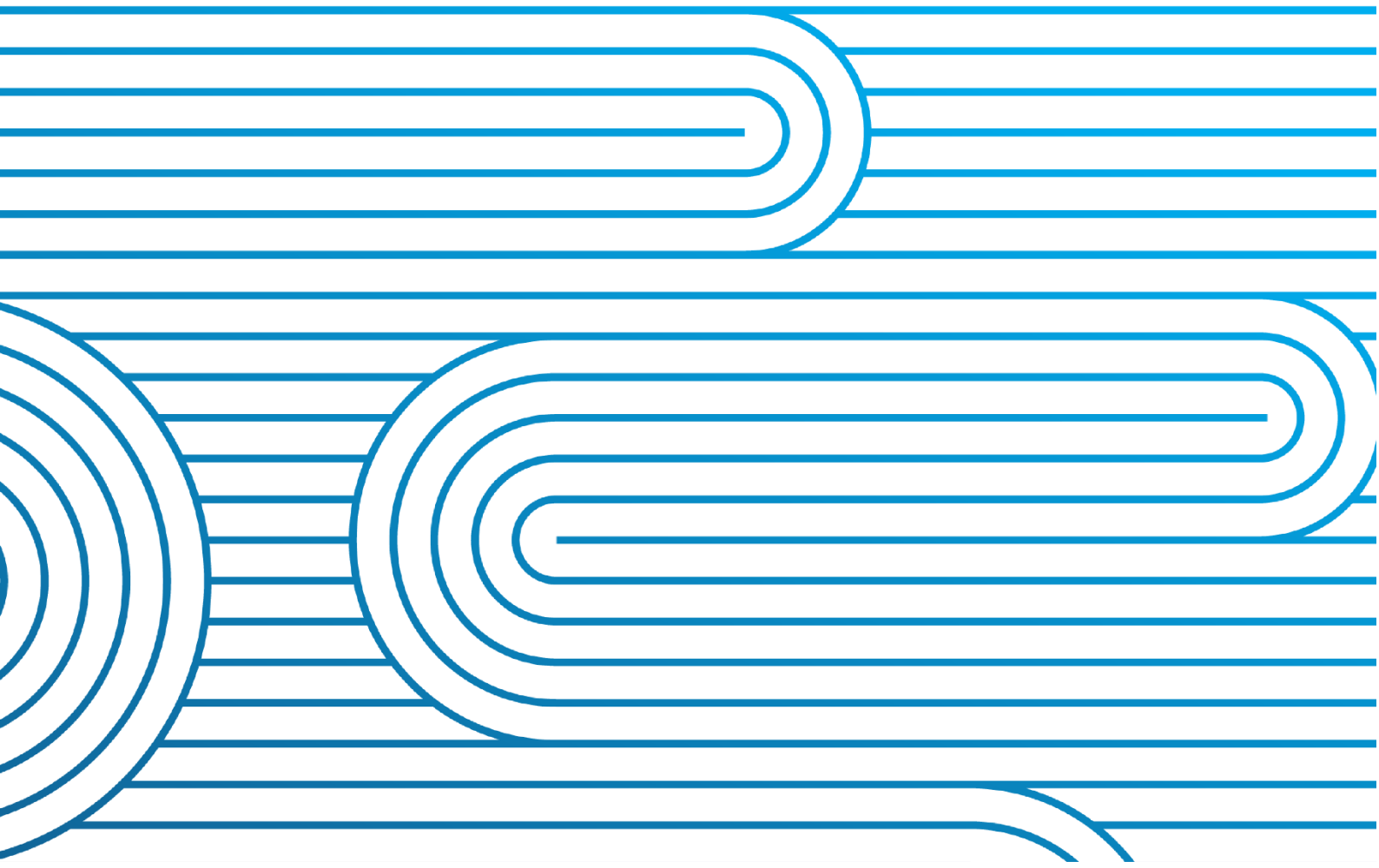


# System operator annual self-review and assessment

## 2023-24

Date: August 2024



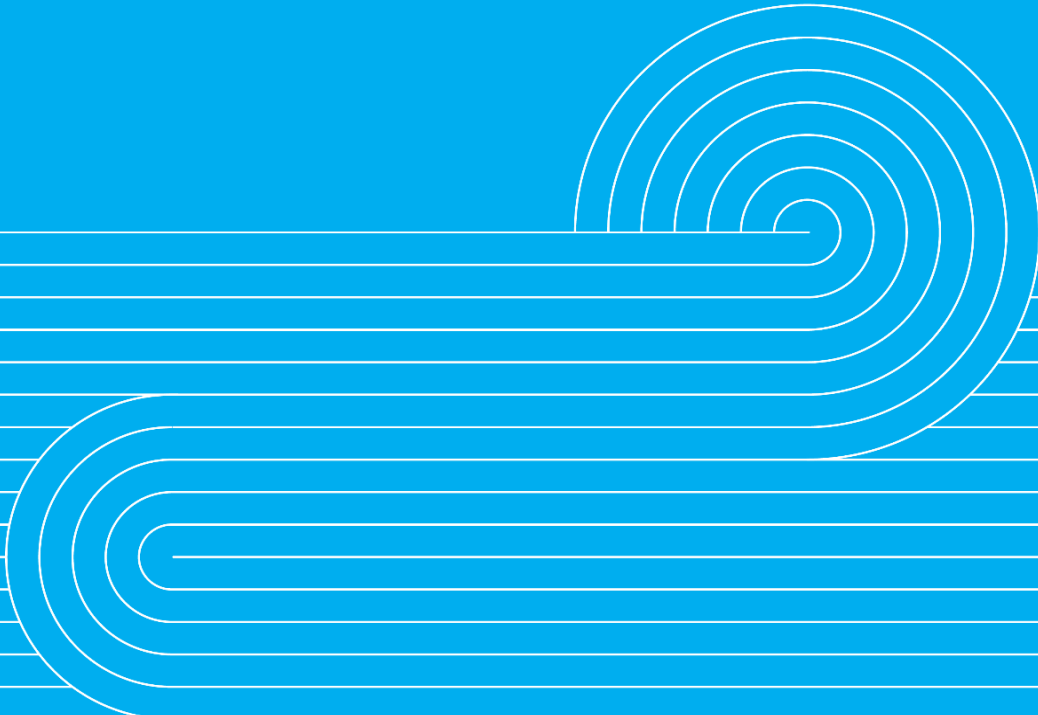
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## Contents

<b>1</b>	<b>Overview .....</b>	<b>1</b>
1.1	Overview of the year .....	2
1.2	Authority recommendations from the 2022/23 Annual Self Review .....	4
<b>2</b>	<b>Operating the power system .....</b>	<b>7</b>
2.1	Preparing for and responding to system events.....	8
<b>3</b>	<b>Power systems investigations and reporting .....</b>	<b>13</b>
3.1	Commissioning generation and demand response.....	14
3.2	System Security Forecast.....	15
3.3	Automatic Under-Frequency Load Shedding.....	15
<b>4</b>	<b>Outage planning and coordination .....</b>	<b>17</b>
4.1	Outage coordination and assessment .....	18
<b>5</b>	<b>Commitment to evolving industry needs .....</b>	<b>21</b>
5.1	Industry engagement.....	22
5.2	International engagement .....	24
<b>6</b>	<b>Project updates .....</b>	<b>26</b>
6.1	Programme delivery .....	27
6.2	Development of the electricity system and market.....	28
<b>7</b>	<b>Security of supply .....</b>	<b>30</b>
7.1	Security of supply – long-term .....	31
7.2	Security of supply – medium-term.....	32
7.3	Security of supply - short-term.....	32
7.4	System Operator Rolling Outage Plan (SOROP) .....	33
<b>8</b>	<b>Risk &amp; Assurance.....</b>	<b>34</b>
8.1	Risk assessment.....	35
8.2	Business continuity plan testing .....	36
8.3	Business assurance audits and plans .....	36
<b>9</b>	<b>Compliance and impartiality.....</b>	<b>38</b>
9.1	Compliance .....	39
9.2	Impartiality .....	39
<b>10</b>	<b>Strategic and business planning .....</b>	<b>42</b>
10.1	Statutory objective workplan.....	43
10.2	Strategic and business planning .....	43
<b>11</b>	<b>Performance metric and monitoring .....</b>	<b>46</b>
11.1	Performance metrics 2023-24.....	47
<b>12</b>	<b>Appendices .....</b>	<b>49</b>

# 1 Overview



This report is Transpower's review of its performance as system operator from July 2023 to June 2024, in accordance with clause 7.11 of the Electricity Industry Participation Code 2010 (the Code).

## 1.1 Overview of the year

As New Zealand electrifies and turns increasingly to renewable generation, the environment in which we operate is rapidly evolving. With a record number of new power system connections enabled during the 2023/24 financial year, the future is coming fast.

