous reserve costs, counterbalanced by a decrease in frequency costs (see below).



This month's instantaneous reserve costs were $2.1 million, an increase of $641k (44 per cent increase) from the previous month. $503k of this increase is attributable to spinning reserves. This is a result of both the overall quantity of reserve procured increasing slightly, and the average price of North and South Island Fast Instantaneous Reserve (FIR) being around 70 per cent higher than the previous month. Both quantities and prices were fairly steady over the month with no dominating periods of high reserve costs.



This month's frequency keeping costs were $1.3 million, a decrease of $443k to the previous month (21 per cent decrease), as offer price volatility decreased and prices returned to more normal levels. Tekapo was islanded for fewer days this month than last month, and consequently Tekapo A frequency keeping costs also reduced.

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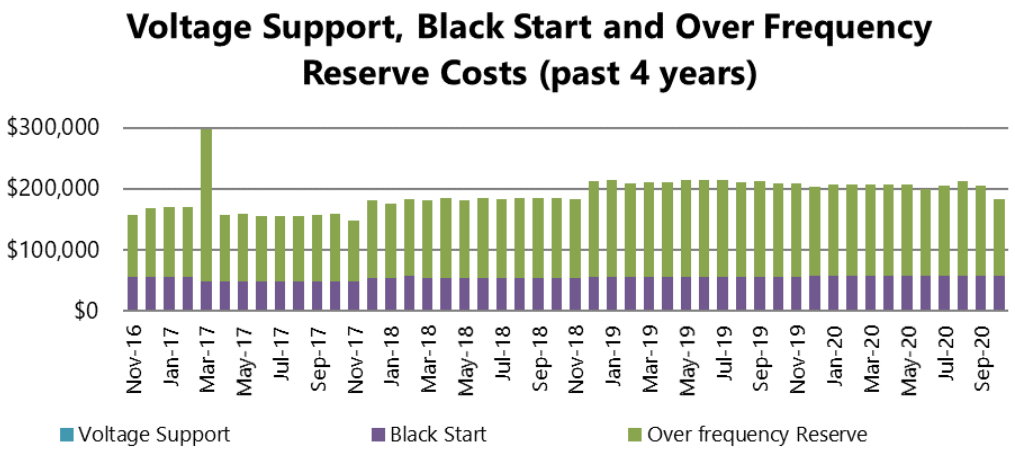

The over frequency costs decreased slightly this month to $125k. Black start costs remained at $58k. There are currently no voltage support costs.

15 Commissioning and Testing

Generation testing, commissioning and model changes

Existing generation commissioning projects (Ngawha, Waipipi and Turitea North) are still progressing, however their timelines are slipping. We continue to meet our system operator deliverables, but these slippages may result in commissioning work occurring over Transpower's summer shutdown period (24 December 2020 to 11 January 2021, inclusive). We will continue to monitor the situation.

16 Operational and system events

High workloads are being experienced in the control centres as the warm weather and large number of outages combine to introduce complexities in managing power system stability.

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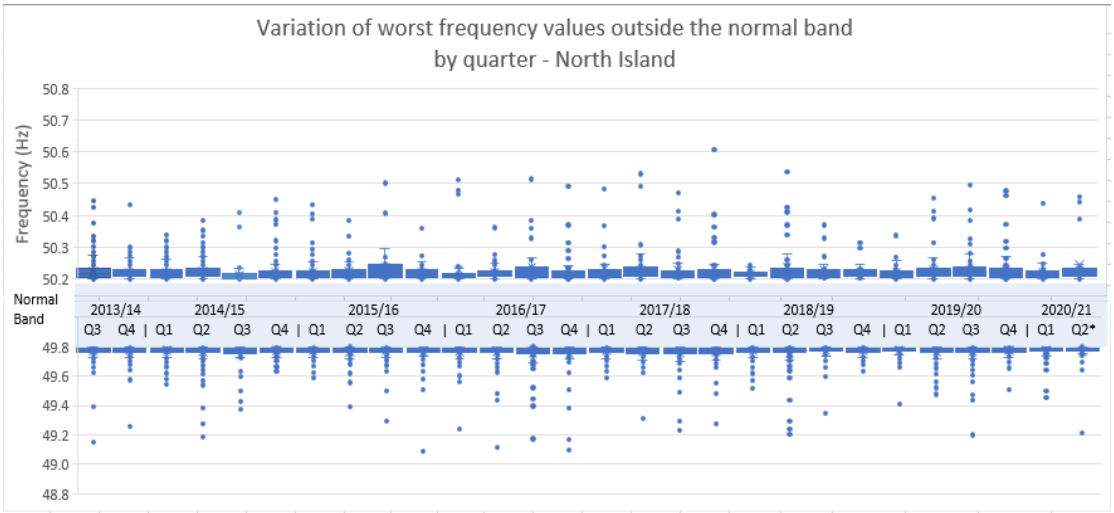
17 Frequency fluctuations

