TRANSPOWER

MONTHLY SYSTEM OPERATOR AND SYSTEM PERFORMANCE REPORT

FOR THE ELECTRICITY AUTHORITY

Transpower New Zealand Limited
January 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 January 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 HVDC outages have progressed to schedule, and we continue to monitor generation margins through NZGB and potential impacts on gas supply. Although there have been several notifications of gas outages, there are allowances within our reduced gas scenarios which take account of these. The pole 2 testing period following replacement of the valve-based electronics will start on 17 February.
- We have modelled a reduction in thermal fuel availability for March in the electricity risk curves to reflect the Pohokura full shutdown, and impact on Genesis generation. Despite the elevated risk curves, we do not foresee a security of supply risk given the levels of hydro storage.
- We have started a pilot inertial monitoring project for New Zealand's power system. The pilot will deploy monitoring devices across 11 locations for a period of three months and help inform further investigations.
- As at the end of January, over half the solution requirement topics for Real Time Pricing (RTP) have been completed or are in progress.
- We are nearing completion of TAS 87: Options for improving the operation of dispatchable demand under RTP.
- The Dispatch Service Enhancements transition of the current participants from GENCO onto their new dispatch protocols is going well.
- The delivery business case for the first phase for our innovative Situational Intelligence programme – Streaming analytics – has been approved.
- Transpower published its 2020/21 draft annual outage plan on 29 January.
- We are continuing to investigate two Moderate incidents as part of the new significant incident reporting process: SCADA failure on 31 October 2019 and Northland loss of supply 27 November 2019

2 Customers and other relationships

Rangitata Flooding Event – Islington–Livingston circuit outage

Meridian has expressed concern over the additional risk of spill from their Aviemore and Waitaki stations. We are working through options that could alleviate this, however consultation with industry and the grid owner will be required to do a net benefit of any recommended option.

Authority System Operations Committee discussion of the industry chief executive interviews

A key take-away from the discussion was that all the work we have undertaken over the last 12-18 months and shared with the Authority and the System Operations Committee, has not always been well communicated to the wider industry particularly at a senior level. We will raise the profile of the work we have been doing, and are going to do into the future, with the industry at all levels.

Customer participation survey

In response to the Authority recommendation that the system operator improve meaningful participation in customer satisfaction surveys, we are making the following changes this year:

- The survey will be active for a period of a month.
- We will increase the number of communication channels for the survey to four: email, industry forums, customer meetings, and our external website.
- Based on research, we will make a number of changes to our process, including pre-notifying the customers of the survey, accompanying the survey with a note from the General Manager Operations and providing a contact point for respondents to get in touch with if they need to clarify anything.
- To increase our understanding of the responses, we will provide an option at the end of the survey where the respondent can elect to discuss the survey and their feedback. This will be entirely optional so as not to break any confidentiality.

3 Risk & Assurance

In January, as part of our annual audit plan, we finalised the scope for our Medium-Term Load Forecast audit. We have also started the process for the annual audit of the auditable software the Reserve Management Tool and Scheduling Pricing and Dispatch tool.

We have also started reviewing our risk management framework and work to refine our risk controls.

4 Compliance

We reported one new system operator breach to the Authority in January.

- 3929 – A network model error, incorrectly modelling Haywards 11 kV and 33 kV market nodes, was used in real-time.

No market impact occurred; this was achieved through claiming a pricing error which allowed amended information to be used for final pricing.

We have five outstanding breaches with the Authority compliance team.

Appendix A shows instances where the system operator has applied discretion under 13.70 of the Code.

5 Separation of Transpower roles

The entries below are the open issues in the conflict of interest register. These issues are being handled in accordance with our policy for managing conflicts of interest.

We did not open or close any issues in January.

We have eight open items in the register.

System Operator Open Conflict of Interest Issues		
ID	Title	Managed by
9	HVDC Outages 2019/20	Operations Planning Manager
18	Recommendations from Conflict of Interest Review	Compliance and Risk Manager
21	Staff interest in generator commissioning	GM Operations
22	Security classifications for PI Vision database access	SO Power Systems Group Manager
26	Response to 14 December UFE recommendation	SO Power Systems Group Manager
27	System operator employee partner to work for grid owner	SO Power Systems Group Manager
28	Investigation into loss of SCADA 31 Oct 2019	SO Power Systems Group Manager
29	Preparing the Net Benefit test – SO involvement	Operations Planning Manager

Greater detail on each of the open conflict of interest issues is provided in the next quarterly report.

6 HVDC 2020 outages

The HVDC outages have progressed to schedule, and we continue to monitor generation margins through NZGB and potential impacts on gas supply. Although there have been several notifications of gas outages, there are allowances within our reduced gas scenarios which take account of these.

