QUARTERLY SYSTEM OPERATOR AND SYSTEM PERFORMANCE REPORT

FOR THE ELECTRICITY AUTHORITY

Transpower New Zealand Limited
January to March 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 Q3 2019/20 (January to March 2020), in accordance with clause 3.14 of the Electricity Industry Participation Code 2010 (the Code).

As this is the final self-review report of the quarter, additional information is included as per SOSPA clause 12.3. This includes performance against the performance metrics year to date, and actions taken in regard to the system operator business plan, statutory objective work plan, participant survey responses, and any remedial plan agreed under clause 14.1(i). A summary of technical advisory services for the quarter is also provided.

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

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Commentary

This section provides a high-level update for this quarter. The remainder of the report provides supporting detail in two sections:

- System operator performance
- System performance.

Update (January to March 2020)

COVID-19 response

- Since February, Transpower has been actively preparing against the risk of a potential COVID-19 outbreak, in accordance with the latest Transpower pandemic plan.
- A Transpower CIMS team was put in place to continually to monitor the situation, including meeting 2-3 times a week, or as required in response to evolving events.
- As system operator we enacted our SO BCP on 16 March to address the situation. We have taken additional steps to protect the control rooms and our people who are skilled to undertake critical functions.
- The government directed lockdown is a key control and the requirements for self-isolation have reduced the immediate need for further measures in our control rooms.
- Further measures are being taken to manage the impact of COVID-19 in the community post-lockdown on our ability to operate our control rooms.
- Weekly updates are being provided to the Authority, the first of these was delivered on Friday 6 March.
- The Authority has also received a copy of our daily update to the National Emergency Management Centre since a state of national emergency was declared on 25 March.
- We have set up a dedicated COVID-19 webpage with links to relevant system operator information.
- We published the April NZGB report, including a low peak demand scenario to reflect demand reductions since the COVID-19 response.
- We have been adapting the load forecast to the COVID-19 level 4 lockdown profile.
- The COVID-19 situation does not present a risk to security of supply as it is reducing demand which increases our energy margins.
- The situation has impacted on day-to-day activities, including creating high workload as both grid and generator outages have been cancelled, requiring project timelines to be rescheduled, and delaying generator commissioning.

HVDC 2020 outages

- The outages completed this quarter – Pole 2 was returned to full market operation on 23 February, Pole 3 returned to service on 28 March almost two weeks ahead of plan.
- As system operator, we have facilitated extensive industry engagement with industry conferences and increased transparency, scenario analysis and communication.
- We have also seen increased collaboration from our customers and the gas industry through this period.
- There has been feedback from industry thanking us for the preparations for these outages.

Security of Supply

- National storage is just above average for the time of year positioning us well for the winter ahead.
- In addition to the HVDC 2020 outages, the coincident outages of gas infrastructure appear to have gone to plan.
- We published our draft Security of Supply Annual Assessment on 9 March and extended the deadline for feedback due to COVID-19. We still plan to publish the assessment by 30 April.

Rangitata Flooding Event - Islington-Livingstone circuit outage

- The grid owner completed work on the temporary section of the Islington-Roxburgh A line on 29 March.
- Subsequently the grid owner has advised they can offer a higher rating for the temporary line section. This reduces the risk of any restrictions on supply into the upper South Island and enables deferred grid outages for urgent work to proceed.

Real Time Pricing (RTP)

- RTP remains on track for completion of delivery business case by 19 June (new approved date).
- The Authority Board has approved funding to cover the transition to the capital delivery phase.

Situational Intelligence

- The $3,693,920 delivery business case for the first phase of the innovative and enabling Situational Intelligence programme – Streaming analytics – was approved in January.

Dispatch Service Enhancements (DSE)

- Trustpower successfully transitioned from GENCO to ICCP block 2 during lockdown. Planning continues with Genesis, Mercury and Vector to support transitions during the next quarter.

Sensitivity schedules

- We began an investigation to trial upper and lower sensitivity calculations to forecast market schedules.

Outage planning forum

- Transpower held the annual outage planning forum on Monday 16 March, jointly hosted by teams from the grid owner and the system operator functions.

Transpower's System Operations Committee (TP SOC)

- The first TP SOC meeting was held on 18 March.

New initiatives

Whakamana i Te Mauri Hiko – Empowering our Energy Future

- On 2 April, Transpower released a report on the opportunity to decarbonise our economy.
- One aspect considered in the report is distributed energy resources (DER) and how DER platforms would interface with the system operator.
- It also proposes that the grid owner develop a document similar to integrated system plans seen elsewhere as a natural extension of the Transmission Planning Report required by the Commerce Commission.

- How the market changes to accommodate DER will impact on the nature of and manner that ancillary services are provided. The system operator will need to stay abreast of how this will be managed in future.

Independent Assessment of the value of DER

- The system operator has engaged Sapere to provide a report on the different values stacks available for DER across distribution, transmission and generation. The intent of this work is to both inform the system operator and wider industry on the opportunity if industry arrangements evolve to optimise the overall value of DER in delivering an efficient mix of DER, distribution, transmission and generation expansion.

Current investigations

Moderate incident: Wellington region loss of supply 12 March 2020

- We are investigating the 12 March 2020 Wellington region loss of supply in accordance with our new significant incident reporting process. Our final report is due to the Electricity Authority in June 2020.

System operator performance

1 Customers and other relationships

Rangitata Flooding Event – Islington–Livingston circuit outage

The grid owner completed work on the temporary section of the Islington-Roxburgh A line on 29 March. The industry has been kept informed of progress via a webpage and previously via a CAN (a proposed teleconference was cancelled as the industry felt that there was sufficient information already provided). A date for the permanent line is yet to be confirmed due to disruptions associated with COVID-19.

Since construction was completed, the grid owner has reviewed the temporary line design and increased the rating of the temporary line which will enhance our ability to meet expected peak demand in the upper South Island during winter and any outages required.

In January, Meridian expressed concern over the additional risk of spill from their Aviemore and Waitaki stations when the Islington–Livingston circuit was out of service. Temporary grid reconfiguration to alleviate the constraints was considered. However, as this was not a security of supply issue it was not pursued as the Code process for reconfigurations would have taken longer than the time to implement the temporary line. These constraints were alleviated when the temporary line section came into service and the rerating of this section will have improved things further.

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 have made the following changes this year:

- The survey was initially planned to be active for a period of a month; this period has subsequently been extended due to COVID-19 disruption.
- We have increased the number of communication channels for the survey to five: email, industry forums, Transpower's customer newsletter, Electricity Authority's Market Brief and our external website.
- Based on research, we have made a number of changes to our process, including 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 have provided 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.

Transpower's System Operations Committee (TP SOC)
The first TP SOC meeting was held on 18 March. It included papers and presentations to provide context and background information on the SOSPA, strategy, performance and deliverables. The next meeting is scheduled for 25 June and we will explore if it is possible to meet with the Authority SOC at the time of this meeting.

Outage planning forum
Transpower held the annual outage planning forum on Monday 16 March. This is jointly hosted by teams from the grid owner and the system operator functions. The grid owner shares the year ahead outage plan with stakeholders, and outage planning is discussed from both a grid owner and system operator perspective. We used the opportunity to inform on a range of related stakeholder initiatives, and for the first time, invited people to attend smaller, focussed afternoon training sessions on understanding how both we and our customers use some of our tools.

Security and Reliability Council (SRC)
We attended a meeting of the SRC on 12 March to present our findings on the August 2019 UK power black-out, as well as other routine items on system operator performance and the latest New Zealand Generation Balance. Our presentations were well-received.

2 Risk & Assurance

COVID-19 response
Since February, Transpower in both its role as system operator and as grid owner has been actively preparing against the risk of a potential COVID-19 outbreak, in accordance with the latest Transpower pandemic plan. At this stage, even though the Ministry of Health stated the chance of widespread community outbreak was expected to remain low, we were prudent and erred on the side of caution by limiting travel and meetings of large groups.

A Transpower CIMS team was put in place to continually to monitor the situation, including meeting 2-3 times a week, or as required in response to evolving events. All planning is based on the most current advisory from the Ministry of Health, cognisant of our role as an essential service 'lifeline' service provider.

As system operator we enacted our SO BCP on 16 March to address the COVID-19 situation. We have taken additional steps to protect the control rooms and our people who are skilled to undertake critical functions. The aim at this stage is to minimise risk, not to completely isolate. This includes limiting access to the control rooms and in some cases, adjacent areas such as kitchens and toilets. Access will continue to be available on request for critical business reasons.

The government directed lockdown is a key control and the requirements for self-isolation have reduced the immediate need for further measures in our control rooms.

Further measures are being taken to manage the impact of COVID-19 in the community post-lockdown on our ability to operate our control rooms.

Weekly updates are being provided to the Authority, the first of these was delivered on Friday 6 March. The Authority has also received a copy of our daily update to the National Emergency Management Centre since a state of national emergency was declared on 25 March. We have set up a dedicated COVID-19 webpage with links to relevant system operator information.