This included enabling two entirely new asset classes for Aotearoa's changing power system – the first utility-scale battery energy storage system and two new solar farms. We expect this workload to grow further in the 2024-25 year and beyond with at least nine generation sites commissioning in 2024-25 and significant interest from more participants, including smaller capacity resources that are more widely distributed.

At the same time, we had to manage a number of major power system events across the year that required significant cross-industry collaboration to minimise impact on consumers. These included:

- a potential electricity supply shortfall caused by an unseasonable cold snap on Friday 10 May
- an extreme G5 solar storm sequence that struck later that evening and required careful management through to Monday morning
- reconfiguring the 110 kV network to resupply Northland after a transmission tower carrying Transpower's 220 kV network fell on 20 June
- the emergence of dry year risk due to a colder than average May 2024, an extended period of low wind, and historically low inflows into the country's hydro catchments.

That these events were managed well came down to extensive planning, preparation and training. The evidence of this was particularly apparent for the potential electricity supply shortfall on 10 May – it came immediately after the two-day pan-industry shortfall exercise we held alongside the Electricity Authority (the Authority).

Any one of these events occurring in a year would be unusual; all four falling in the same year with a challenging winter, means the system operator has had to balance necessary focus on these events without distraction from the business-as-usual work we do to deliver the system operator service to the level industry and New Zealanders have come to rely. The ability to continue to do this - delivering our core roles like planning for essential maintenance outages and dispatching every schedule without significant incident – reflects the commitment of the team to getting the best outcomes for consumers.

As a key provider to the Authority through the system operator service, we also continued to use our experience and expertise in the day-to-day operation of the system to support the Authority as it evolves market rules critical to enabling the power system of the future.

The new information resources for market that we delivered ahead of winter 2023 alongside the Authority also played a critical role in managing capacity risks in 2023/24. With improved information, the industry responded well to numerous tight electricity supply situations across 2023/24, including managing near record demand on at least six occasions.

On at least four of these occasions, low residual situations would have escalated to grid emergencies if industry had not responded through a mix of delayed or cancelled outages, the commitment of additional slow-start thermal units, and proactive management of controllable load. The new information resources and the improved collaboration they allow were also instrumental to the successful management of the potential electricity shortfall on the morning of 10 May.

Keeping one eye on the future while grappling with challenges facing the power system now was a key driver behind our proposal for the second reset of our System Operator Service Provider Agreement (SOSPA3). This sets out the funding we will need for the three years to July 2028 if we are to be able to invest in the people, systems and technology that we will need to deliver our critical electricity system role now and into the future.

It is clear that additional system operator resources will be required to connect the increasing number of participants to the system and then to ensure these new asset types can operate effectively and efficiently across the whole system.

The theme of accelerated change, also set out in Transpower's *Whakamana i Te Mauri Hiko* strategic context, was front of mind throughout 2023/24, alongside leading indicators from the Future Security and Resilience project, our operational experience and engagement with stakeholders, and the Authority's strategic ambitions and priorities.

*In the words of the Authority, the pace of change is increasing which means the future is arriving faster than previously expected, and it is imperative that we prepare now for the transformative role electricity will play in our economy and day to day lives.*

As the provider of the system operator service, we are at the heart of this transformation. As we move further ahead into the 2024/25 financial year, we are well-placed to deliver for the Authority, for the electricity industry and for all New Zealanders.

## 1.2 Authority recommendations from the 2022/23 Annual Self Review

In its review of the system operator performance for 2022-23, the Authority made five recommendations which we have acted on:

**Recommendation 1:** That the system operator does more to work with the Authority and provide strategic thinking across the short, medium, and long term planning. This is an opportunity for the system operator to educate and promote thinking on solutions.

**Response:** In the 2023/24 year we focussed on developing our capability to engage the wider industry on areas of interest related to power system and market operations. We produced three market insight papers<sup>1</sup> in the review period:

- *Evolving security of supply assessment*, which looked at changes we might make to improving our resource adequacy assessments
- *Winter 2023 review*, which reported on the peak demand and energy supply challenges of Winter 2023, and
- *2024 Security of supply outlook*, which highlighted potential challenges for the 2024 winter period.

A fourth paper was produced in the first week of the 2024/25 review year:

- *Evolving market resource coordination*, which was a broad-ranging paper discussing potential enhancements to the market design which we feel could improve commitment in the market.

At the same time, we have been heavily engaged with FlexForum and Future Networks Forum in preparing for an increase in Distributed Energy Resources (DER). These are issues which are not unique to New Zealand, and we are also engaging with international peer organisations (particularly the Australian Energy Market Operator, AEMO) to better understand how system operations have needed to adapt to accommodate these new operating modes.

We have directly engaged with the Authority in 'quarterly brainstorm' sessions. These sessions have proved beneficial to both organisations, allowing a wide range of topics to be covered and views to be shared candidly.

Alongside market development, the Future Security and Resilience programme continues apace, and we have supported the Authority in their options papers for improving frequency and voltage management,<sup>2</sup> and their consultation on the future of system operation in New Zealand.<sup>3</sup>

Each of these activities were undertaken as part of our first strategic focus area for the year, *Enabling whole system development*.

<sup>1</sup> [System and market insights | Transpower](#)

<sup>2</sup> [Review of common quality requirements in the Code | Our consultations | Our projects | Electricity Authority \(ea.govt.nz\)](#)

<sup>3</sup> [Future operation of New Zealand's power system | Our consultations | Our projects | Electricity Authority](#)

**Recommendation 2:** In collaboration with the Authority, the system operator considers running a simulation for its next pan-industry exercise in 2024, with more interactive elements for a wider range of participants (e.g. including direct grid connected consumers) and include injecting elements of surprise during the exercise. We consider including these elements in an industry exercise would ensure the industry continues to be engaged in the exercise and assist with preparedness for unexpected events. We also recommend that the system operator alongside the Authority starts preparation for the 2024 exercise early, to ensure that the exercise meets its objectives and is well planned and executed

**Response:** The System operator took on board the Authority's recommendation when planning and delivering the 2024 pan-industry exercise which was successfully held over two days in early May. We commenced planning this exercise with the Authority in November 2023, ensuring we had plenty of time to agree objectives and then work to establish a credible, yet surprising, exercise scenario to engage a broader range of participants.

**Recommendation 3:** When the system operator is performing a business assurance audit, the system operator includes an audit of the inputs, that the outputs of software used in the process are as expected, and that the software is functioning as in the functional specification. The Authority notes most software used is not "auditable software" under the SOSPA and is not suggesting a full audit of non-auditable software. However, including an assurance that software integral to a process is functioning as required and expected is critical to the robustness of a business assurance audit. This is especially so for software that is infrequently used. This check / assurance could be undertaken internally and does not need to be completed by an external auditor. The system operator should also regularly review its manual data update / input processes for market system tools and their fitness for purpose as part of the business assurance audit. This supports the finding from the recent business assurance audit for the voltage stability assessment tool (VSAT), where it is acknowledged that manual errors can impact on real time operations

**Response:** We have taken on board this recommendation and during the 23/24 financial year, have ensured the scope of the five business assurance audits incorporated consideration of the inputs and outputs of processes. This was evidenced in the evaluation of handover processes for the system operator gatekeeper actions, and the deployment of an end-to-end review of the processes to be followed during a Security of Supply (SoS) event. However, we accept there is room for further improvement. Separately we are developing a quality assurance framework for our modelling work, which will incorporate the data updates and input processes, and is aimed at providing assurance across tools including where we have manual updates to tools.

**Recommendation 4:** The system operator should include a section in the self-review that acknowledges any adverse issues, events, or near-events that occurred or concluded in the year, for example Rulings Panel decisions. This is especially the case where issues span more than one review period, as they risk being missed by both reviews.