The pole 2 testing period, following replacement of the valve-based electronics, will start on 17 February. In the run-up to this testing period we have coordinated with the grid owner on testing plans. We are making system operator resource available to assess weekend tests once they are completed - to ensure the early return of pole 2 following successful tests, or advice and assessment if further testing is required.

With the HVDC in monopole operation for an extended time, and with multiple planned bipole outages, we have kept close watch on both market and operational implications, including performance of frequency keeping.

Market impact

The market has behaving as expected during the outage. The prices have rebounded from the lows seen over the Christmas and New Year period as people return to work. The price has averaged $120/MWh compared to $61/MWh at the start of the month. During the bipole outages the South Island prices have dropped to $0-$25/MWh and the North Island prices have risen to $100-$180/MWh.

Independent review
We have continued to answer questions to assist the Authority's independent review of our risk assessments for the HVDC outages.

7 Project updates

7.1 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)
We are continuing to make progress on the detailed solution requirements and high-level design for the technical solution. As at the end of January, over half the solution requirement topics have been completed or are in progress. We expect that remaining topics (which are less complex than the first nine in progress) will be completed by 22 May 2020.

A change request has been prepared for Authority Board consideration to push out the completion date of the delivery business case three weeks from 22 May to 19 June. The change request covers changes to scope, time and cost – additional time due to complexity encountered during development of solution requirements; and additional scope, time and cost to include DNx requirements (Dispatch lite) in the scope of the RTP delivery business case.

Alongside initiation phase of RTP, we are nearing completion of TAS 87: Options for improving the operation of dispatchable demand under RTP.

While the collection of the detailed solution requirements is proving more challenging in some areas than anticipated, the information we are gathering is providing the opportunity for us to collaboratively work with the Authority to review and revise the finer details of the technical solution required to meet the market design objectives. This piece of work will put us in a good position for the development and implementation phases of the project.

Dispatch Service Enhancements (DSE)

The transition of the current participants from GENCO onto their new dispatch protocols is going well. Trustpower and Mercury are actively working through the testing phases of their transition before April 2020. Vector has requested to start connectivity testing and is working with us to establish a formal transition date. All remaining participants are scheduled to transition between June and December, except for Pioneer. We are discussing additional communication activities with Authority to ensure all participants are transitioned by the 'sunset date' of December 2020.

Situational Intelligence

The $3,693,920 delivery business case for the first phase of the innovative Situational Intelligence programme – Streaming analytics – has been approved. Streaming analytics will provide us with a foundation for future development of the situational intelligence solution; establishing real time feeds from critical systems (SCADA and the market system) and will build ability for the business to visualise data, create business rules, alerts and establish business processes to support real time decision making. This phase will run over 12 months, commissioning in September 2020.

Extended Reserves (AUFLS)

We are continuing work on TAS 88 to develop recommendations for collecting data on the current two-block automatic under frequency load shedding scheme. Participants are responding to the draft specification for collection of data on current feeders. External providers, You DO, and Transpower's internal IST division and Energy Market Services (EMS) are preparing estimates for costing the completion of a tool for data collection. The recommendation report on establishing baseline data for extended reserves is on schedule to be delivered to the Authority in March 2020.

New Generating Technology for Ancillary Services

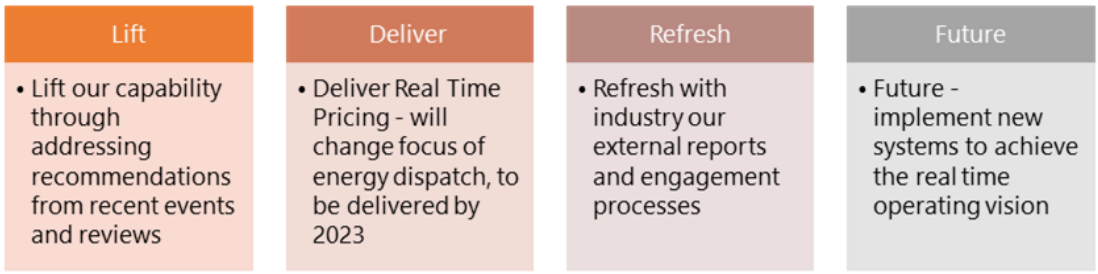
The TAS 89 report is being prepared to outline regulatory and IST system changes required to facilitate the efficient operation of storage technology in the wholesale market and enable batteries to contribute to reserve response. Workshops to understand impacts on the Code and on the market system were held in January. Activities to estimate IST changes will continue and findings will be in reported on in February.

7.2 Other projects

Energy Futures

We have started a pilot inertial monitoring project for New Zealand's power system. The pilot will deploy monitoring devices across 11 locations for a period of three months. Combining the data from these devices with measured power fluctuations will allow us to determine the systems inertial response. Our intent is to compare these measurements with our current modelling techniques to determine their accuracy. In turn this will help us understand the suitability of the monitoring system to support our system operator service in the future.