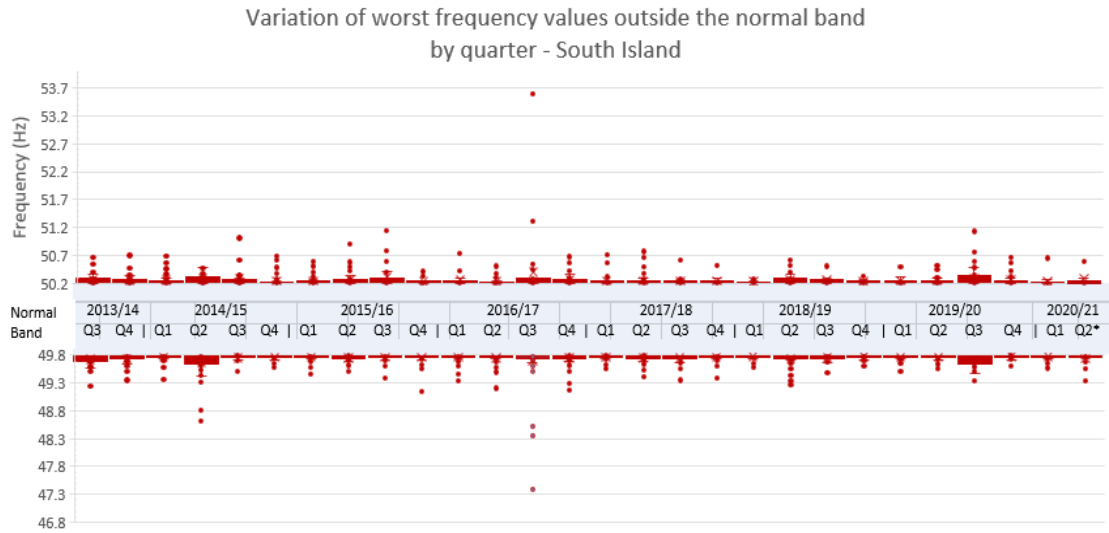
17.1 Maintain frequency in normal band (Frequency value)

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



* 2020/21 Q2 contains data for October 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.

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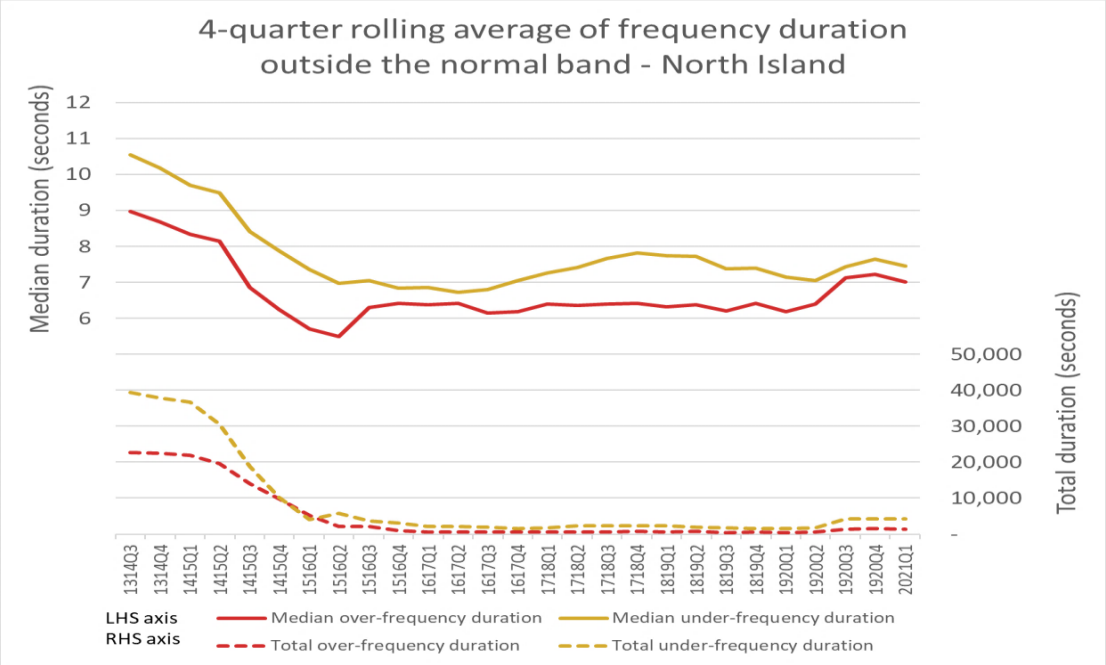
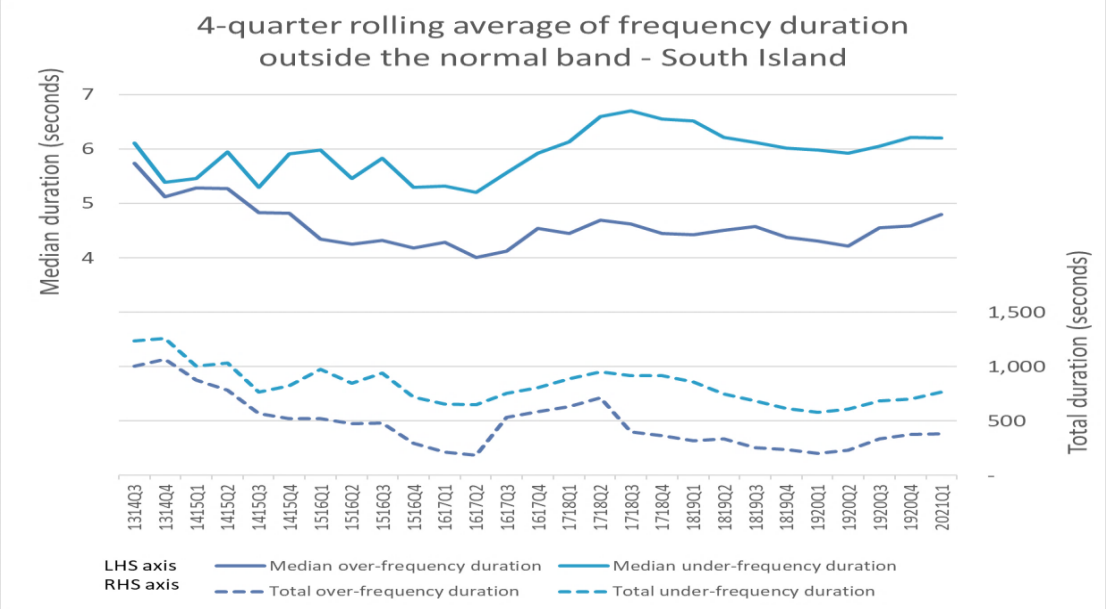
17.2 Recover quickly from a fluctuation (Time)