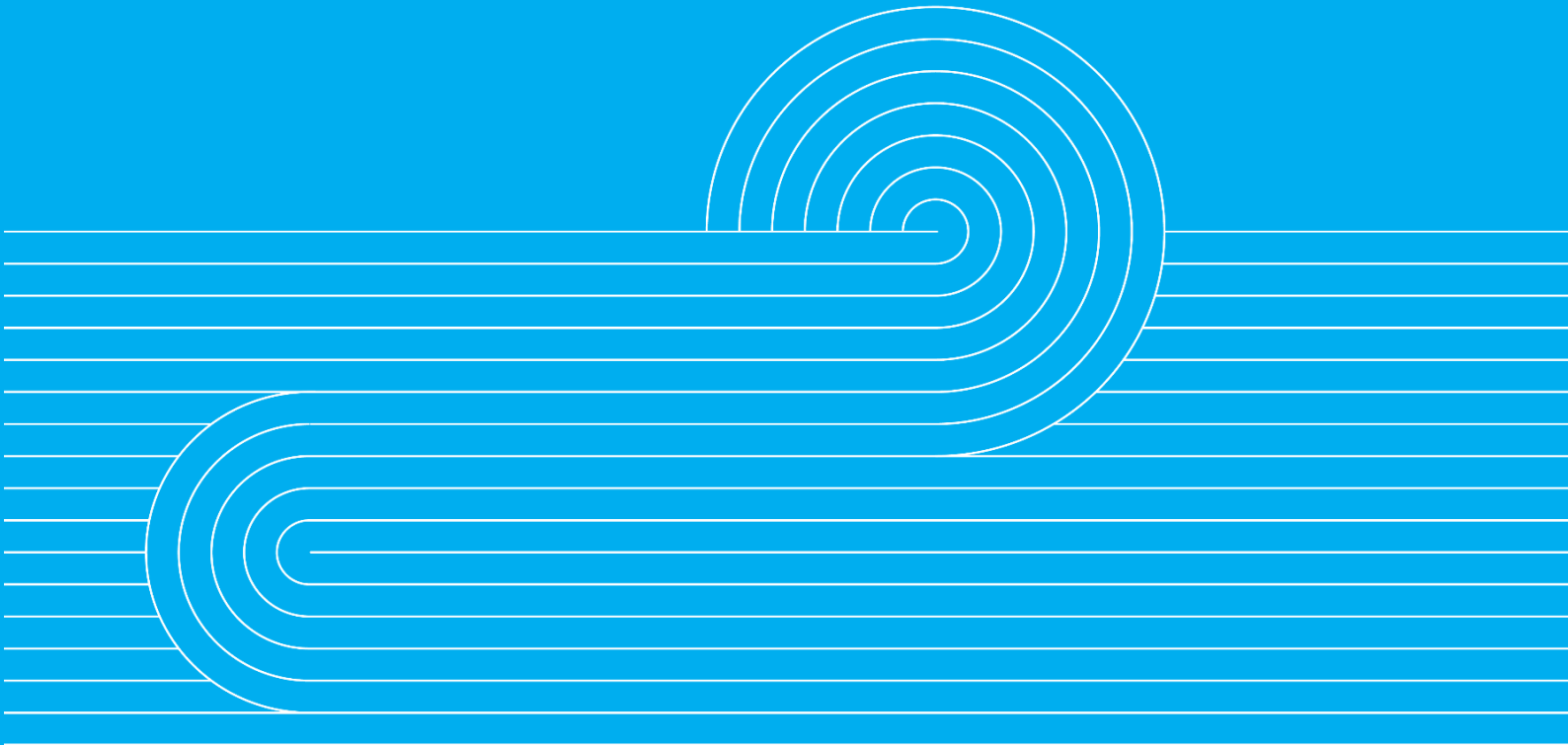
**Response:** We have included a section on system events which addresses this recommendation.

**Recommendation 5:** We also recommend that the self-review better reflects on the things that did not go well and what the system operator learned from this. The Authority will provide feedback to the system operator about including more compliance material in future self-reviews to provide greater clarity about the system operator's performance over the reporting period.

**Response:** At the time of finalising this review, the Authority had not provided us with any direct feedback on their expectations of providing more clarity. However, we have included a section on compliance in this year's review to address this recommendation.



# 2 Operating the power system



## 2.1 Preparing for and responding to system events

The system operator manages the electricity system to meet the Principal Performance Obligations (PPOs) established in the Part 7 of the Code (clause 7.2) We record and review system events and report to the Authority on any moderate or major events using a definition agreed with the Authority.

Our operating environment continues to be increasingly challenging due to tightening capacity margins, increasing quantities of variable generation and less flexibility of the available resources. This section highlights the preparedness work undertaken to meet this challenge, as well as an overview of our more significant events throughout the 2023/24 year.

### 2.1.1 Preparing for system events

To ensure we are prepared for future events we incorporate lessons learned into our event preparedness, which includes collaborating with the industry and targeting specific training areas.

#### *South Island black start simulation*

On Wednesday 21 February 2024 our real-time operational teams successfully hosted an industry simulation exercise to black start the South Island. For this training session we invite generation controllers from Meridian and Contact Energy as well as controllers from the New Zealand Aluminium Smelters at Tiwai to join us in our training simulator. This collaborative approach to training tests our contingency plans, identifies areas of improvement, and serves as a valuable learning experience for all involved. It also helps us ensure our communication channels among all key participants are set up and ready to go.

#### *2024 Pan-industry exercise*

The Authority and the system operator held a two-part industry exercise covering a major power system event on the 1 and 8 May 2024.

Our scenario involved a low residual situation being forecast for an evening peak, which suddenly escalated when a fire broke out at the Manapouri generation station requiring it to shut down (Meridian Energy assures us the scenario is fictional and that safety measures are in place that would prevent such an incident occurring). The overall impact of this scenario was that we needed to manage both national controllable load and real load in the lower South Island (element of surprise) until the restoration of Manapouri occurred.

Day 1, led by the system operator, was for control room operators to test grid emergency processes and interactions between the system operator and generators, electricity line businesses (EDBs) and direct connect industrial customers. This provided an important opportunity to remind industry of improved information resources and processes for identifying and managing potential electricity supply shortfalls, put them to the test, and look for opportunities for further improvement. Day 1 of the exercise involved 34 organisations, including 23 EDBs, 6 Generators, 3 Direct Connects, Raw Energy and Utilities Disputes.

Day 2, led by the Authority alongside Transpower's communication team, was for communications and customer teams. It tested communications and interactions from Transpower via EDBs and retailers to end consumers. With winter approaching rapidly, it was good timing to have key people from most of the country's generators and local lines companies registered to take part, alongside some of the major industrial customers that connect directly to the national transmission grid. This exercise helped socialise a pan-industry approach to communicating with consumers (and the media) about any risk to their electricity supply and what the industry is doing to minimise the impact and keep the power flowing for New Zealanders.

The exercise was timely, and instrumental to the successful management of the potential electricity shortfall this year on the morning of 10 May when industry and consumers were asked to conserve electricity on what was the coldest morning of the year.

#### *GridEX VI 2023:*

On the 14 - 15 November 2023, the system operator took part in the GridEX VI exercise, facilitated by Transpower. This bi-annual exercise leverages the event run by the North American Electric Reliability Corporation (NERC). It simulates wide scale cyber and physical attacks on the New Zealand power system, requiring an extensive across industry and government response. This exercise provided us an opportunity to practise our Coordinated Incident Management.

#### *Coordinator team training:*

Our coordinator training this year included amongst other things undertaking black starts (for both North and South Islands), responding to an AUFLS event, preparing for an islanding situation and then resynchronisation, and HVDC management. Notable topics included training for an extreme G5<sup>4</sup> geomagnetic storm, familiarising the team with the latest procedure for managing this. Training was timely and ensured that we were prepared for the Gannon G5 solar storm that occurred in May.

A continued focus in team training has been the management of low residual/shortfall events, and simulations for these events have been a regular fixture of team training since the 9 August 2021 event. Such training remains critical as procedures continue to evolve and coordinators build their knowledge and skills on the tools and processes.

#### *Industry response plan to an extreme G5 solar storm:*

We have worked collaboratively with industry as part of the Electrical Industry Space Weather Working Group (EISWWG) to develop an industry response plan to an extreme G5 extreme geomagnetic storm, based on the Solar Tsunami projects modelling of impact. This work meant we were well prepared for the actual event that occurred in May and we will continue to refine the response with industry as our knowledge of impact grows.

#### *MetService daily briefings*

MetService informed us it expected May to be colder than the past five years with potential for more intense sharp cold snaps - due in part to colder ocean temperatures. Consequently, we began daily MetService briefings from 1 May this year (a month ahead of plan). The briefings occur each weekday with an in depth 48-hour look ahead, and an overview of further ahead. They help us better understand the weather risk to peak load and wind generation forecasts to help manage tight situations. Notably, the daily briefing we received on 9 May informed our risk assessment of the 10 May morning peak, correctly identifying that temperatures were likely to be lower than forecast on 10 May.

## 2.1.2 Responding to system events

Overall, for the year we issued 136 customer advice notices (including revisions), 369 voltage and frequency excursion notices, 1 warning notice, 14 grid emergency notices (including revisions) and 3 grid emergency reports.