Operations "Big 4" – Lift, Deliver, Refresh, Future



Lift:

- We completed the actions from the Deloitte maturity check on risk and assurance.

Deliver:

- The detail for the RTP project is included in section 7.1.

Refresh:

- We completed the fourth and final Planned Outage Co-ordination Process (POCP) meeting on 14 February.

Future:

- The Outage Planning Enhancements project investigation phase is on track; the capital phase of the project is currently being prioritised alongside the wider programme of work.

8 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.

9 Outage planning and coordination

2020/21 Outage Plan

Transpower published its 2020/21 draft annual outage plan on 29 January. During February, outage planners will begin meeting with generators, distributors and direct connects to align outage requirements where possible with grid owner outages. This year sees a high number of project outages visible in the proposed plan, and the outage planners have a wider knowledge of other upcoming work. As system operator we have provided advice into the planning process and will review the plan once the customer visits are complete.

10 Power systems investigations

United Kingdom power outage

We are still in the process of preparing our review report on the 9 August 2019 significant power system event in the United Kingdom which impacted over 1 million customers. We will present the report at the Security and Reliability Council in March, as well us publish a report on our website.

Moderate incident: SCADA failure 31 October 2019

We continue to investigate and document the 31 October 2019 SCADA failure in accordance with our new significant incident reporting process. This is the first 'moderate' incident identified under the new process and our final report was delivered to the Authority in early February 2020.

Two breaches of the Code have been identified during the investigation and dealt with separately. The one regarding the accuracy of schedules produced by the system operator was reported in December; the other breach related to the early return to service of a piece of equipment by the grid owner without the correct notifications. The grid owner has been made aware of the breach and has confirmed it will self-breach.

Moderate incident: Northland loss of supply 27 November 2019

We are investigating the 27 November 2019 Northland loss of supply in accordance with our new significant incident reporting process. Our final report is due to the Electricity Authority in early March 2020.

Electricity Authority power system event queries

We continue to support the Authority's understanding of the following power system events:

- 20 November 2019: Islington–Livingston 1 circuit auto reclosed due to lightning. Although the circuit reclosed successfully the fault resulted in an event which caused a loss of 140 MW of voltage sensitive load across the South Island.
- 27 November 2019: Northland lost supply due to the Bream Bay–Huapai 1 circuit tripping as a result of a bird streamer. The region was on N security at the time with auto reclose disabled.
- 30 November 2019: a Haywards current transformer failed, resulting in a fire and the need to disconnect load. The grid owner had previously identified this make and model of current transformer to be prone to failure and had implemented a replacement programme. The event also identified a separate oscillatory issue between the HVDC and nearby windfarm which is being investigated.

11 Performance metrics

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.

12 Cost-of-services reporting

The cost-of-services for financial year 3 (2018/19) was provided to the Electricity Authority on 31 January 2020.

13 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

14 Security of supply

Hydro storage

The hydro lakes national storage levels remain above 90 per cent full. This provides New Zealand with plenty of stored energy but also susceptible to spill when large inflow events occur, as happened on 4 February when flooding hit parts of the south west region of the South Island. The effect of the spill was very low prices in the South Island as hydro was offered at low prices and the HVDC outage restricted what could be sent northwards.

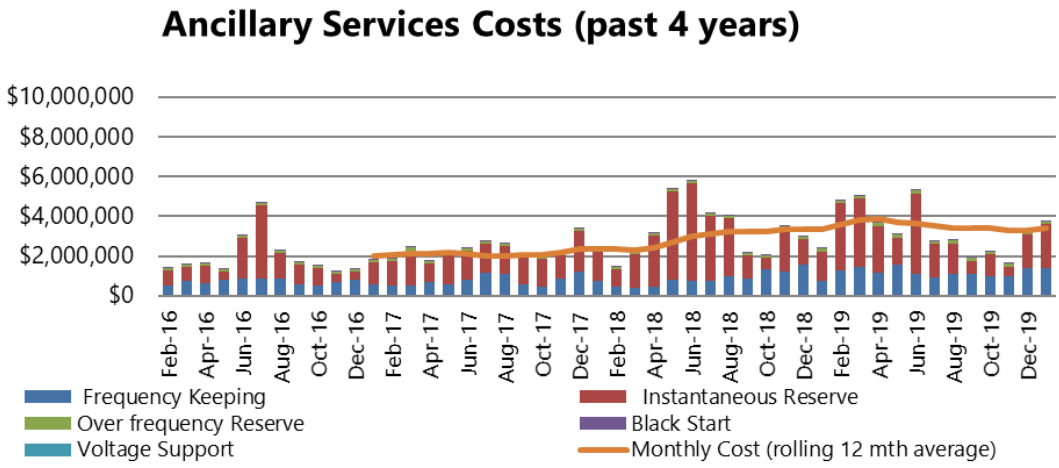
Gas supply

January was a busy month for gas industry notification outages being posted, with six notifications over the month. These provide details of outages in January, February and March across the Pohokura, Kupe, Maui and McKee- Mangahewa wells.