Other risk matters

In January, we started reviewing our risk management framework and work to refine our risk controls.

We are progressing two process audits under our annual audit plan: the Medium Term Load Forecast process and the Outage Planning Policy.

We have completed the software audits of the Reserve Management Tool (RMT) and Scheduling Pricing and Dispatch (SPD) software as required under the Code. We have also scoped and are starting our fifth assurance audit for 2019/20 looking at our Conflict of Interest process.

We had been developing a combined industry CIMS exercise for 15 May working with the lower South Island generators, distributors and NZAS to practice working through contingency plans across multiple CIMS teams. Unfortunately, with the COVID-19 situation in New Zealand impacting normal operations across the industry, we decided to postpone the exercise. Many of the same resources who planned to participate in the exercise are heavily involved in managing the COVID-19 situation. The good work we have begun will be retained and participants will reconnect at an appropriate time.

3 Compliance

January

We did not report any new system operator breaches to the Authority in January, though we signalled one would be notified in February.

February

We reported one system operator breach to the Authority in February. This had been noted in the January monthly report, but the formal notification was in February.

- 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 as a pricing error was claimed and delayed finalising the price. This allowed amended information to be used for final pricing.

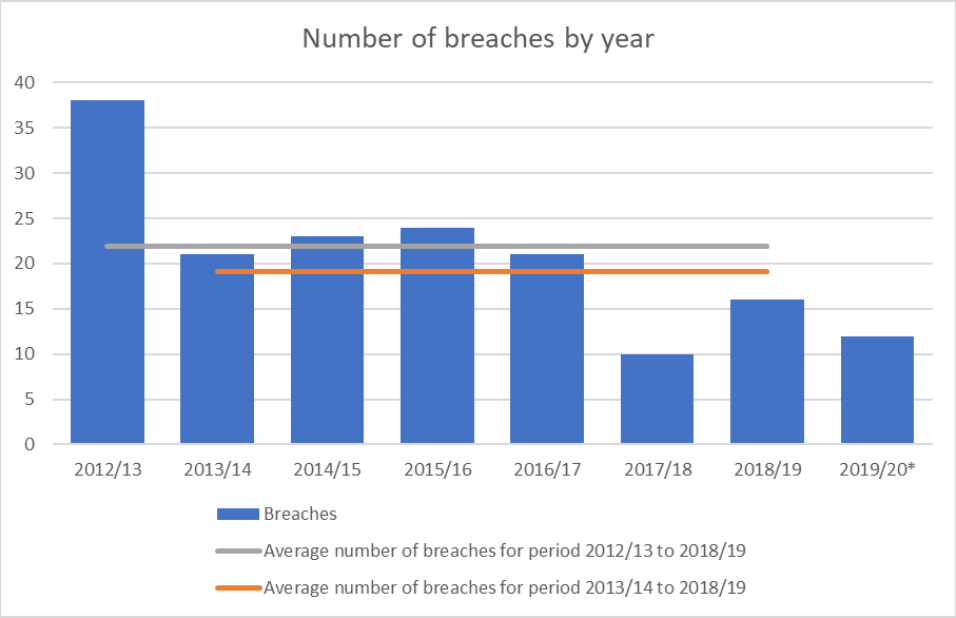
March

We reported one system operator breach to the Authority in March.

- 3966 – An erroneous input to the RTP schedule meant an inaccurate schedule was published.

No market impact occurred. The is the same error that we made in September 2019 which was also reported as a breach (3823). Further investigation has identified that Market database code changes are required to address this issue with no practicable way to fix this within the system. We have put in place an interim process to prevent further occurrence until the proposed removal of the RTP schedules with the Real Time Pricing project.

We have five outstanding breaches with the Authority compliance team.



* Data is only for 9 months

Refer to Appendix A for instances where the system operator has applied discretion under 13.70 of the Code.

3.1 Update on South Island AUFLS event (2 March 2017)

Actions from the 2017 South Island AUFLS event

This section was included in the report to provide updates on the 2 outstanding actions from the 13 identified, that were still open at the end of the 2018/19 year. All actions are now completed. As part of a wider audit there will be a management review to ensure actions have been completed as envisaged.

4 Separation of Transpower roles

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

January

No new conflicts of interest were raised or closed during January.

February

No new conflicts of interest were raised or closed during February.

March

Five items have been opened in the register during March and one has been closed.

- A participant requested information concerning the performance of a third-party participant's asset. Once permission was received from the owner of that information, it was provided. This item has been closed.
- A new conflict of interest has been added to our register regarding the system operator's participation in discussions of Transpower's proposed plans for its demand response platform.
- The Electricity Authority raised a concern over a perceived conflict of interest where the same legal adviser was used by the system operator and grid owner to provide advice on the December 2018 Under Frequency Event causer decision. A formal process around appointing separate legal counsel for the system operator and grid owner is being established to address this concern.
- To ensure an impartial response during the COVID-19 lockdown, the system operator has instigated a separate BCP response. Part of this response includes a specific role to monitor compliance for all participants during the incident.
- During the COVID-19 lockdown, a member of staff identified that he and his wife work for different electricity industry participants. Guidance has been provided to ensure confidentiality and impartiality can be maintained during the COVID-19 lockdown.

We have 12 open items in the register.

System Operator Open Conflict of Interest Issues		
ID	Title	Managed by
9	**HVDC outages 2019/20**: The nature and size of the potential impact of the outages requires prudent management of the system operator and grid owner roles in this process. This includes lessons learned.	Operations Planning Manager
18	**Recommendations from the Advisian conflict of interest review**: Ensure that the recommendations are fully implemented across the whole of Transpower to strengthen our conflict of interest management around the dual roles.	Compliance and Risk Manager
21	**Staff interest in generator commissioning**: Manage the personal conflict of a staff member who has a family relationship with the project lead for a generation commissioning project.	GM Operations
22	**Security classifications for PI Vision database access**: Seek assurance that Transpower's information security policies have been adhered to and applied for the implementation of PI vision.	SO Power Systems Group Manager
26	**Response to 14 December UFE recommendation**: Ensure the system operator maintains role separation with regard to determining the causer of the event – including with the provision of information and carrying out the process	SO Power Systems Group Manager
27	**SO employee partner to work for GO:** Partner of a System operator employee hired by the grid owner.	SO Power Systems Group Manager
28	**Investigation into loss of SCADA 31 Oct 2019:** System event involving industry. System operator investigating performance of all participants in the event. Completing report for Authority.	SO Power Systems Group Manager
29	**Preparing the Net Benefit test – SO involvement:** System operator 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:** System operator ensure options and involvement does not favour one demand response option over another.	SO Market and Business Manager
32	**Use of the same legal advisor:** Electricity Authority raised potential for a breach of the Policy Statement due to the use of the same legal advisor as the grid owner.	SO Power Systems Group Manager
33	**Sharing working space during lockdown:** Staff member sharing work-space with wife who works for another industry participant.	Grid and Systems Operations Manager
34	**Impartial response to COVID-19 pandemic:** System operator instigated separate BCP response to ensure impartial response and monitoring of participant behaviour during the pandemic.	General Manager Operations

5 HVDC 2020 outages

The HVDC 2020 outages completed on Saturday 28 March with the successful return of Pole 3 to service – almost two weeks ahead of plan.

The first phase of the outages was the HVDC Pole 2 system testing (following the control system equipment (VBE) replacement); this was carried out successfully and to plan. This started on 17 February and Pole 2 was returned to full market operation on 23 February at 16:00, with careful management of communications to industry.

In the run-up to the Pole 2 testing period, we coordinated with the grid owner on testing plans and made system operator resource available to assess weekend tests once they are completed. This was to ensure the early return of Pole 2 following successful tests, or to provide 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 kept close watch on both market and operational implications, including performance of frequency keeping.

We continued to monitor generation margins during and after the outages, as OMV full and partial outages were notified.

The second phase of the outages, during which the grid owner completed reconductoring work and maintenance, progressed well, with weather helping enable an early completion to the reconductoring.

These 13-week outages have marked the most significant outages since Pole 3 commissioning in 2013. As system operator we have facilitated extensive industry engagement, with industry conferences and increased transparency, scenario analysis and communication. There has been feedback from industry thanking us for the preparations for these outages. We have also seen increased collaboration from our customers and the gas industry through this period. We will close our project with a review of any lessons learned through the planning and implementation phases.

6 Project updates

6.1 Market design and service enhancement project updates

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

Real Time Pricing (RTP)
The Real Time Pricing project continues to make good progress during the COVID-19 lockdown. We will perform an assessment of any impacts to scheduled milestones in early April although at this stage no significant red flags have been raised.

We are nearing completion of the solution requirements and the High Level Design is underway. The Authority Board has approved the inclusion of Dispatch lite products within the scope of the delivery business case, extending the deadline for the delivery business case to 19 June.

In March, we completed the TAS 87 report which identifies options for improving the real time security of the dispatchable demand products. The Authority has advised us that the options we reported on should be brought into in the current phase of work for inclusion in the business case. A change request to include the TAS87 scope is being drafted (Change request CR003) which, when approved will extend the business case completion date to 10 July; an additional three weeks.