Two events that took place in the 2023-24 year resulted in a Grid Emergency Notice (GEN) being issued:

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Geomagnetic storms are categorised in scale from G1 (Minor) to G5 (Extreme)

- 11-13 May 2024, G5 geomagnetic storm "Gannon": A GEN was issued on 11 May because of a G5 extreme geomagnetic storm over the weekend of 11-13 May. To maintain operational security, in accordance with contingency plans to mitigate impacts of geomagnetic induced currents on the grid, the system operator instructed transmission circuits to be removed from service. A system operator industry briefing was held to inform stakeholders of the situation. Contingency plans, created in conjunction with advice from Professor Craig Rodger from Otago University, were applied to maintain security on the system; these plans had been tested as part of group training. This was the first 'G5' extreme storm to hit earth in decades and is at the lower end of the scale (10x less) of events for which the Electrical Industry Space Weather Working Group is preparing. There was no market impact and supply to consumers was not affected. New Zealand's electricity industry response to this event was acknowledged by experts around the world as first rate, and in many cases more mature than their local jurisdictions response.
- 20 – 23 June 2024 Northland Loss of Supply: On Thursday, 20 June at 11:03, the Huapai\_Marsden\_1 220 kV circuit tripped. At that time, Bream Bay\_Huapai\_1 220 kV circuit, was out of service for planned maintenance and 110 kV system splits at Maungatapere were in place to mitigate potential overloading of the Henderson\_Maungatapere 110 kV transmission circuits. Consequently, the trip resulted in a 159 MW loss of supply from Warkworth north. A grid emergency was declared at 11:17 on the 20<sup>th</sup> by the system operator and remained in force until 16:00 on 23 June 2024. The cause of the incident was failure of Tower 130 on the Henderson-Marsden A transmission line, which resulted in an earth fault on the circuit that could not be cleared. Most of the supply was restored by Thursday afternoon, with full capacity restored on Sunday afternoon once a replacement tower was erected. Full security of supply into Northland was restored on Wednesday 26 June after the installation of additional temporary structures for the second 220 kV circuit.

At the time of writing, we are awaiting the independent investigator report into the incident and restoration. As with all major incidents, we expect to confirm opportunities for improvement to our event management processes, and potentially other participants. We will share the report with the Authority when it is complete.

One event that took place in the 2023-24 year resulted in a Warning Notice (WRN) being issued:

- 9 May 2024, Insufficient generation offers to meet demand (National): With unseasonably cold (and still) weather forecast for 10 May, a low residual CAN was issued on 9 May (07:28), based on the 06:00 schedules, for the 10 May morning peak. Forecast energy and reserves shortfall in the 10:00 schedules triggered a WRN to be issued at 10:51. A system operator industry briefing was held at 11:00.

Following assessment of the risks to the forecast residual based on the response from industry in the 12:00 schedules, known plant risks and informed by a MetService briefing that indicated demand was likely to be higher and wind lower than then forecast, Transpower began warning the public of a potential electricity supply shortfall via media release and through our Facebook page. The messaging asked New Zealanders to stay warm but be mindful of their electricity use between 7am and 9am the next morning by (for example) turning down heaters, turning off lights in rooms not in use, delaying using appliances such as washing machines, dryers, and dishwashers, and not charging electric vehicles. Messaging was shared with retailers and lines companies to amplify to their customers, as practiced in the pan-industry exercise the previous day. Another system operator industry briefing at 15:30 provided an opportunity for participants to seek clarifications.

Through the evening of May 9 and the morning of May 10 a number of risks played out in the system. On the evening of 9 May, weed issues were reported at Tokaanu, requiring generation output to be significantly reduced throughout the night (as low as 20 MW). As the morning

approached there were delays in getting Stratford generation to start, along with more energy/reserve shortfalls being seen in the 06:00 schedule. As a result, Whirinaki units 1, 2 and 3 were discretioned on at 18 MW each from 07:00 to cover the risk of further thermal startup or weed issues and to mitigate the Whirinaki units' ramp time.

A shortfall was avoided in real time thanks to a good response from industry and the public. We estimate consumers reduced demand across the morning peak by around 235 MW, made up of roughly 175 MW conforming load and 60 MW industrial load. Later on 10 May we acknowledged the industry and consumer response through another media release. The events were covered extensively by media, and we appeared multiple times on live radio and television interviews to explain the situation.

Following the event, we provided industry (via system operator industry forums, weekly market summaries<sup>5</sup> and CEO forums) with post-event assessments including updating agreed communications approaches to provide more opportunities for an industry response. This helps industry stakeholders understand the operational risks the system operator observes in the lead-up to real-time, our operational processes and how these interact with current market settings.

Six potential short fall or low residual situations were managed during the 2023-24 year which did not result in a WRN or GEN being issued:

- 10 August 2023, Low Residual Situation: A Customer Advice Notice (CAN) was issued for a North Island low residual situation forecast for the following morning, 11 August 2023 07:30 – 09:00
- 10 October 2023, Low Residual Situation: A CAN was issued for a national low residual situation forecast for the following morning, 11 October 2023 07:30 – 09:30
- 2 November 2023, Low Residual Situation: A CAN was issued just after midnight for a national low residual situation forecast that morning, 2 November 2023 07:30 – 09:00
- 19 February 2024, Potential Short Fall or Low Residual Situation: A CAN was issued for a potential South Island reserve shortfall forecast in the coming week, 24 February 2024 05:00 – 25 February 2024 22:00
- 7 May 2024, Low Residual Situation: A CAN was issued for a national low residual situation forecast for the following morning, 8 May 2024 07:30 – 08:30.

The response to these events was aided by the improved industry information resources launched ahead of winter 2023 and continued for winter 2024. Better information about system conditions helped industry respond to tight supply through a mix of delayed or cancelled outages, the commitment of additional slow-start thermal units, and proactive management of controllable load.



Although we had practised with industry in early May on triggering communications to the public to be mindful of their electricity usage, we received feedback from participants which indicated they didn't fully understand within their organisation the use of this mitigation for a shortfall. We have subsequently worked to clarify and recommunicate the trigger for this mitigation via the CEO forum. This reinforces that we need to continue to exercise with and educate all levels of industry on how we respond to different types of events to avoid any unnecessary confusion.

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<sup>5</sup> See [here](#) and [here](#)

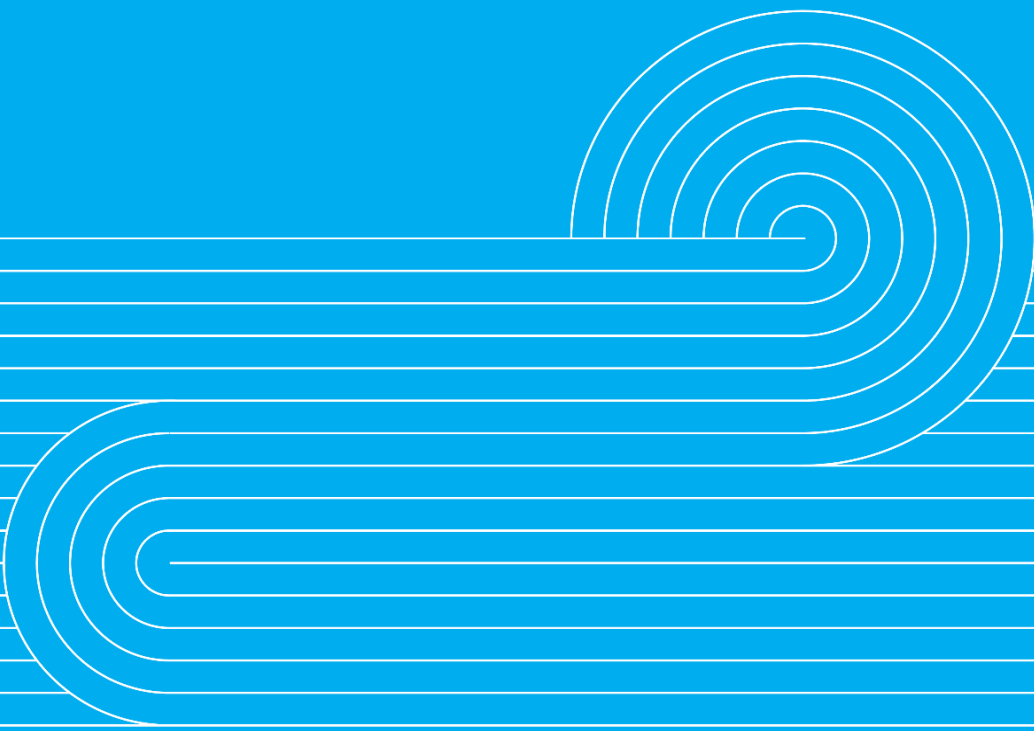
A lesson from the Northland loss of supply event was that there is benefit in holding meetings between the system operator and other operational teams responding to an event where time permits. This improves response coordination by providing a targeted forum where operational teams can ask questions and clarify response actions etc directly with the system operator.