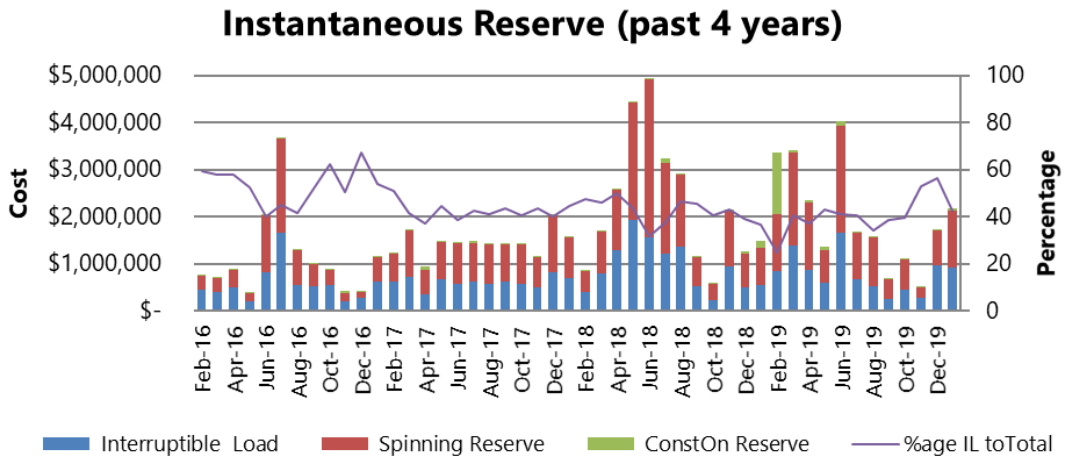
Most of the notifications and the outages that happened during January are minor and can be absorbed by the low demand underpinned by the time of year and the planned shutdown on the small Methanex production unit.

March will be the month to watch closely as Pohokura has a full shutdown. The full shutdown is expected to impact gas supplied to Genesis and make the market very tight for those looking to buy gas. To reflect this, the electricity risk curves have modelled a reduction in thermal fuel availability for March. Despite the elevated risk curves, we do not foresee a security of supply risk given the levels of hydro storage.

15 Ancillary services



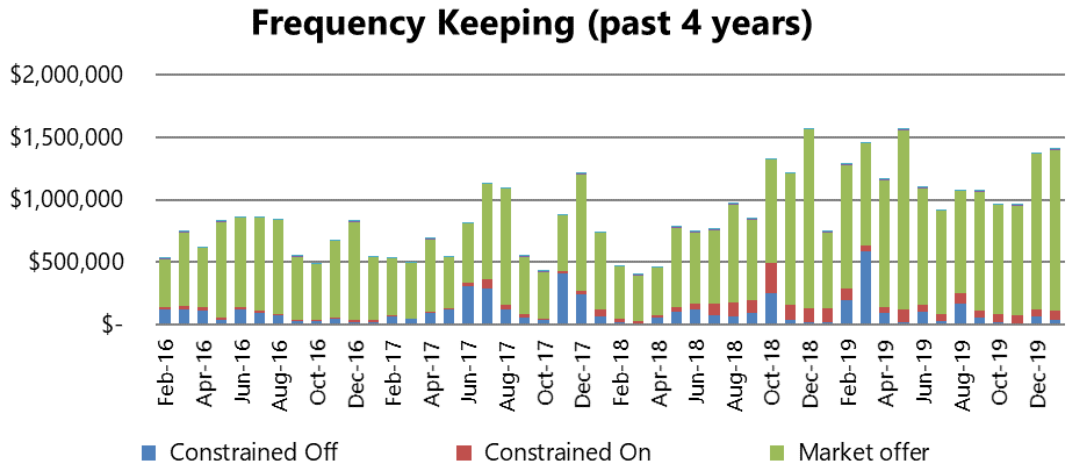
This month, ancillary services cost increased by $489k (15%). The majority of this increase is due to instantaneous reserve costs, details are provided below.