Change request CR002 sought and was granted formal approval by the Authority for increased funding of the project out to the end of August to cover the period the Authority requires to complete the business case approval process. We continue to work with the Authority to plan industry engagement activities beyond the COVID-19 level 4 lockdown period.

Dispatch Service Enhancements (DSE)

We have been working with participants during lockdown period to understand any impacts COVID-19 may have on transition plans. Trustpower successfully transitioned to ICCP block 2 on 19 March as planned. Work is progressing with Genesis and Vector planning for transitioning in May. Mercury has indicated there may be some delay to their transition in Q2 of 2020, but work continues aiming for transition go-live on 27 May.

Situational Intelligence

The $3,693,920 delivery business case for the first phase of the innovative Situational Intelligence programme – Streaming analytics – was approved in January. 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 twelve months, commissioning in September 2020.

Extended Reserves (AUFLS)

We completed analysis and a draft TAS report (TAS 88) recommending the next steps for establishing baseline data for the extended reserves project. The due date for delivery has been extended June, at the Authority's request, to absorb underutilised baseline TAS hours in quarter four of FY 2020/21.

Reserve Management Tool (RMT)

In February, we began defining the enhancements to the reserve management tool. The delivery business case is scheduled for completion in August 2020.

Sensitivity Schedules

We have started an investigation into producing upper and lower sensitivity calculations to the forecast market schedules (Non-Response Schedule (NRS)). Price forecasts can be very sensitive to the load forecast, however currently, Transpower produces the one forecast price per trading period (no sensitivity). The trial will produce, and make available to market participants, upper and lower sensitivities to the forecast price due to load variations. Trial results will be available on Transpower's website in July 2020.

Customer Portal – SO Modelling Database

The first phase of the Customer Portal project, delivering a like-for-like replacement of the system operator modelling database, went live in March. The data has been migrated to new platform and planning is underway for the second phase of project – which will re-platform the system operator Asset Capability Information Register.

SCADA programme

The new SCADA environments to support the delivery of the SCADA programme were delivered in January. Parallel work in the SCADA programme involves us upgrading the SCADA front end, Habitat and desktop; and working on ICCP, file transfer, and the energy management platform.

6.2 Other projects

Whakamana i Te Mauri Hiko – Empowering our Energy Future

On 2 April, Transpower released a report showing how accelerated electrification stands to provide a stronger, more reliable system with much lower reliance on fossil fuel imports at the same time as cutting average household energy costs. This report builds on the original Te Mauri Hiko released in 2018.

One aspect considered in the report is distributed energy resources (DER) and how DER platforms would interface with the system operator.

It also proposes that the grid owner develop a document similar to integrated system plans seen elsewhere as a natural extension of the Transmission Planning Report required by the Commerce Commission.

How the market changes to accommodate DER will impact on the nature of and manner that ancillary services are provided. The system operator will need to stay abreast of how this will be managed in future.

Independent Assessment of the value of DER

The system operator has engaged Sapere to provide a report on the different values stacks available for DER across distribution, transmission and generation. The intent of this work is to both inform the system operator and wider industry on the opportunity if industry arrangements evolve to optimise the overall value of DER in delivering an efficient mix of DER, distribution, transmission and generation expansion.

Energy Futures: New Generating Technology for Ancillary Services

We are finalising the TAS 89 report 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. As part of this stream of work, we held workshops in January to understand impacts on the Code and on the market system.

Inertial monitoring project

The pilot inertial monitoring project for New Zealand's power system has started. Frequency monitoring equipment arrived in the last week of February. Unfortunately, due to travel restrictions associated with COVID-19 we have been unable to deploy all the devices, so the project has been paused. At present there are still four devices actively monitoring the system and recording data.

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

Lift	Deliver	Refresh	Future
• Lift our capability through addressing recommendations from recent events and reviews	• Deliver Real Time Pricing - will change focus of energy dispatch, to be delivered by 2023	• Refresh with industry our external reports and engagement processes	• Future - implement new systems to achieve the real time operating vision

During this quarter:

- We completed the actions from the Deloitte maturity check on risk and assurance.
- We completed the fourth and final Planned Outage Co-ordination Process (POCP) meeting on 14 February.
- We have begun a second stage POCP project to review the operational notifications.
- We are on track with the Outage Planning Enhancements project investigation phase; the capital phase of the project is currently being prioritised alongside the wider programme of work.
- We have a developed a plan to work through our risks across all Operations teams. This work will inform the review of our risk bow ties, targeted for completion in July.
- The first phase of the Operations Customer Portal, the replacement of the System Operator Modelling Database (SOMD) went live into production on the 3 March. This is an internally facing component. The planning for migration and the next phase, Asset Capability Statements (ACS) is underway.
- The detail for the RTP project is included in section 7.1.

Initiatives in the operational area are on-hold while COVID-19 priorities are in place. For our projects including RTP, Operations Customer Portal, and Digital Switch Management, work continues to progress as we develop new ways of working remotely.

Continuous business improvement initiatives

We have six improvement initiatives underway with three being added during the last period to review the operating control and assurance processes as well as an assessment of removal of operational fax. The operational fax initiative is currently being planned with a challenge of targeting removal of fax within the next 12 months.

7 Technical advisory hours and services

The following table provides the technical advisory hours for Q3 and a summary of technical advisory services to which those hours related (SOSPA 12.3 (d) refers).

TAS Statement of Work (SOW)	Status	Hours worked during Q3
TAS SOW 83 - Provide ROM for system changes to support removal of constrained on payments for ramp-constrained generation	In progress	0.00
TAS SOW 87 - Options for improving the operation of DD under RTP	In progress	115.25
TAS SOW 88 - Extended Reserve: project reset scoping	In progress	335.00
TAS SOW 89 - New generating technology in the wholesale market	In progress	304.00
TAS SOW 90 - Simultaneous Feasibility Testing (SFT) SFT Studies for UTS Claim	Complete	40.00
Total hours		**794.25**

8 Outage planning and coordination

2020/21 Outage Plan

Transpower published its 2020/21 draft annual outage plan on 29 January. During February, ahead of the 2020 Annual Outage Planning Forum on 16 March, we met with generators, distributors and direct connects to align outage requirements where possible with grid owner outages for the 2020/21 annual outage plan.

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.

We published the April NZGB report, including a low peak demand scenario to reflect demand reductions since the COVID-19 response.

Near real time

Outage numbers in February were high, approaching 600, and March was expected to be higher. Whilst this time of year is the busiest part of the year, outage numbers were coming in higher than last year. This prompted us to take a closer look at workloads. There continued to be short term outage changes, although lower than February last year. There were also a high number of complex outages – with a similar number scheduled for March. All of these outages require assessment for system security.

As the grid owner and other asset owners responded to the COVID-19 level 4 pandemic alert, we are seeing cancellations, or deferrals of outages; these changes are keeping outage assessment workloads high.

9 Power systems investigations

United Kingdom power outage

We have completed our report on the 9 August 2019 significant power system event in the United Kingdom which impacted over 1 million customers. We presented a summary of our findings at the Security and Reliability Council in March. We are finalising the longer version of the report that we will publish a report on our website.

Moderate incident: SCADA failure 31 October 2019

We have delivered our report to the Authority on 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 reported it as a self-breach.

Moderate incident: Northland loss of supply 27 November 2019

We delivered our report to the Authority on the 27 November 2019 Northland loss of supply in accordance with our new significant incident reporting process; no feedback has been received at this stage.

Moderate incident: Wellington region loss of supply 12 March 2020

We are investigating the 12 March 2020 Wellington region loss of supply in accordance with our new significant incident reporting process. Our final report is due to the Electricity Authority in June 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. Initial discussions between the grid owner and windfarm asset owner have been held in March to determine the best mitigation.

10 Performance metrics and monitoring

The following dashboard shows system operator performance against the performance metrics for the financial year to date as required by SOSPA 12.3 (a).

Those metrics with a weighting will be used in the calculation of the system operator incentive payment.

		Annual Target	Actual to date	Weighting
Our customers are informed and satisfied				
Annual participant survey result		81%	Not currently available	5
Annual participant survey result response rate - First tier stakeholders		80%	Not currently available	
On-time special event preliminary reports		90% ≤ 10 business days	No projects to date	5
Future thinking and insights	Future thinking report	≥ 1	0	5
	Publicly available market insights	≥ 8	37	5
Quality of written reports		100% of standard	100%	
We maintain Code compliance and meet our SOSPA obligations				
Market breaches remain below threshold		≤ 3 @ ≥ $40k	0	10
Breaches creating a security risk - below threshold/within acceptable range		≤3	0	10
On-time Code and SOSPA deliverables		100% (54 *)	100%	10
We deliver projects successfully				
Improved project delivery	Service Maintenance projects	≥ 60% on time	0%	
		≥ 60% on budget	0%	
	Market Design and Service Enhancement projects	≥ 60% on time	0%	
		≥ 60% on budget	50%	
Accurate capital planning		≥ 50%	0 to date	10
We are committed to optimal real time operation				
Sustained infeasibility resolution		80% ≤ 10am or equiv	87%	5
High spring washer resolution		80% ≤ 10am or equiv	0 to date	
Our tools are fit for purpose				
Capability functional fit assessment score		75.00%	Not currently available	
Technical quality assessment score		65.00%	Not currently available	
Sustained SCADA availability		99.90%	99.97%	10
Maintained timeliness of schedule publication		99.00%	99.99%	10

* No Market Design investigation proposals were developed this year (by agreement with the Authority)

As part of the Strategic Objective Work Plan for 2019/20, we have developed a Dispatch Accuracy dashboard for energy dispatch. This is a means of monitoring overall industry performance and is contained in Appendix B.