### 2.1.3 Further opportunities

We also note the following opportunities to further improve our event preparedness and response:

- We have trialled using a post event operational feedback survey as a way of gaining timely insights from those directly involved in our incident response, both within the control room and incident management teams. This includes seeking feedback on what went well, what did not go well, what would we do differently. Respondents are also asked to rate the overall quality of the response, incident management and communications (internally, industry and public). We will continue to refine this approach and adopt as standard post-event.
- We will continue to look out for opportunities to participate in New Zealand event simulations which have the potential to impact the operation of the electricity market and power system. For example, we understand NEMA is considering a space weather exercise in the coming year.
- We will look to improve our record keeping during incident management through improved use of MS Teams and additional incident specific situational report templates over and above our generic templates. For example, a template specifically for low residual situations, or a loss of supply.
- We will look to see how our Incident Management Team can better make use of Transpower's existing real-time data directly for situational awareness (such as PiVision), removing some of the burden placed on the Operations Manager to provide.

# 3 Power systems investigations and reporting



### 3.1 Commissioning generation and demand response

Commissioning and testing is required to ensure that the new generation is compliant with the Code’s requirements.

As system operator we facilitate new customers to connect to the power system and to participate in the market. We also work with existing participants to commission and test existing and upgraded equipment. Throughout the 2023-24 year this workload has grown and we expect it to grow further in the 2024-25 year. Looking forward there is an interest from more participants, including much small capacity resources that are more widely distributed and with new technologies introducing new challenges to commissioning and testing. We work with new generators or energy resources from about one year out from their connection, starting with planning activities, through connection studies to evidence compliance with Code requirements through to completion of testing and modelling activities.

Over the last year we have six new sites being connected and increasing power output, the most in one year since 2005. We also had eleven upgrades. The majority of commissioned units were intermittent generation, including Kaitaia Solar Farm, Harapaki wind and the Rotohiko Battery which were all connected in November. Several of these were firsts for both us and participants.



Figure 1 FY 2023/24 Completed Commissioning

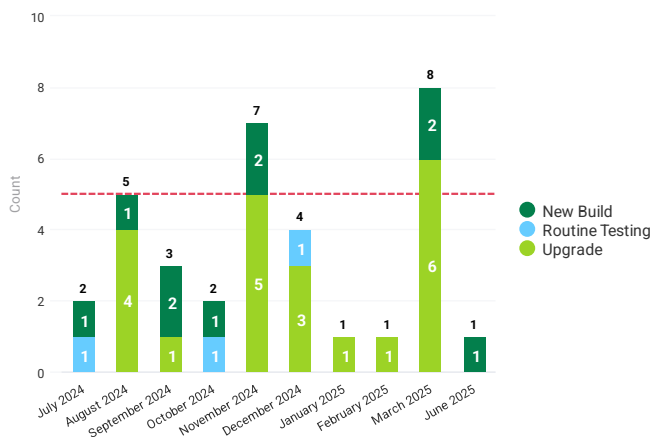


Figure 2 FY 2024/25 Completed & Confirmed Commissioning

In July 2023, SolarZero went live, as the first participant in the Dispatch Notification service, implemented through the Real Time Pricing project. SolarZero began offering ~23MW of aggregated residential batteries, and this capacity will increase over time as part of an innovation pilot project in partnership with Ara Ake.<sup>6</sup>

We have nine new sites confirmed for commissioning for 24/25, with another two potentials for this coming year.



This year we have undertaken a review of our commissioning process – a review which is timely given the uptick in generation commissioning. We have identified pain points and bottlenecks in the process and have started to implement improvement recommendations including establishment of a central coordination function, development of a generation commissioning delivery framework, and development of a workflow tool for core commissioning work. This is a critical time for commissioning new resources, at a time when Code requirements are evolving.

<sup>6</sup> See for example, [Winter-Peak-Innovation-Pilot learnings-and-insights-report.pdf \(araake.co.nz\)](https://www.araake.co.nz/winter-peak-innovation-pilot-learning-and-insights-report.pdf)



As part of the 2024-25 Business Audit Plan we have included an independent audit of the key external-facing procedure which is timely and will help us test our documented process as we continue to work on improvements.

We have updated our modelling studies guidelines this year, but with experience of new technologies connecting, we are finding there are learning opportunities which we could better include in our guidelines.

### 3.1.1 Further opportunities

We will continue to roll out improvements during the next year including:

- extending our workflow tool to wider Operations groups
- updating and communicating our external-facing commissioning documents and more clearly communicating pre-requisites for commissioning
- updating our modelling guidelines documents for new requirements reflecting inverter-based technologies, noting that modelling information is also being considered by the Future Security and Resilience Programme.

## 3.2 System Security Forecast

The [System Security Forecast \(SSF\)](#) identifies risks to our ability to achieve our PPOs over the next three years. It provides information to enable market participants to understand security risks and how these will be managed. We produce the SSF every two years and provide updates every six months if there are material changes to the power system.

Over the last decade or more we have produced the SSF focusing on thermal and voltage stability risks, but we are now moving away from this traditional focus. For our ongoing SSF work this year we have adopted a new process for scoping our work which recognises that there are new and emerging security risks caused by the changing energy landscape, particularly the introduction of more inverter-based resources instead of conventional synchronous generators. We discussed and presented our approach to the Authority during the year and received support and some feedback, and presented our approach to industry at the system operator Industry Forum.

Our high-level approach is to provide more regular reports spread across the two years with a summary report two-yearly. We worked on our first report of 2024 which was finalised in July on N-1 Thermal and Voltage Study and have undertaken analysis on transient rotor angle stability assessments in advance of the second report.

## 3.3 Automatic Under-Frequency Load Shedding

We provided the 2022 annual assessment on 6 December 2023. The report identified non-compliances from some NI connected asset owners, both in terms of timely provision of information for our assessment and in terms of AUFLS provision obligations. The report also identified that the grid owner did not comply with AUFLS obligations at Tiwai. Our security assessment for 2022 completed analysis of both worst case under- and over-provision of AUFLS in both islands and as a result we are confident that the system remained secure during the 2022 year should the binding extended contingent event (ECE) have occurred.

At the end of the year, we presented to the Authority Compliance Committee on AUFLS generally, which was a constructive session and helped gain understanding on both the mechanisms, obligations, and Authority's concerns. It was also an opportunity to clarify the differences between obligations for North and South Island AUFLS.

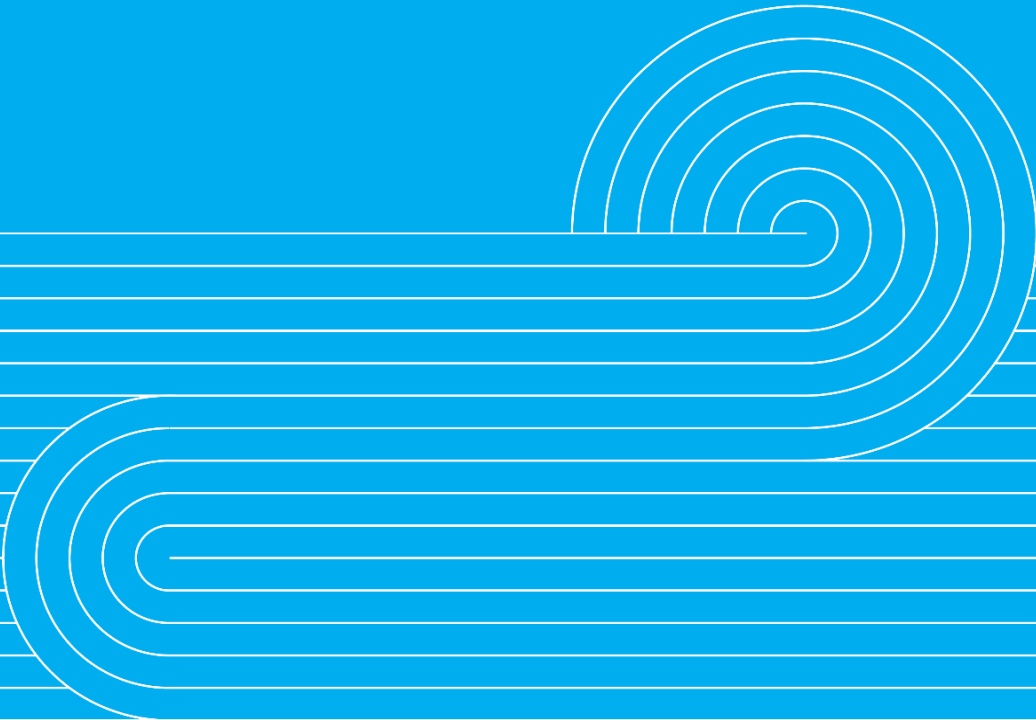


We have started the process of AUFLS assessment for the 2023 year and have taken on board feedback from the Authority. This year, we have notified the Authority of all AUFLS providers who have not met their obligations to provide information to us by 30 April 2024, ahead of providing the full report later in 2024. We have also kept the Authority across the grid owner's progress in delivering its information, noting that its obligations are different to providers in the North Island. We recognise that the Authority would like to better understand and discuss the worst-case scenarios to use for the 2023 year and have built in time to discuss and agree these scenarios ahead of finalising our studies.