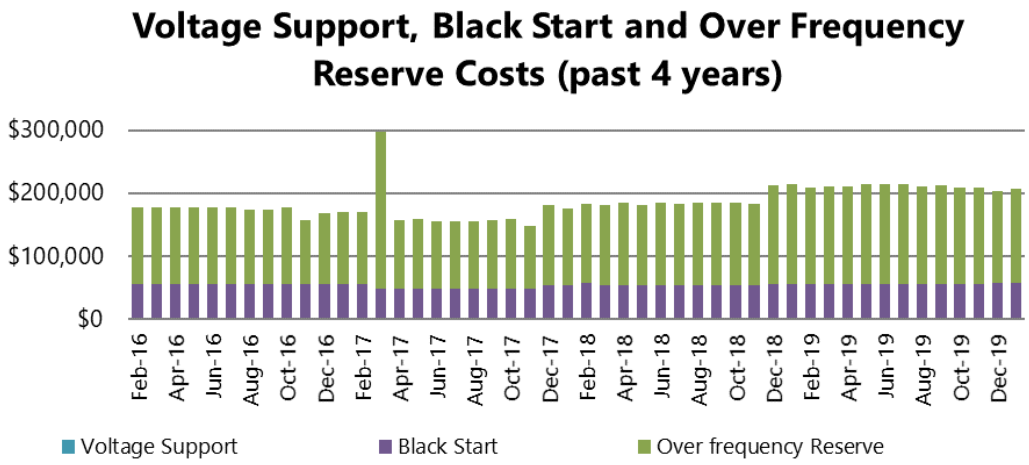
Instantaneous reserves costs increased by $450k to $2.18M (26%). This cost increase is attributable to spinning reserves as interruptible load costs actually decreased in the month.

Although both Fast Instantaneous Reserves (FIR) and Sustained Instantaneous Reserves (SIR) prices are relatively unchanged from December, January has seen a significant increase in the quantity of reserves procured. The quantity of North Island FIR procured increased by 30 per cent since December, and the quantity of South Island FIR required increased by 56 per cent. SIR procured in January increased from December in the North and South Islands by 20 per cent and 52 per cent respectively.

The HVDC pole 2 outage throughout January has meant a higher North Island reserve requirement than would be expected in January. Additionally, without bipole operation, reserve sharing to the South Island has been limited increasing the quantity of South Island reserves procured.



There is no significant change in the frequency keeping costs since December.



The availability fee paid for over frequency reserves was slightly higher this month, mainly due to the 12 days of outages of Kawarau in December reducing the fees for the previous period.

There was also a minor increase to all contracted over frequency reserves costs and black start costs as a CPI adjustment was applied in January.

There are currently no voltage support costs.

16 Commissioning and Testing

Generator commissioning

We continue to support the commissioning activities for several windfarms, geothermal, gas and solar generation projects across New Zealand.

Junction Road commissioned on 14 February. This will add a further 100 MW of peaking capacity which can be fed from the Ahuroa gas storage facility making it robust against gas supply disruptions.

17 Operational and system events

Halfway Bush 33 kV re-configuration

A modelling error was made during a Halfway Bush 33 kV re-configuration. The error resulted from a misinterpretation of market modelling requirements. This decision resulted in the Waipori generation feeders being 'islanded' during the T5 transformer outage which caused the generation to not be dispatched. The error was picked up in the pre-dispatch timeframe and corrections put in place. The incident is under investigation as a probable breach.

Management of fire risk

The Real Time Operations team continues to support management of fire risk to Transpower assets during the current high fire risk season. Events of note are an auto-reclose of Fernhill–Redclyffe circuit 2 due to a hedge fire on 30 January, and the removal from service of Oamaru–Blackpoint–Waitaki circuit 1 on 31 January. There

has also been close monitoring of a fire near the Islington–Tekapo B circuit on 31 January and both the Islington–Kikiwa 220 kV circuits and Southbrook–Waipara 66 kV circuits on 3 February.

Rangitata Flooding Event - Islington–Livingston circuit outage

Our Operations division continues to run a coordinated approach to the Rangitata river event that occurred on 8 December. Our work on this includes assessment of our ability to meet peak demand and assessment of the temporary line. We are also providing advice and recommendations on planned outages which may impact system security.

Analysis shows that the margins between the expected load and our voltage stability limit will be tight but manageable with the support of the upper South Island load controller where this is required. Once the temporary conductor is in place in April (exact date to be confirmed), our limiting factor is a thermal constraint. Details on the ratings of this conductor and transfer limits have been shared on the webpage. It is expected that this conductor will support expected winter peaks. Taking this approach has mitigated any risk with delays in the supply of steel out of China.