11 Cost-of-services reporting

We provided the Authority with a final report on the cost-of-services for financial year 3 (2018/19) in February. This incorporated feedback from the Authority to the report sent out in January.

12 Actions taken

The following table contains a full list of actions taken during Q3 regarding the system operator business plan, statutory objective work plan, participant survey responses and any remedial plan, as required by SOSPA 12.3 (b).

Item of interest	Actions taken
(i) To give effect to the **system operator business plan**:	• We completed the fourth and final Planned Outage Co-ordination Process (POCP) meeting on 14 February. As part of these forums we investigated options for changes to POCP to enable greater information disclosure by energy market participants. • We published our draft Security of Supply Annual Assessment on 9 March - our 10-year view (2020 to 2029) of security of supply for four supply and demand scenarios. Once the final results are published in April, we will hold an industry workshop to discuss the results and post an online tool on our website where participants can view results based on different combinations of scenarios and sensitivities. • All participants have scheduled a time slot for transition onto new ICCP or web services dispatch platform between now and December 2020. The next three transitions are with Mercury, Trustpower and Genesis.

(ii) To comply with the **statutory objective work plan**:	• Papers outlining proposals for the five performance metrics for the 2020/21 are almost completed. Due to the COVID-19 situation, and associated disturbances, we requested to extend the deadlines for the metrics. The original deadlines were 1 April, the revised dates agreed with the Authority are as follows:
	  • Role impartiality 8 April
	  • Perception of Added Value 8 April
	  • Project delivery performance 8 April
	  • Dispatch accuracy - energy 15 April
	  • Dispatch accuracy - reserves 22 April

(iii) In response to participant responses to any **participant survey**:	**Area of growth identified in the June 2019 survey** • *Improve demand forecast*: In addition to all the improvements already made this year to the demand forecast, we have been adapting the forecast to the COVID-19 level 4 lockdown profile. The changes made and observations from the first few days of the lockdown were published as an insight on the Transpower website on 27 March.
(iv) To comply with any **remedial plan** agreed by the parties under SOSPA 14.1	N/A – No remedial plan in place.

System performance

13 Security of supply

By the end of the quarter, national storage is just above average for the time of year positioning us well for the winter ahead.

It was a busy few months with coincident major infrastructure outages in the electricity and gas sectors. This was due to industries making the most of favourable weather conditions and associated low demands through the summer months. The most notable of these outages were the HVDC outages, Pohokura outage, and Ahuroa outage which all placed reliance on North Island generators to meet North Island demand at a time when North Island inflows are typically low. All outages appear to have gone to plan.

Hydro storage

South Island inflows have been above average which led to much spilling through early summer. The opposite was true in the North Island with lower than average inflows resulting in North Island hydro storage finishing the quarter at 70 per cent of average for the time of year. But the successful completion of the major outages combined with reduced demand due to the COVID-19 situation has positioned the market well to enable conservation of North Island hydro storage as inflows rise towards winter.

Gas supply and Electricity Risk Curves

The Pohokura gas field shut down all production from 11 March to 24 March to enable maintenance of the field's onshore production station. The full shutdown was expected to make the market very tight for those looking to buy gas. The outage was modelled in the Electricity Risk Curves (ERCs), and due to the current high levels of hydrology represented no risk to security of supply.

In February, we had observed Genesis running Huntly hard, but in the last few weeks of the month output from the Rankine units reduced due to Waikato river heating (common at this time of year). At the same time, Stratford's TCC plant came online potentially indicating a Contact may have been covering Genesis reduced output.

Security of Supply Annual Assessment

We published our draft Security of Supply Annual Assessment on 9 March – our 10-year view (2020 to 2029) of security of supply for four supply and demand scenarios. We subsequently extended the deadline for feedback due to COVID-19. We still plan to publish the assessment by 30 April.

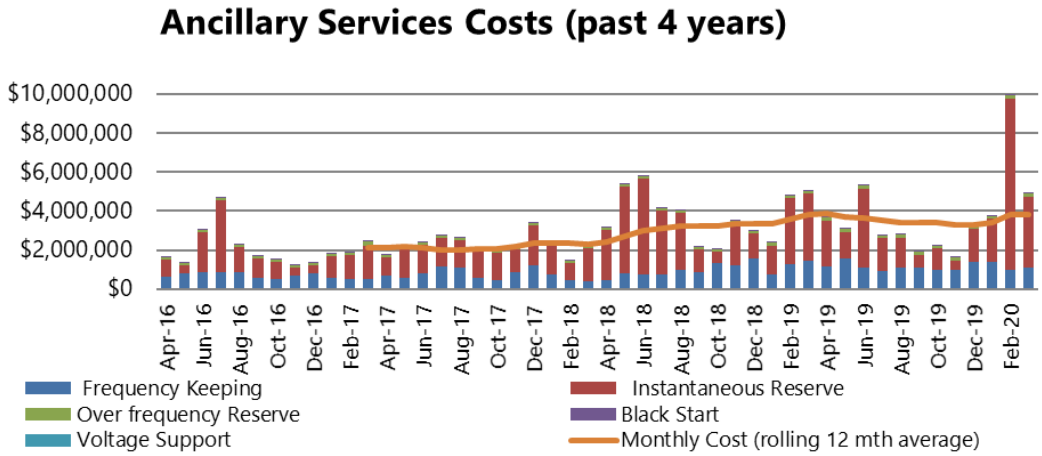
Results from this year's assessment indicate that, for all scenarios, new generation investment will be required around 2024-25. If this investment is delayed, then New Zealand could face increased risk of winter shortfalls. There is, though, enough known new generation options, ready for development, to ensure that an efficient level of reliability can be maintained right throughout this decade.

Once the COVID-19 situation allows, we will hold an industry workshop to discuss the results and post an online tool on our website where participants can view results based on different combinations of scenarios and sensitivities.

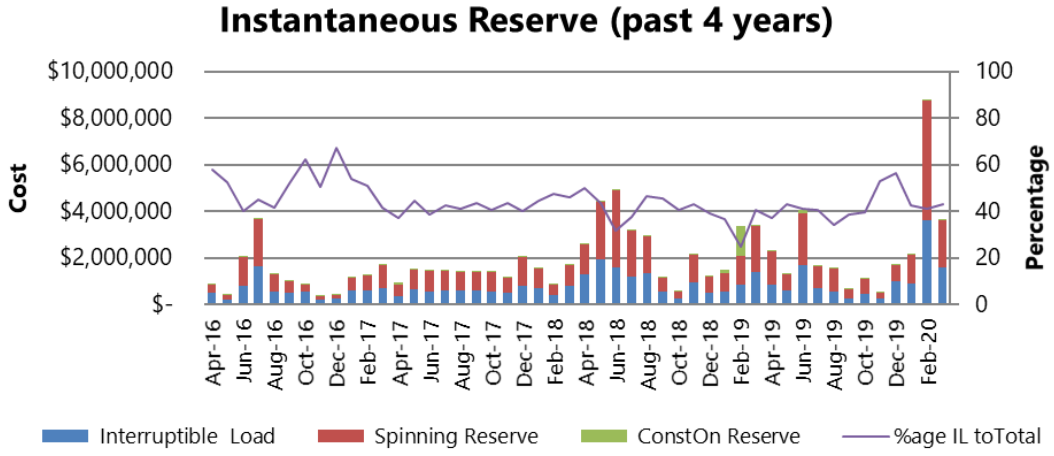
Next quarter

Looking ahead to the next quarter, we expect the dominating issue for the industry to be the COVID-19 situation. The COVID-19 situation does not present a risk to security of supply as it is reducing demand which increases our energy margins. How demand returns post-lockdown period is currently uncertain and an area of work we will need to refine in the coming quarter.

14 Ancillary services



This quarter's ancillary service costs were $18.7 million, which is a 158 per cent increase compared to Q2's costs of $7.3 million. The large variation is mostly attributable to the instantaneous reserve costs in February which were almost $9 million. This high instantaneous reserve costs are a result of the planned HVDC outages that limited both the HVDC energy transfer capacity and the ability for reserves to be shared between islands. Greater detail on this is contained in the instantaneous reserve costs section below.