### 3.3.1 Further opportunity

Following discussions with the Authority on the scenarios to be used for the 2023 assessment, we will include a "sanity check" scenario for the high HVDC southward flow case that occurred on 18/08/2024 at 736 MW (received) using the AUFLS block size data from 2023.

# 4 Outage planning and coordination



## 4.1 Outage coordination and assessment

The system operator co-ordinates industry planned outages to minimise power system risk. This includes performing power system studies, and modelling to identify risks and provide mitigation options to asset owners. These assessments cover the period from 7 days out to 200 days ahead of real time.

### *Forecasting future growth and resource requirements*

Transpower's proposal for the next regulatory control period RCP4 indicated a 30% increase in maintenance on the existing grid assets. The Operations Planning team have found there to be an historical correlation in this spend and outage numbers, which we have used to forecast the number of grid outages we need to process over the RCP4 period. This forecast provides guidance on what level of output the team will need be able to achieve in future years which informs our resourcing, tool development, and process roadmaps.

### *Process and impartiality*

The grid owner has the largest number of outages per year of any asset owner and its outages typically require more detailed power system studies. To enhance coordination, efficiency, and impartiality between the grid owner and system operator, we created a single outage request information form (ORI) between teams. This is used to use to transfer outage information between grid owner and system operator in a consistent, efficient, and impartial method. The system operator expects to work with the grid owner to automate this process through the grid owner's project to replace and enhance its Outage Handling Management System (OHMS) which is due for completion in 2026.

### *Reducing risk by managing outage congestion*

The grid owner has over 8,000 outages per year, the timing of each outage has traditionally been quite lumpy resulting in periods of high outage numbers and low outage numbers creating an uneven workload week on week, trading period by trading period. Periods of high outage numbers are referred to as periods of outage congestion, these periods can put stress operators introducing operational risk of human error which have potential to cause loss of supply events. This year we worked with the grid owner to develop guidelines, reporting, and routine meetings to smooth outage congestion to levels that are deemed manageable by the system operator. This has smoothed workload and reduced operational risk.

### *Improving outage co-ordination information*

#### *New Zealand Generation Balance*

The New Zealand Generation Balance (NZGB) is the system operator tool used to report on capacity margins up to 200 days in advance. This tool assists market participants to co-ordinate outages that impact on the overall supply demand balance of the country. A key input to this tool is a demand forecast. This year, we have replaced the old demand forecast method (which year-on-year took the previous year's load and added a 2% increase) to the more sophisticated Tesla/Yes Energy's probabilistic demand forecast.

The Tesla/Yes Energy's demand forecast principally uses a distribution of load based off today's load forecast model and uses the last 10 years of data providing more depth of insight into the types of load profiles that may present capacity risk. This change has helped the market participants to co-ordinate outages against different load percentiles. At the same time the supply side scenarios have been updated and simplified into a base case that shows all physically available generation, and firm generation – generation that offers its capacity 90% of the time. These scenarios are designed to show the range of supply that we can expect to see on any given day. This tool update was communicated to the Authority and industry via a specific industry forum.

### Improving outage co-ordination information

#### Communicating risk under different scenarios

The system operator has worked on how it communicates risk associated with long, high impact outages that have limited recall options. These types of outages need to be robust to many scenarios. To communicate how robust these outages are to various plausible scenarios we have begun using heatmaps that illustrate the level of risk under multiple scenarios.

This method was used to stress test the concurrent HVDC outage and Wairakei ring outage. Both outages restricted large amounts of North Island supply and would be slow to recall once on outage. Our general assessment showed limited impact with the concurrency of these outages. The industry informed us of various risks outside the normal planning process. We used the heat map to show the level of risk for these plausible scenarios industry raised which clearly showed a significant downside risk of the concurrency. This was communicated to the Market and directly to the grid owner, with the grid owner opting to separate the outages.

*"Covered everything to maintain safe, reliable and secure operation of the Grid"*

Market Participant

#### Providing Information on new key constraints

More generation has been connecting to the Wairakei ring. This has resulted in some outages having a very large impact on total North Island generation. We have proactively engaged the industry to provide more information about the size of the changing constraints.

#### Developing our people

In response to feedback from employees, we have reduced the administration required to participate in the Engineering Progression Plan. This has now moved from written submissions against 32 competencies to a 5-block assessment model that is comprised mostly of on-the-job assessments. This is more appropriate and makes it easier for engineers to demonstrate their progression; it also has assisted with staff retention.

To support new starters, we have also developed a structured first 12-week training plan. This is to give engineers the best start in their roles, speeding up development and assisting with retention.



Being impartial and demonstrating impartiality are two different things. While the system operator takes impartiality seriously and applies this lens in everything we do, often we hear through others that outage planning is an area where there are perceptions that we may not be impartial. There is scope to better demonstrate our impartiality going forward.

Through managing outage congestion, we have learnt how to use guidelines, data reporting, and routine process to manage operational risks associated with overall timing and quantity of the grid owners 8000 plus outages per annum. There is scope to use this approach across other areas of the outage pipeline to further reduce operational risks that are not part of an individual outage assessment.

The new NZGB tool has provided more information on risks, but also provided more information to, synthesise insights from, and communicate to the market to co-ordinate outages. We are still learning new ways of using this additional information and expect to continue into the new year.

## 4.1.1 Further opportunities

### *Improve market information*

With improved insights from NZGB, there is scope to refresh the Monthly NZGB report to provide more information and insights to support the market to make informed decisions.

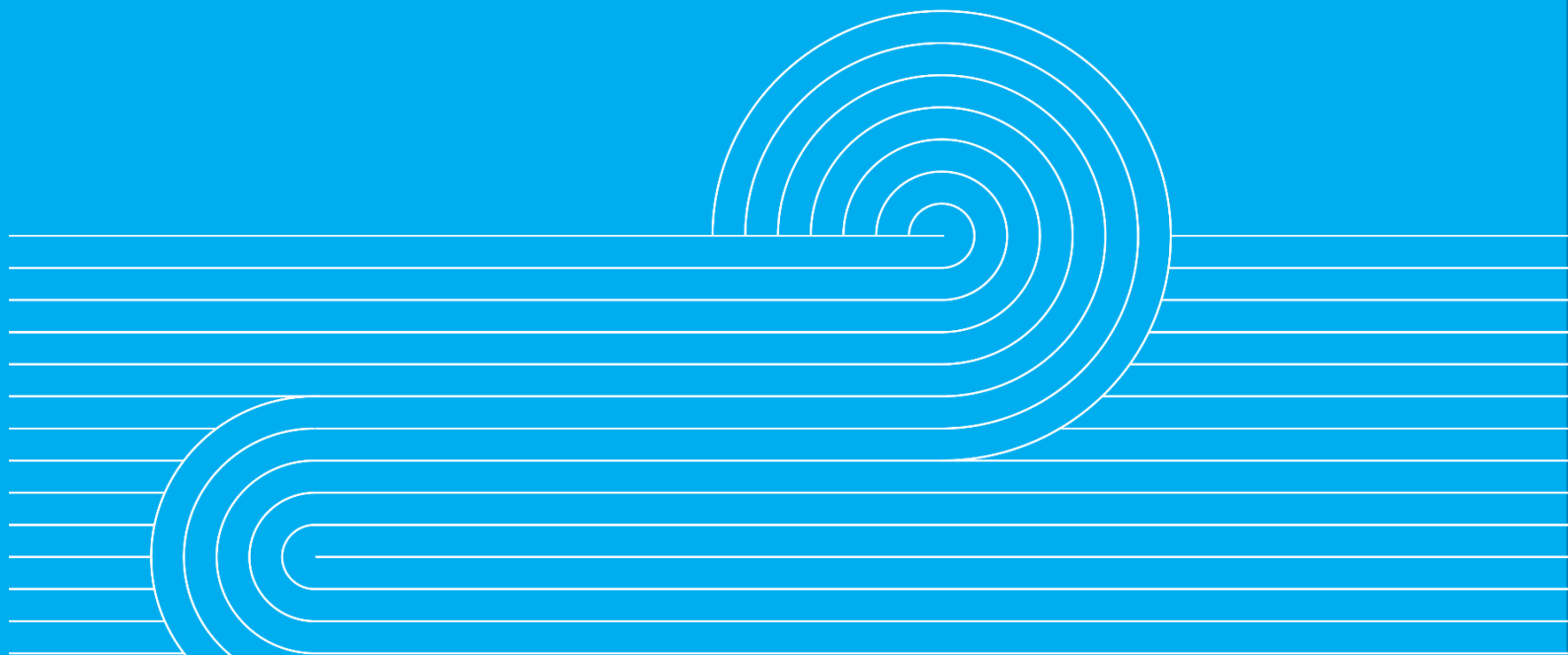
### *Advocating for and supporting improved industry outage co-ordination policy and processes*

The Authority has signalled an intent to review code changes that support greater outage co-ordination by the system operator. The system operator looks forward to engaging the Authority on the scope of this work and building off its previous advice to mandate outage information required to be submitted to the Participant Outage Co-ordination Platform (POCP).