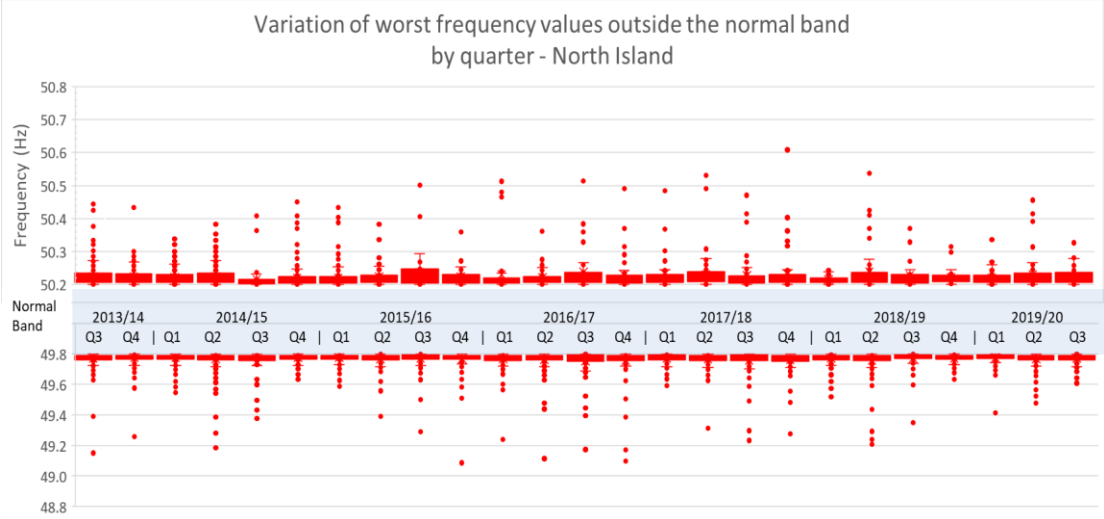
Customers are also being kept informed of any updates through regular teleconferences and via a dedicated webpage.

18 Frequency fluctuations

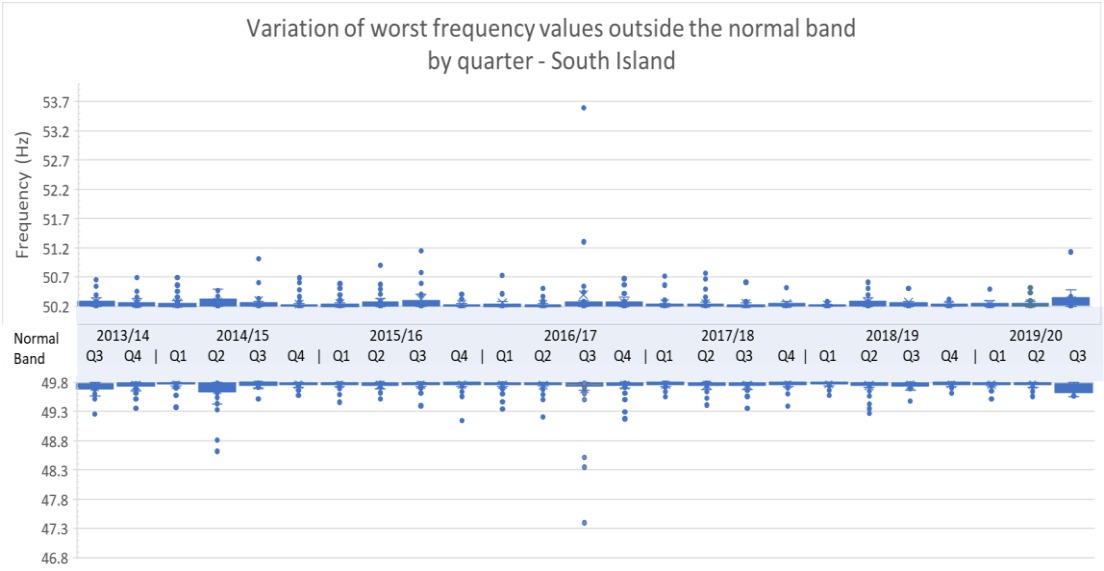
18.1 Maintain frequency in normal band (Frequency value)