This quarter the instantaneous reserve costs were $14.6 million, which is an increase of 336 per cent from the previous quarter ($3.3 million) and the main driver for overall increases in ancillary services this quarter. Interruptible load costs increased by $4.4 million (264 per cent increase), spinning reserves by $6.7 million (423 per cent increase) and constrained on costs by $53k (89 per cent increase).

In January, although both Fast Instantaneous Reserves (FIR) and Sustained Instantaneous Reserves (SIR) prices are relatively unchanged from December, there was 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.

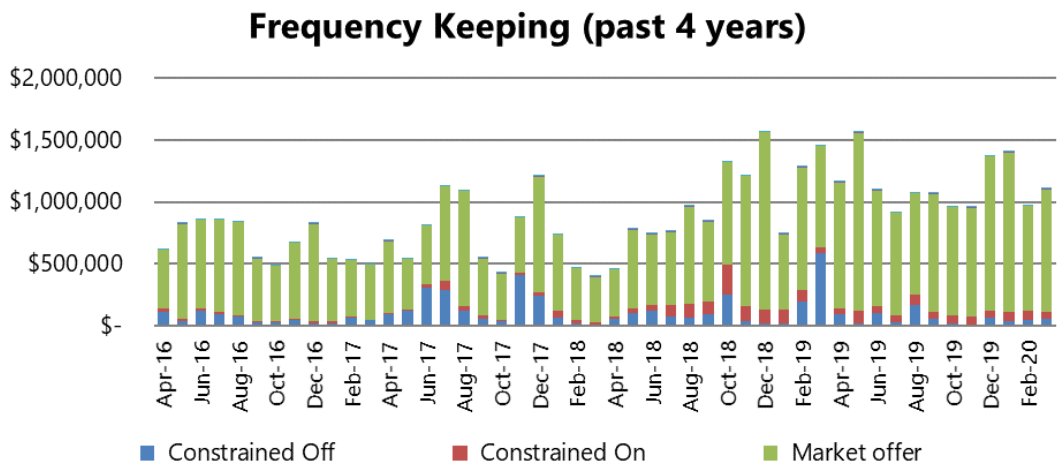
The HVDC pole 2 outage in January meant a higher North Island reserve requirement than would be expected in a typical January. Additionally, without bipole operation, reserve sharing to the South Island has been limited increasing the quantity of South Island reserves procured.

Instantaneous reserves costs jumped dramatically in February by $6.6 million to $8.8 million (304 per cent increase). With restricted transfer capacity on the HVDC due to a planned outage and exceptionally high South Island hydro lake levels, the HVDC was almost entirely in north transfer - setting a high North Island reserve requirement during the month. North Island SIR quantities increased by 15 per cent, while Fast Instantaneous Reserves FIR quantities increased by a larger 30 per cent. By comparison, South Island reserve quantities are decreasing month on month due to increased reverse reserve sharing on the HVDC during north energy transfer (this was high relative to its maximum capability – given much of the time it was operating in monopole mode).

Separation in reserve prices occurred between the islands with average North Island SIR prices increasing from $1.94/MWh to $3.23/MWh, while FIR prices jumped significantly from $9.57/MWh to $38.28/MWh (400 per cent increase). Average SIR and FIR prices in the South Island declined due to the increased reverse reserve sharing from the North Island. Procured quantities of South Island FIR and SIR decreased from January by 14 per cent and 22 per cent respectively.

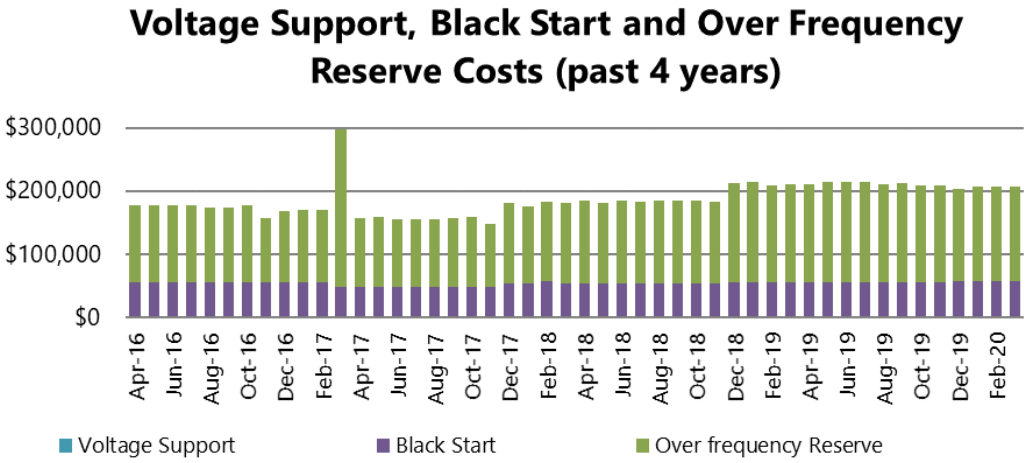
The March instantaneous reserves costs reduced from the high February levels back down to more typical levels. The major driver being South Island hydrology as throughout February and March the storage levels decreased. The result of lower South Island storage meant that the HVDC north energy transfer decreased which affected the MW of reserves required in the North Island.

The reduction in the quantity of North Island reserves required had the dual effect of decreasing the procured MW and the price of those reserves (as a lower MW requirement generally means lower reserve prices). There were also more shared reserves from the South Island during March as the HVDC was not transferring as much energy northwards as it was in February.



This quarter the frequency keeping costs were $3.5 million, a small 6 per cent increase to the previous quarter's costs of $3.3 million.

The higher frequency keeping costs seen in December continued through to January, mainly driven by the market costs as generators place a higher value on holding capacity to use as frequency keeping compared to their preference to generate. Both February and March frequency keeping costs were closer to the previous cost levels.



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

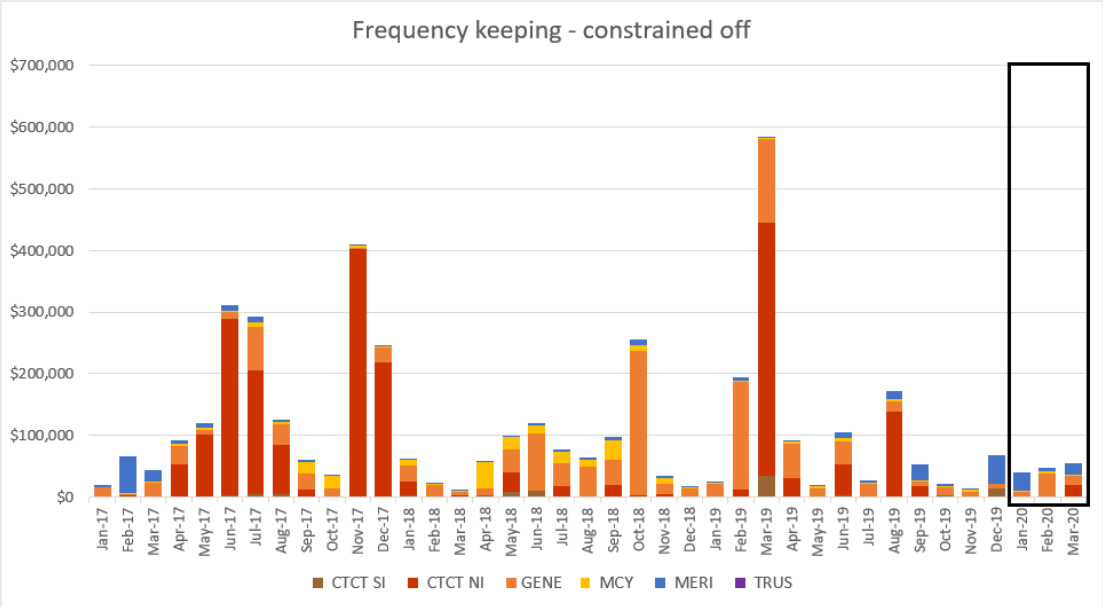
There was also a minor increase to all contracted over frequency reserves costs and black start costs as a CPI adjustment was applied in January.

There are currently no voltage support costs.