The grid owner is working through an End-to-End works planning review process with the aim of enabling the higher throughput required to achieve the investments outlined in RCP4. This presents an opportunity for the system operator to advocate for outcomes that reduce operational risk, system security, and promote positive market outcomes by driving:

1. A greater number of projects in the grid owner's annual outage plan. The Annual outage plan provides long outage lead times which provide more certainty. This reduces operational risk, allows for greater time to study security risks, and improves market outcomes through allowing more time for market outage co-ordination.
2. A revised Short Notice Outage Request (SNOR) process. The current SNOR framework was created in 2016 and does not reflect that operational risk and poor market outcomes increase the less notice that is given. There is scope to work with grid owner to create a SNOR process that reflects operational risk and market impact but also provides flexibility to ensure reliability risks are addressed in a timely way.
3. Automated Optimisation engine that seeks to minimise the number of outages needed to facilitate work required, the market impact, and security risk.

# 5 Commitment to evolving industry needs



## 5.1 Industry engagement

We continue to work with stakeholders to support their participation in the market, including through providing educational materials, and gathering advice and knowledge from our industry participants and partners.

From our annual participant survey, 100% of our respondents agreed or strongly agreed that, overall, Transpower performs well in providing the system operator service.

We are encouraged to see the emergence of new products, business models and participants, and to learn with them, as they come into the market. This year we worked with:

- NewPower, to incorporate the Rotohiko BESS into the Instantaneous Reserve market.
- Simply Energy on how it can offer its product as Dispatch Notification Light (DNL), a low-cost path to allow small scale generation and aggregated resources to directly participate in the spot market.

We also assisted with Contact Energy's request to change its whole-of-station dispatch for the Whirinaki power station to three individual per-unit dispatch and deployed the changes to enable the Tauhara geothermal station to offer into our market system (ahead of commissioning).

*"Good solid performance over the years"*

Market Participant

We are working with SolarZero to implement a dynamic response from its rapidly growing fleet of 13,000+ aggregated residential battery systems. SolarZero has been participating in the instantaneous reserves on a provisional basis, with the capability to provide a binary reserve response only. Additional instantaneous reserves will free up more generation for energy to meet the tight winter capacity situations.

In January, we hosted the new Minister for Energy, Simeon Brown, and two of his staff for a tour of our Wellington control room (NCC). The Minister was very engaged and interested in the work we and the wider industry do and how we do it.

In March, we hosted the State-Owned Enterprises Minister, Paul Goldsmith, for a tour of NCC. The Minister was particularly interested in the accuracy of our wind forecasting as the MetService is also within his portfolio and many economic aspects such as how the market price is determined.

Other industry engagement this year has been via:

- **Week-ahead dispatch schedule (WDS) offers:** The WDS schedule provides the system operator and market participants with information about potential security issues and forecast price signals up to seven days into the future. The accuracy of the schedule is only as good as the information that is provided to us. While generators have improved the quality of offers into the WDS there remains room for improvement. We raised the importance of market participants providing accurate, up-to-date information in our Winter 2024 Outlook paper and our 9 April extended system operator industry forum when we outlined our approach to winter. Participants sought further clarity of what good looked like for the system operator. We have drafted a note in response to that request, which is available on our website.
- **System Operator Rolling Outage Plan (SOROP) review:** On 31 May we submitted our proposal (including our response to feedback received from stakeholders) to the Authority for its consideration. We are preparing to implement a new SOROP which will include modelling, working with distributors and direct connects to update their participant rolling outage plans (PROPs), and procedure updates.



- **Security of Supply Security of Supply Assessment (SOSA) 2024:** The Security of Supply Assessment 2024 final report was published on 26 June. South Island Winter Energy Margin (SIWEM) has worsened relative to last year’s SOSA due to an increased South Island energy demand forecast. Both the New Zealand Winter Energy Margin (NZWEM) and the North Island Winter Capacity Margin (NIWCM) have improved due to a reduced demand forecast and an increase in the existing and committed generation pipeline.
- **Transpower (as grid owner) discussion paper “Examining the purpose and future role of our HVDC link”:** On 26 April, we provided feedback to this paper to say that we agree with the assessment of the increasing importance of the HVDC to the operation of the power system. We highlighted our unique insight into the operation of the HVDC as part of the wider electricity system and markets, and signalled our intention to engage with the grid owner’s process. Transpower’s summary of submissions responds to our submission.

We use our website as one of the engagement methods with the industry and stakeholders, as well as providing operational notices and reports, policies and other information that support our role as system operator. The graphic on the right covers the last 10 months of the reporting<sup>7</sup> period. Live data pages continue to be the most viewed pages on the site. As expected there has been a large increase in the views of security of supply information.

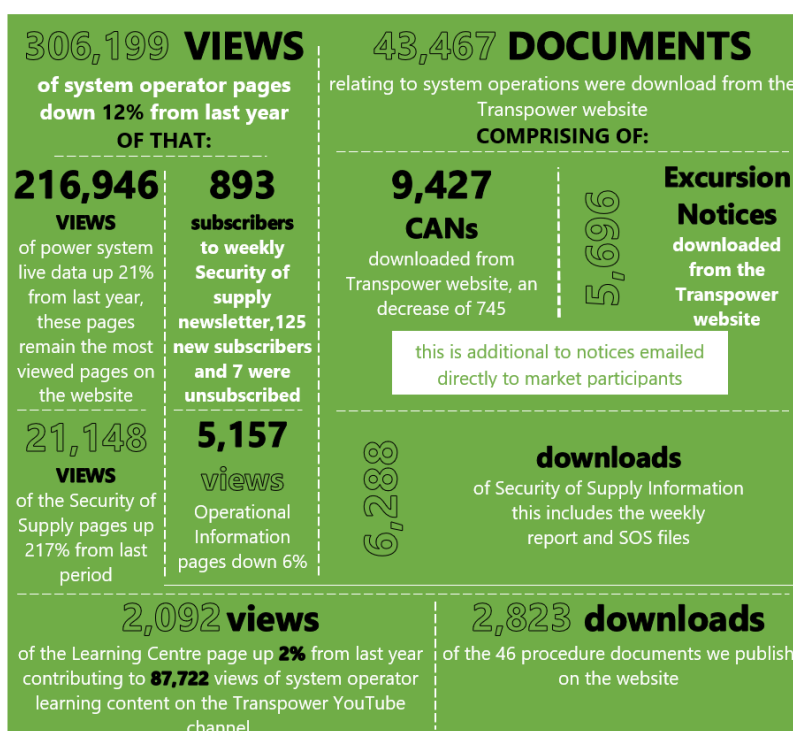


Figure 32 2023-24 Website activity

### Winter 2024 readiness

Each year, we carry out several pieces of work so that we and the industry are prepared for the winter conditions. The purpose is to make us all aware of the work being undertaken and reduce risk. Tasks that we undertook this year were:

- **Market Insight paper:** Our Winter 2024 Outlook paper was published on 31 January. It highlighted the capacity and energy risks on the system for this year, and the need for increased investment in flexible resources (such as peaking generation, batteries and demand response) to manage these risks. It builds on our Winter 2023 Review paper, published in October 2023, which reviewed the performance of the electricity system and market response over last winter.
- **Extended winter system operator forum:** On 9 April, we hosted an extended system operator industry forum where we stepped industry through our approach to Winter 2024. This included

<sup>7</sup> Due to change in Google Analytics we were unable to get data for July and August 2023.

what information is available to industry, operational notices, and response, as well as industry communications. The forum was well-attended

- **Extensive bilateral discussions with market participants to fully understand energy position to inform risk assessments:** We engage with industry participants on a monthly (and sometimes more frequently when needed) basis to understand fuel and plant availability to inform our risk assessments. This includes updates on forecast fuel availability, potential fuel supply-constraints and plant limitations which can have an impact on the electricity risk assessments.

### *Industry forums and conferences*

To keep up to date with industry developments and engage with our peers, we attend and present at various forums and conferences. Examples of such engagement are:

- **Taranaki Energy Forum:** We presented on the challenges of security of supply, and talked through changes to reporting, monitoring and management of security of supply.
- **Electricity Networks Aotearoa (ENA) Future Networks Forum:** We led workshops on SO/EDB interfaces and hot water cylinder load control.
- **Energy Traders conference:** In conjunction with the Authority, we presented on recent changes and the upcoming work programme.