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



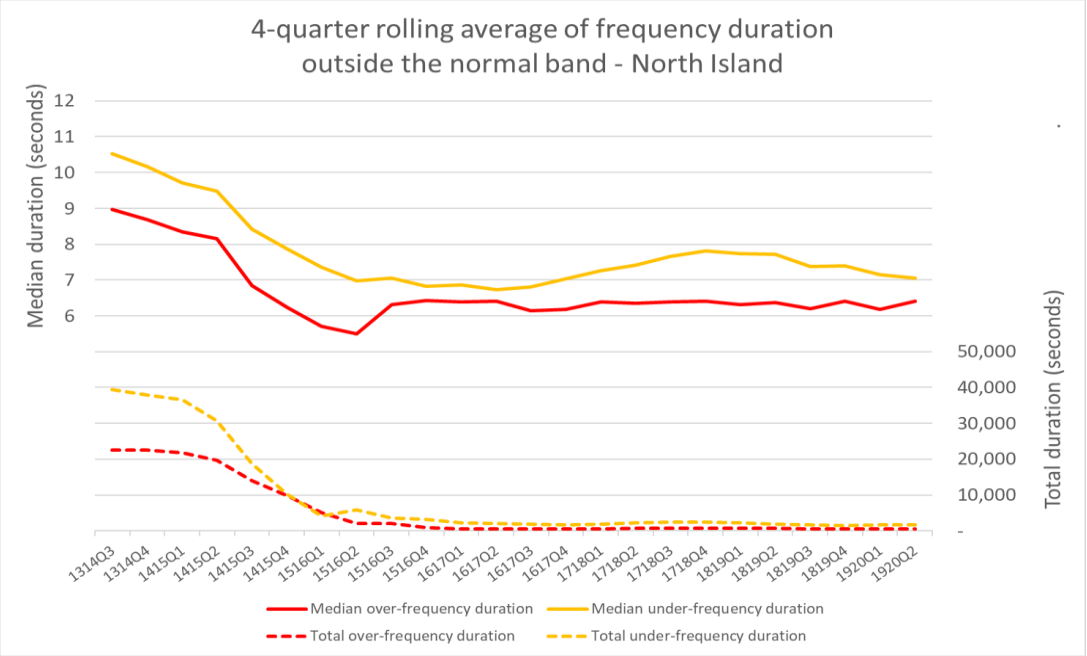
* 2019/20 Q3 contains data for January only

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.

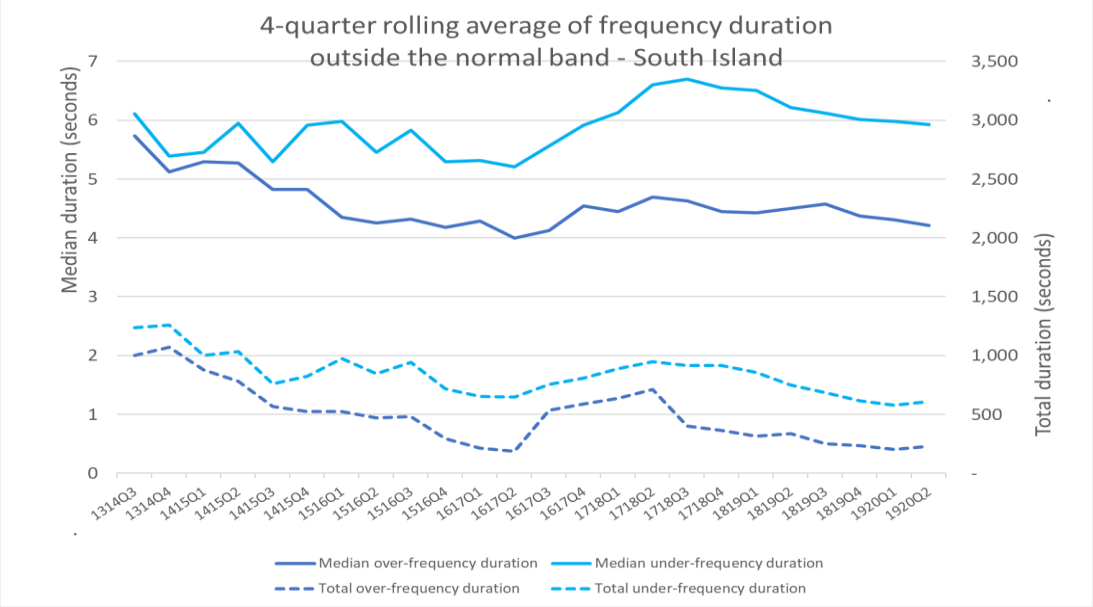
18.2 Recover quickly from a fluctuation (Time)