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 2020/21 Q1; they will only be updated at the end of each quarter

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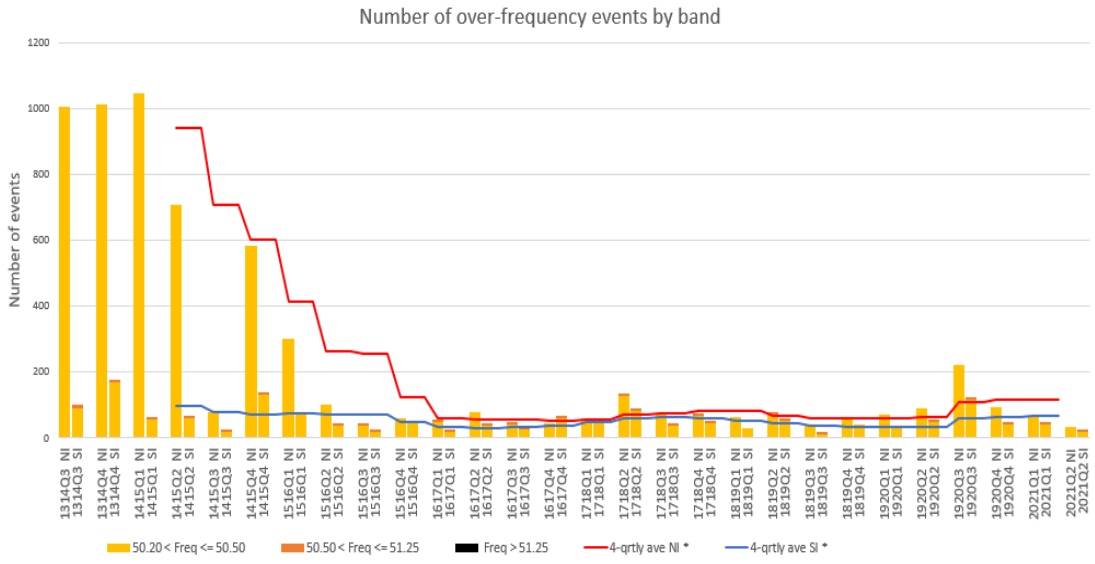
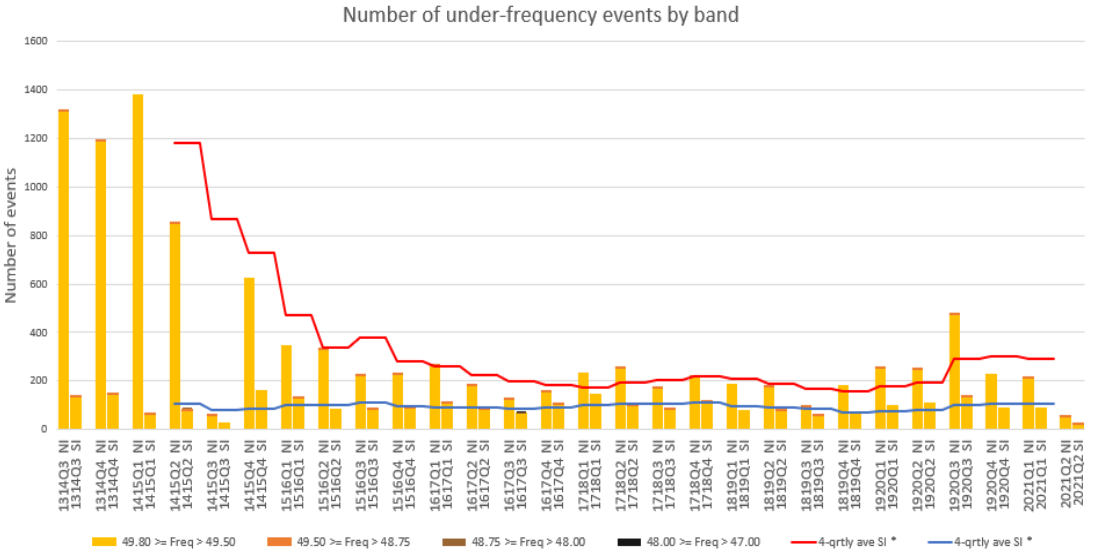
17.3 Manage frequency and limit rate of occurrences during momentary fluctuations (Number)