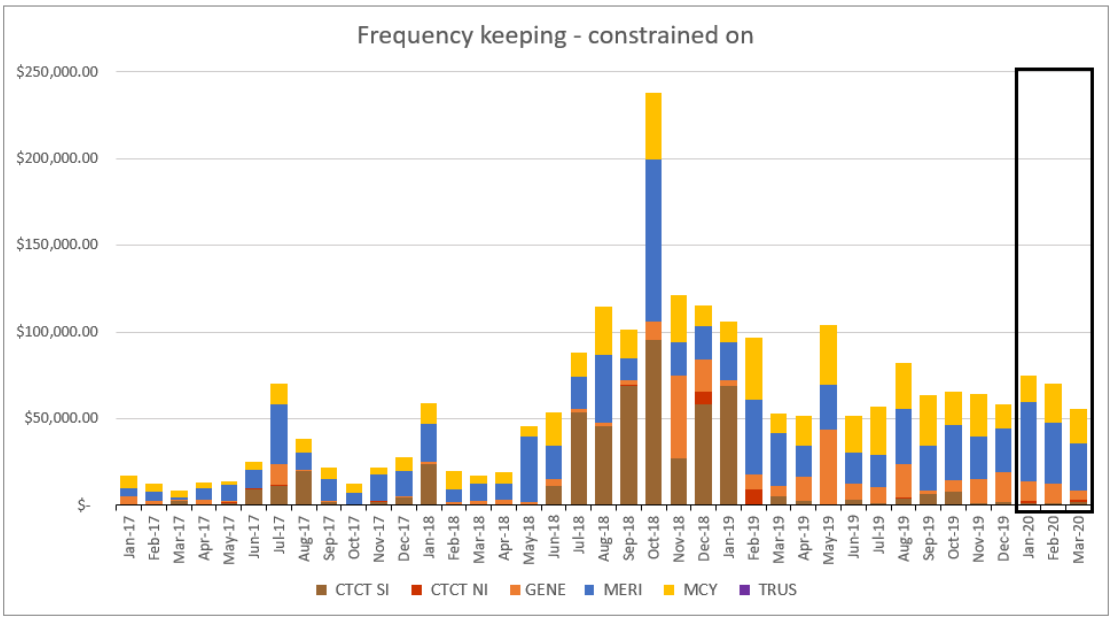
14.1 Constrained on/off costs

Note: Where there is a high payment, as opposed to in increasing/decreasing trend, it will often relate to payments over a small number of trading periods.

Frequency Keeping

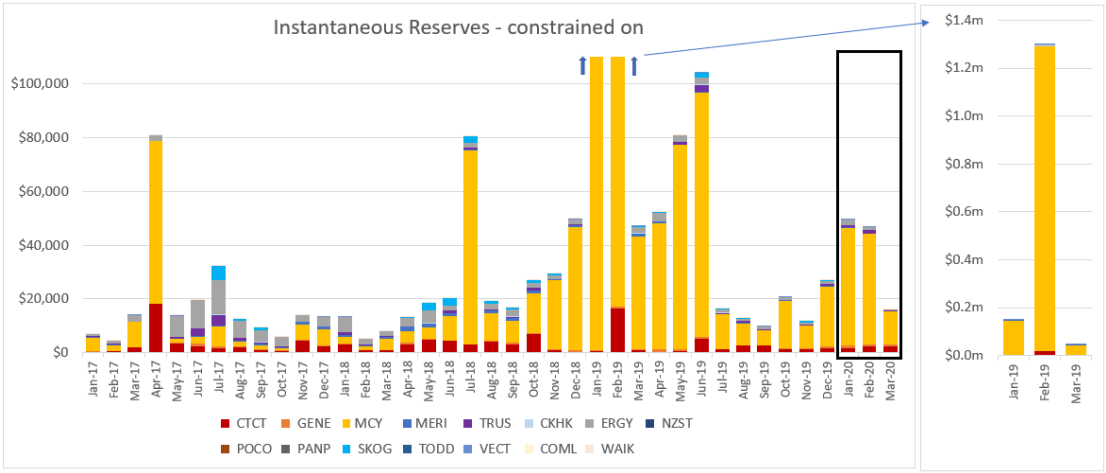


The constrained off costs this quarter reflect the costs the generators placed on backing off energy to provide frequency during the HVDC outages.



Frequency keeping constrained on costs this quarter also are a reflection of the requirements during the HVDC outages.

Instantaneous Reserves



The instantaneous reserves constrained on costs increased this quarter compared to last quarter. These variations are mostly due to costs at Maraetai – to provide reserves during the HVDC outages.

Note: The graph shows the costs for the January to March 2019 on a different axis as they are considerably higher than constrained on amounts for instantaneous reserves for any other period. This was a data issue and the Clearing Manager reprocessing this period. The changes in the amounts were reflected in subsequent invoices.

15 Commissioning and Testing

Generator commissioning

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

Todd Generation Taranaki Limited have finished commissioning their Junction Road gas turbines. Generation is now available for normal market dispatch.

Work on the following generation commissioning projects scheduled to be completed in 2020 continues:

- Ngawha (30 MW geothermal into Kaikohe 110kV, August 2020)
- Turitea North (118 MW wind into Linton 220kV, August 2020)
- Waipipi (130 MW wind into Waverly 110kV, October 2020).

With similar commissioning dates being targeted by customers, care will be needed to manage their expectations should clashes occur for access to the grid for testing.

The COVID-19 situation is likely to delay the commissioning of these new generation assets due to work stopping on site due to lockdown. We have been actively engaging with asset owners during this period to progress their commissioning documentation so as to avoid any further future delays.

16 Operational and system events

January

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. We reported the breach on 27 February.

Management of fire risk

The Real Time Operations team continued to support management of fire risk to Transpower assets during the high fire risk season. Events of note were 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 was also 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 continued to run a coordinated approach to the Rangitata river event that occurred on 8 December. Our work on this included assessment of our ability to meet peak demand and assessment of the temporary line. We also provided advice and recommendations on planned outages which may impact system security.

February

There were no major operational and system events in February. However, it was a very busy month, managing a high workload of outages, and supporting the Junction Road commissioning.

March

Haywards loss of supply incident

We have initiated a moderate incident review in accordance with our significant incident reporting process regarding the Haywards loss of supply incident on 12 March.

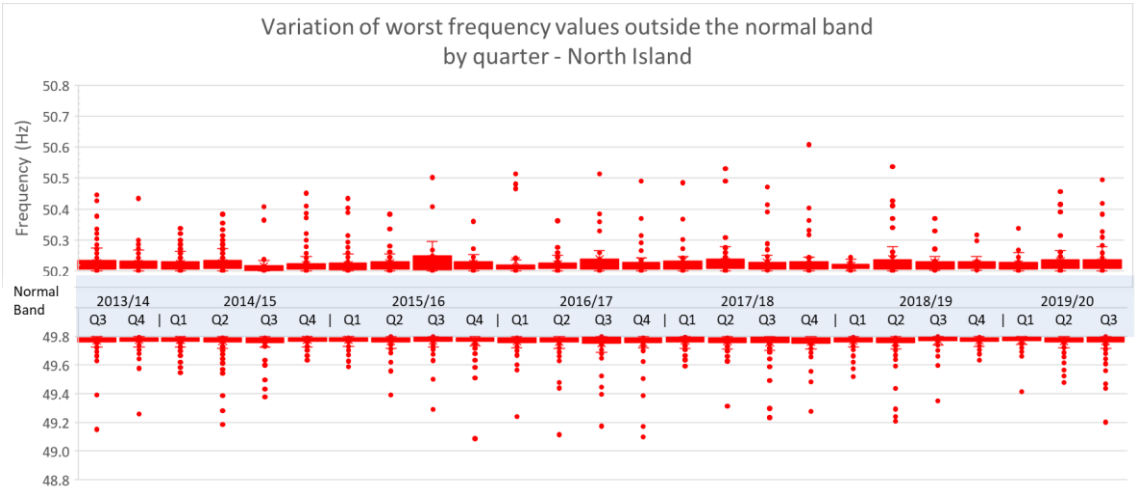
17 Frequency fluctuations

This quarter has seen a rise in both the occurrence and durations of frequency excursions outside of the 49.8 – 50.2 Hz deadband. The rise correlates strongly with the HVDC outages that lasted over the majority of the quarter. As these outages and the consequent reduction in HVDC modulation effectiveness would explain the observed increase, no further analysis is proposed unless this trend is observed to continue

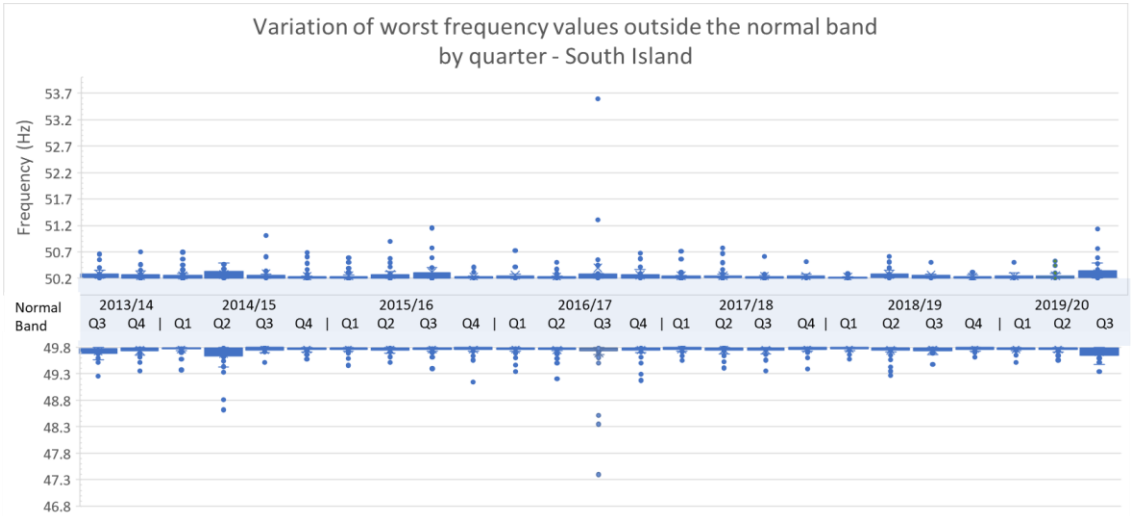
17.1 Maintain frequency in normal band (Frequency value)

The following charts show the distribution of the worst frequency excursion outside the normal band (49.8 to 50.2 Hz) by quarter since July 2014, including the reporting period.