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

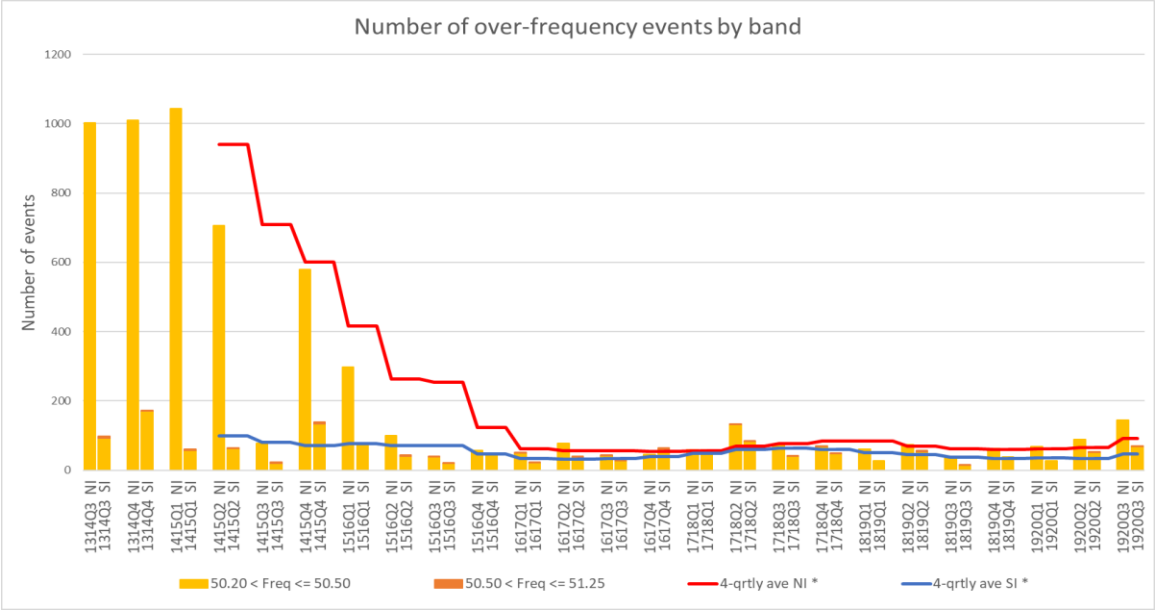


* These graphs have not been updated since 2019/20 Q2; they will only be updated at the end of each quarter

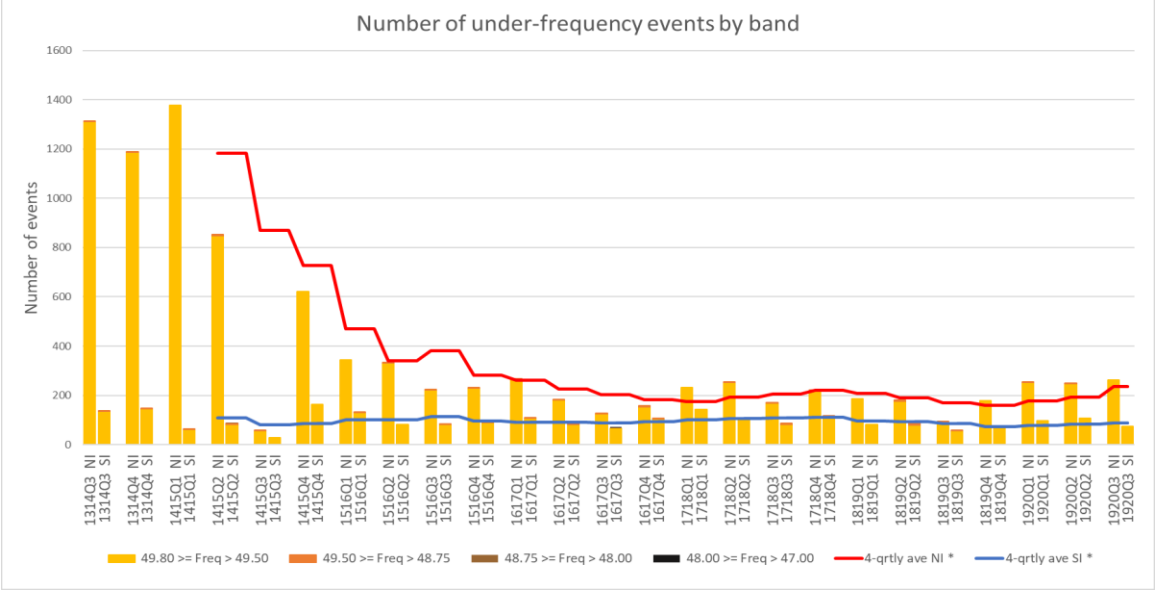
18.3 Manage frequency and limit rate of occurrences during momentary fluctuations (Number)

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 2019/20 Q3 contains data for January only.

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

18.4 Manage time error and eliminate time error once per day

There were no time error violations in the reporting period.

19 Voltage management

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

20 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	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	-	1	-	-	-	-	1	-	1	3	-	-
Warning Notice	-	-	-	-	1	-	-	-	-	-	-	1
Customer Advice Notice	6	7	4	8	17	9	14	6	15	15	14	6

21 Grid emergencies

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

Date	**Time**	**Summary Details**	**Island**
		None	

Appendix A: Discretion

Event Date and Time	Description
3 January 01:05	HLY2201 HLY5 Discretion : Required for security / voltage management. Last Dispatched MW: 173.54
3 January 04:35	HLY2201 HLY5 Discretion : Required for security / voltage management. Last Dispatched MW: 174