The following charts show the number of momentary fluctuations outside the frequency normal band, grouped by frequency band, for each quarter since 2014. The information is shown by island, including a 4-quarter rolling average to show the prevailing trend.

Over-frequency events



Under-frequency events



Note: The 2020/21 Q2 contains data for October only.

* 4-qtrly averages for NI and SI will only be updated at the end of each quarter

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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	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	3	-	-	-	1	-	-	1	-	-	-	1
Warning Notice	-	-	1	-	2	-	-	-	-	-	-	-
Customer Advice Notice	15	14	6	21	14	13	10	13	11	15	9	6

20 Grid emergencies

The following table shows grid emergencies declared by the system operator.

Date	Time	Summary Details	Island
14/10/20	17:36	A gird emergency was declared to allow a grid reconfiguration in the North Canterbury area. This was required due to a lightning storm increasing the risk of a double circuit contingency on the 220 kV Islington – Waipara – Culverdon – Kikiwa Circuits 2 & 3.	S

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Appendix A: Discretion

Event Date and Time	Description
06-Oct-2020 07:29	ARG1101 BRR0 Discretion Max : 0 Last Dispatched MW: 10 : For switching during ARG_KIK_1 outage
06-Oct-2020 10:59	ARG1101 BRR0 Discretion Max : 0 Last Dispatched MW: 11 : For switching during ARG_KIK_1 outage
07-Oct-2020 07:25	ARG1101 BRR0 Discretion Max : 0 Last Dispatched MW: 11 : For switching during ARG_BLN_1 outage
09-Oct-2020 09:12	MAN2201 MAN0 Discretion Max : 535 Last Dispatched MW: 704.85. : TWI 3 Potline returning. Backing off MAN to provide capacity to manage the potline
09-Oct-2020 09:15	MAN2201 MAN0 Discretion Max : 590 Last Dispatched MW: 535 : TWI 3 Potline returning. Backing off MAN to provide capacity to manage the potline
09-Oct-2020 13:23	ARG1101 BRR0 Discretion Max : 0 Last Dispatched MW: 11 : Switching to return ARG_BLN to service
14-Oct-2020 01:22	HLY2201 HLY5 Discretion Min : 182 Last Dispatched MW: 182 : Claimed 13.82a exemption to avoid breaching resource consent. Security Coordinator advised that they will be required over the morning peak.
27-Oct-2020 20:29	MAN2201 MAN0 Discretion Max : 780 Last Dispatched MW: 788 : NMA_TWI2 static violation
30-Oct-2020 08:34	NMA0331 WHL0 Discretion Max : 27 Last Dispatched MW: 34.17 : RTCA violation for NMA_TWI2
30-Oct-2020 08:18	MAN2201 MAN0 Discretion Max : 733 Last Dispatched MW: 738 : RTCA violation NMA_TWI2

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