North Island



South Island

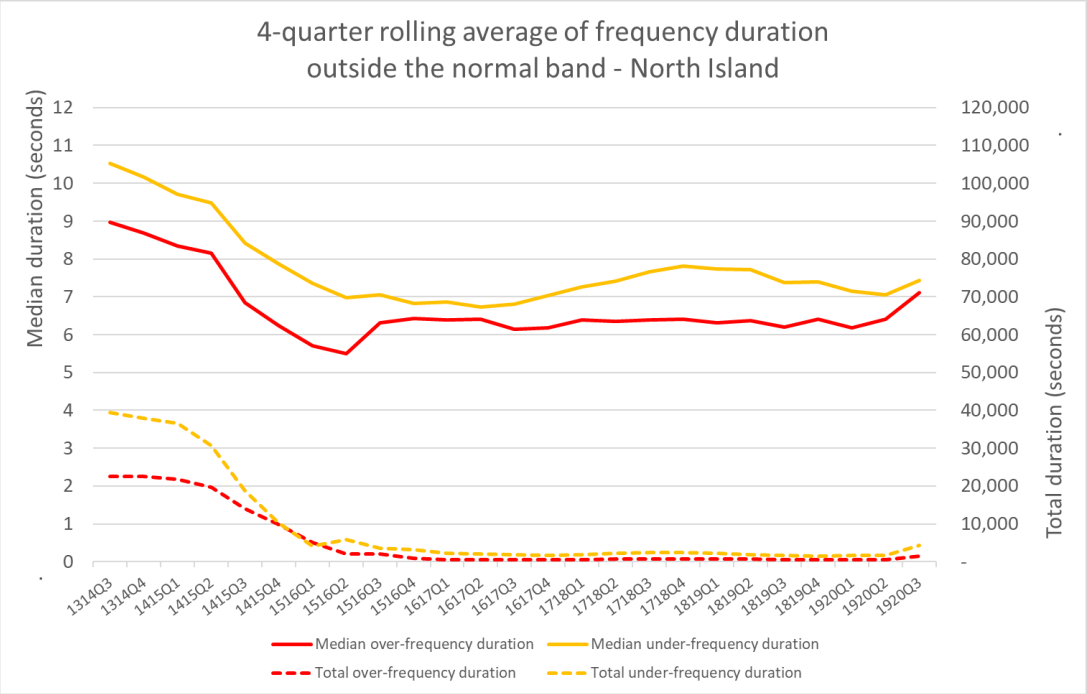


Note: These box and whisker charts show the distribution of data. The “box” represents the distribution of the middle 50% of the data, the “whiskers” indicate variability, and outliers are shown as single data points.

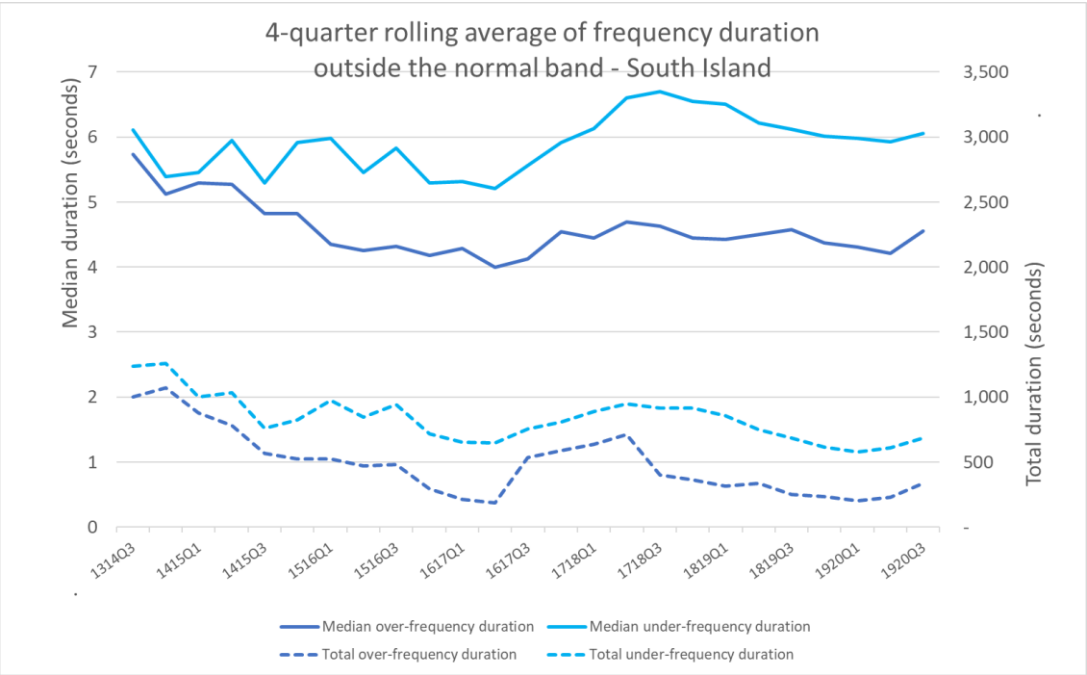
17.2 Recover quickly from a fluctuation (Time)

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



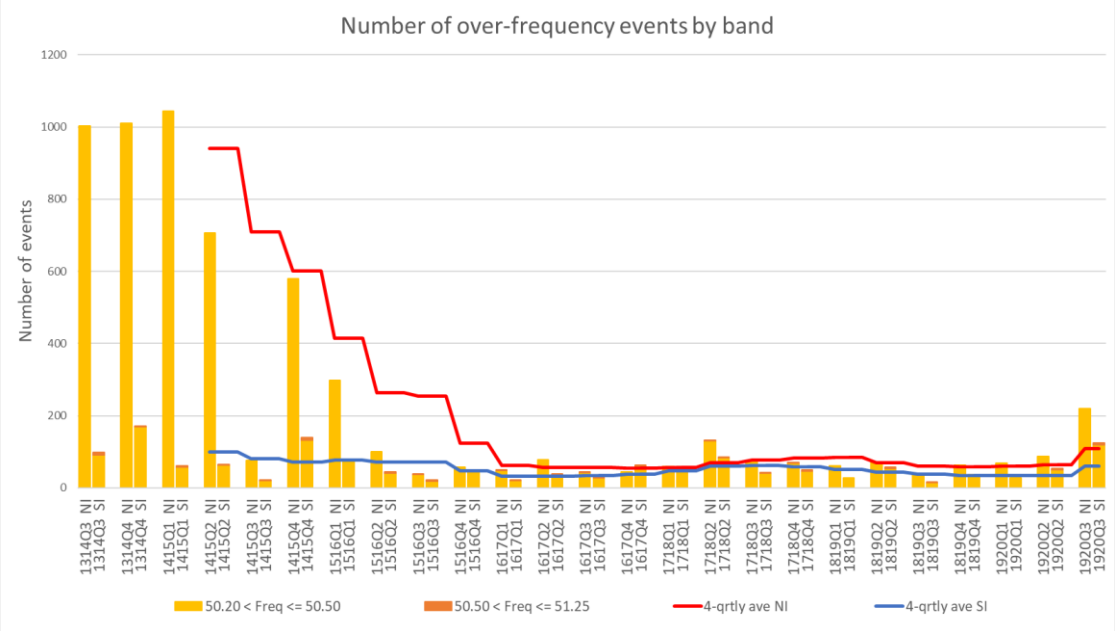
South Island



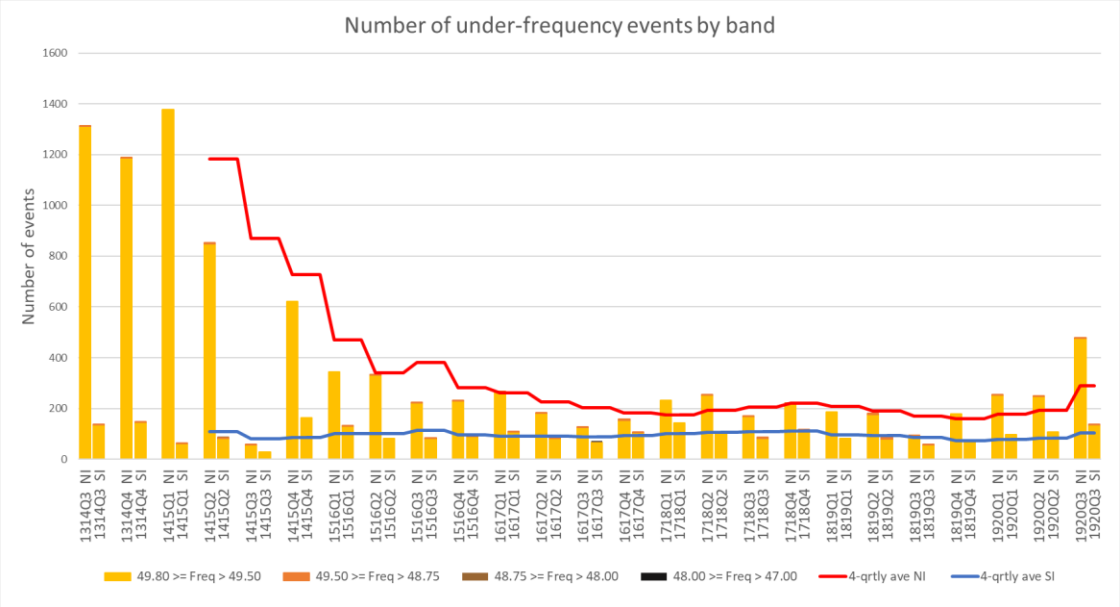
17.3 Manage frequency and limit rate of occurrences during momentary fluctuations (Number)

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



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-19	May-19	Jun-19	July-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	-	-	-	-	1	-	1	3	-	-	-	1
Warning Notice	-	-	1	-	-	-	-	-	-	1	-	2
Customer Advice Notice	4	8	17	9	14	6	15	15	14	6	21	14

20 Grid emergencies

The following table shows grid emergencies declared by Transpower as system operator from January to March 2020.

Date	Time	Summary Details	Island
12-Mar-20	08:26	A grid emergency was declared to assist with restoration of supply to the Hutt Valley and Wairarapa areas following a fault on the Haywards 110 kV bus during planned switching.	N

Appendix A: Discretion

January

Event Date & Time	Event Description
03-Jan-2020 01:05	HLY2201 HLY5 Discretion: Required for security / voltage management. Last Dispatched MW: 173.54
03-Jan-2020 04:35	HLY2201 HLY5 Discretion: Required for security / voltage management. Last Dispatched MW: 174

February

Event Date & Time	Event Description
08-Feb-2020 13:10	SFD2201 SFD22: Security discretion to 0MW. Last Dispatched MW: 3.44
17-Feb-2020 09:25	ARG1101 BRR0: Required off for ARG_BLN_1 outage (only for duration of switching). Last Dispatched MW: 6
21-Feb-2020 16:00	ARG1101 BRR0: To return to service ARG_BLN_1. Last Dispatched MW: 6
28-Feb-2020 15:32	ARG1101: For switching on return of ARG_KIK 1. Last Dispatched MW: 6

March

Event Date & Time	Event Description
03-Mar-2020 18:35	RI1101 ARI0: Kinleith-Tarukenga circuits 1 & 2 offload violations creating block security constraint (BSC) Last Dispatched MW: 57.14
07-Mar-2020 08:45	MW Max applied to Pole 2 to discretion / ramp down to 0 for pole outage. 08:45 405 MW Max, 08:50 250 MW Max, 08:55 125 MW Max, at 09:00 pole was set to 0 as modelled.
21-Mar-2020 08:45	Starting from 08:45 and until 08:55 dispatch, HVDC North Max Limit changed to 375MW, 250MW, 125 MW respectively to ensure HVDC is dispatched to 0 MW at 09:00 (maintaining its 25MW/min ramp).
25-Mar-2020 16:24	JRD1101 JRD0: Junction Road tripped no bona-fide claimed. Last Dispatched MW: 96

Appendix B: Dispatch Accuracy Dashboard

Dispatch Accuracy Dashboard

			2019 January	February	March	April	May	June	July	August	September	October	November	December	2020 January	February	March
Frequency keeper	Average absolute deviation (MW) from frequency keeper dispatch point. A	**NI**	6.63	7.04	6.90	6.56	6.64	6.72	6.96	6.71	6.67	6.56	6.63	6.83	7.63	7.01	6.90
		SI	0.59	6.82	0.87	6.25	6.07	6.28	6.37	6.15	6.30	6.00	6.23	6.28	6.49	6.84	6.33
Time error (s)	Average absolute daily time error (s) indicates imbalance between generation and load, a reflection of imperfect dispatch	**NI**	0.1670	0.2127	0.1621	0.1921	0.2032	0.2431	0.1946	0.2021	0.1737	0.2198	0.2033	0.1996	0.2410	0.2340	0.2455
		SI	0.1802	0.1662	0.1548	0.1741	0.2001	0.2123	0.1999	0.2161	0.1688	0.1989	0.2086	0.2137	0.1967	0.2309	0.2217
FK within 5% of band	% of time frequency keepers spend near to or exceeding their regulation limits indicates	**NI**	**3.3%**	**4.0%**	**3.7%**	**3.1%**	**3.6%**	**3.9%**	**5.0%**	**4.2%**	**3.7%**	**3.5%**	**3.7%**	**4.0%**	**5.4%**	**5.0%**	**5.8%**
		SI	**2.6%**	**3.2%**	**3.0%**	**4.7%**	**3.0%**	**3.7%**	**4.2%**	**3.5%**	**3.1%**	**4.0%**	**3.0%**	**3.3%**	**3.1%**	**3.9%**	-
HVDC modulation beyond 30MW band	% of minutes where the maximum HVDC modulation exceeds 30MW away from its dispatch setpoint. This indicates greater variability in the system, but can also indicate the need for redispatch.		9.3%	9.2%	8.3%	10.1%	14.4%	14.8%	11.6%	13.6%	11.3%	10.8%	10.9%	10.5%	8.4%	12.8%	10.4%
Constrained on energy- Total	Total Monthly Generation	MWh	3,481,939	3,228,619	3,469,377	3,398,188	3,658,987	3,786,198	3,921,132	4,003,430	3,656,770	3,621,216	3,418,901	3,475,825	3,501,768	3,329,074	2,851,415
	Total constrained on - All sources	MWh	30,623	25,936	24,238	23,687	29,352	29,941	36,182	34,394	36,974	25,683	29,286	31,997	23,641	28,565	24,912
		% of all generation	**0.88%**	**0.80%**	**0.70%**	**0.70%**	**0.80%**	**0.79%**	**0.92%**	**0.86%**	**1.01%**	**0.71%**	**0.86%**	**0.92%**	**0.68%**	**0.86%**	**0.87%**
		$	408,321	969,802	603,987	357,336	466,469	1,015,133	1,227,521	1,173,614	930,592	534,069	609,542	517,746	365,863	468,969	304,255
Constrained on energy ($) - Frequency keeping	Total constrained on $ due to frequency keeping (within band is attributable to SO)	$	38,827	96,573	53,170	51,528	103,917	51,815	57,023	82,481	63,352	65,890	64,505	58,343	75,173	70,074	52,492
Optimal Dispatch (%)	Compares the average impact of a perfect foresight case against dispatch solutions. Indicates impact of wind offer, load forecast and PSD accuracy.	%	94.4%	93.5%	94.2%	93.6%	92.1%	93.0%	93.7%	93.1%	94.1%	91.6%	91.3%	88.3%	93.4%	90.7%	91.8%
Wind offer error (%)	Average absolute difference between persistence wind offer (based on 5mins prior) and the actual wind output relative to the average wind output	%	99.60%	99.61%	99.62%	99.62%	99.56%	99.55%	99.61%	99.60%	99.62%	99.50%	99.48%	99.51%	99.62%	99.55%	99.57%
Load forecasting error (%)	Average absolute difference between forecast generation (load plus losses, including PSD) and actual generation relative to the average actual generation	%	97.88%	97.63%	97.63%	97.31%	97.77%	97.15%	97.46%	97.55%	97.89%	97.71%	97.96%	97.71%	97.90%	97.80%	97.46%
	Metric calculation rows	FK within 5% of													2.0	2.0	1.0
		Constrained on energy- Total													4.0	3.0	3.0
		Optimal Dispatch													4.0	3.0	3.0
Dispatch accuracy %	**Metric out of 5 (5 is best possible result)**														**3.3**	**2.7**	**2.3**

Heat map

The dashboard uses a type of heat mapping which makes it easy to highlight interesting cells or ranges of cells and emphasise unusual values. In this case we have used a colour scale from green, through yellow and orange, to red. Each of the cells sits on a colour gradient within this scale. For the purposes of the dashboard this provides a way to identify patterns and trends.

NOTE: the scales used to calculate the metric are formulated separately (details on the performance metric can be found in the paper “Develop metric for efficient energy market operation: Dispatch Accuracy – energy”)

NOTE 2: Summary data for “FK within 5% of band limit” is not shown for the South Island in March . The data collected for this month has missing values for a number of dates in the month which we are currently investigating.