This year the number of responses to our annual participation survey was low. We recognise the need for good feedback from the industry and despite repeated attempts through different channels to proactively seek engagement, the response was smaller than expected. The survey is an important way for us to understand how our stakeholder's regard our service and we will explore what we can do to get a better response in future.

## 5.1.1 Further Opportunities

Incorporation of feedback relating to industry engagement received in the annual participant survey in future industry engagement activities.

Respond to the feedback received from industry on our Evolving Market Resource Coordination market insight paper. Including consideration of which initiatives can be progressed either independently or to assist the Authority to progress initiatives

Progress voluntary information exchange to assist with operational coordination e.g. information exchange between the system operator and EDBs.

Seek 'standardisation' in approaches to new operating relationships (e.g. system operator and distributed system operator) and new technologies/business models (e.g. virtual power plants) via FlexForum and the Future Networks Forum.

## 5.2 International engagement

Examples of how we are engaging with the industry worldwide:

- Institute of Electrical and Electronics Engineers (IEEE):

- We presented a paper on “Analysis of wind and solar resource correlation and its impact on real-time balancing in NZ” at the power engineering society annual general meeting in Florida, USA.
- We hosted an event at which Dr Lin (Powertech Labs Inc., Canada) covered current practice, challenges, and trends for dynamic security assessments of power systems.
- Association of Power Exchanges (APEX): We presented a session on price formation.
- CIGRE (International Council on Large Electric Systems): We helped to organise the New Zealand market development and regulation event at Victoria University and presented on “Move to RTP and updating distribution network setting”.
- We attended the Cairns CIGRE (International Council on Large Electric Systems) conference which shared knowledge on technologies, systems and markets, and changes in IT systems.
- We hosted EVN (Vietnam Electricity), the largest power company in Vietnam, and as part sharing our experiences, presented on distributed energy resources aggregation.
- In preparation for the Authority’s consultation on wind forecasting, we met with Australian Energy Market Operator (AEMO) to discuss their experience of wind and solar forecasting.

The industry is quickly changing and accordingly we endeavour to continue to connect and leverage our international relationships to learn and understand how others are managing the new challenges facing the industry. Throughout the year we have engaged with other system operators including Eirgrid and Australian Energy Market Operator (AEMO). We met with Eirgrid, owner and operator of the Irish electricity grid, to discuss optimal grid ratings and operational limits.

In June AEMO a small contingent of our leadership team visited AEMO and TransGrid. The trip was an opportunity to see their control room operations first hand, discuss a range of common topics (control room operations/staffing, technology and tool development, training, outage management and challenges/opportunities associated with the transition) and build stronger connections to enable future sharing and collaboration.



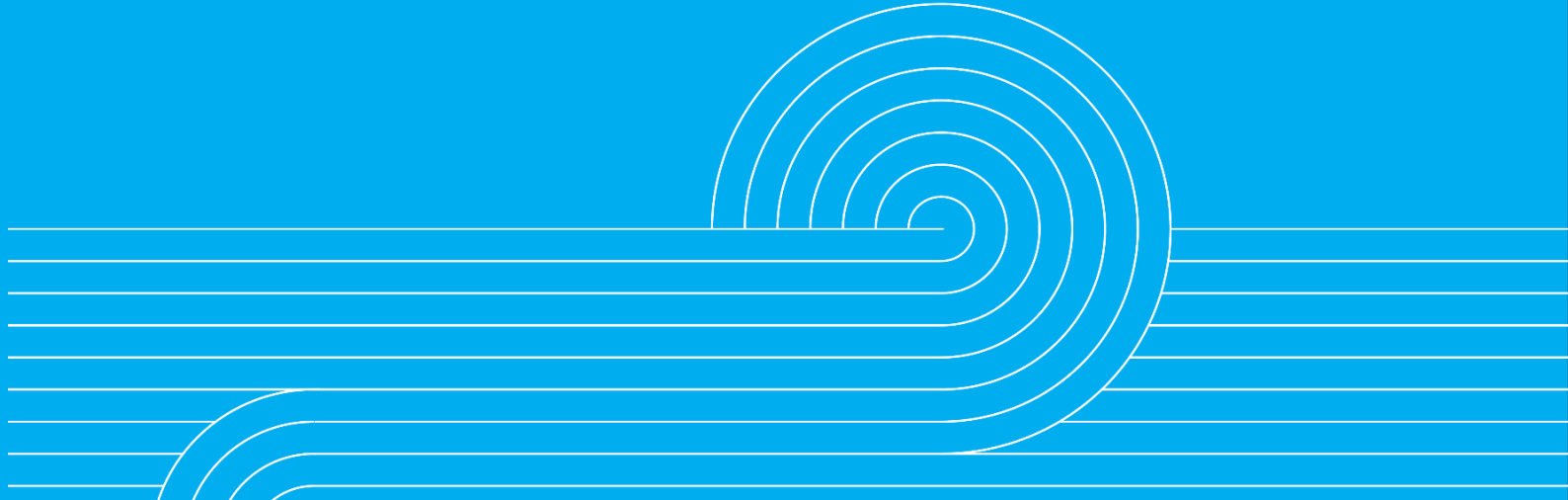
Systems Operators across the world are all grappling with the energy transition, increased workload and complexity, and working to improve decision making by investing in data and systems. A common focus is to improve awareness across participants, investors and regulatory bodies of the power system issues and risks associated with increased contributions from renewables. As yet there is no clear picture on how transmission system operation should best interface with distribution system operations as they emerge. Our engagement with system operators from other jurisdictions, including through membership of specialist organisations, participation in conferences and bilaterally, is a rich source of learning as we look towards solutions that will work for our Aotearoa New Zealand context.

### 5.2.1 Further opportunities

Work with the Authority to understand their high-interest areas for international engagement activities and consideration of this in our ongoing international engagement activities.

Agree a standardised information sharing approach with the Authority to communicate insights from our international engagements.

# 6 Project updates



## 6.1 Programme delivery

### *Joint Development Programme*

In August, we agreed a refresh of the Joint Development Programme with the Authority, which provides a view of shared change programmes from 2023-28. The updated plan is available on our website.

The Joint Development Programme (JDP), between the system operator and Authority, spans a period of five years and involves a range of projects related to service maintenance and service enhancement. The programme is updated at least annually and, as such, may change as planning assumptions become more certain over time.

We delivered the investigation and capital expenditure change projects outlined in the JDP and capital work programme, each of which is agreed with the Authority.

We successfully delivered four Technical Advisory Services (TAS) projects for the Authority. Two of these have provided the initial framework required to move on to the next level of investigation, for which new TAS projects will be set up and carried out in 2024-25.

### [TAS 106 - FSR Workstream – Part 8 of the Code – Common Quality Requirements](#)

In March 2021, the Authority approached Transpower in its role as system operator to commission TAS advice to support its response to the Electricity Price Review recommendation (G2) to examine the potential impact of technological advances and other changes on the long-term security and resilience of New Zealand's electricity supply.

Consequently, the Future Security and Resilience (FSR) programme was created, consisting of 3 phases.

- Phase 1 – Identify opportunities and challenges
- Phase 2 – Develop a 10-year FSR Roadmap
- Phase 3 – Delivery of a forward work programme of investigations (as identified under Phase 2).

With the completion of Phase 1 in 2021 and 2022 consecutively, Phase 3 commenced in August 2022 with the start of TAS102 – Review of Part 8 of the Code – Common Quality as the first investigation under the FSR roadmap. TAS102 was superseded by TAS106, which started in July 2023.

### [TAS 107- Extended Reserves – Automatic Under-Frequency Load Shedding \(AUFLS\) transition](#)

We started the AUFLS transition with the North Island Connected Asset Owners (NI CAOs) in January 2024. To ensure we maintain system security and can continue to meet our PPOs during the 18-month transition, we developed a transparent and comprehensive change and reporting process. To date the transition has been progressing well with active engagement between the system operator and the NI CAOs and good collaboration with the Authority. Any NI CAO non-adherence to the plan is being reported monthly to the Authority as per the agreed process.

### [TAS 109 - Instantaneous Reserves cost allocation for contingent events investigation](#)

The purpose of this TAS was for the system operator to investigate potential tool changes and rough order of magnitude costs to upgrade its instantaneous reserve cost allocation tools and processes to accommodate some Electricity Industry Participation Code changes the Authority is investigating. The TAS was delivered in two stages:

- Investigation, analysis and costing of Work Package 1, groups of generating units, and provision of an interim report to the authority of its findings,
- The investigation, analysis and costing of Work Package 2, voltage dispensations and Work Package 3, at risk HVDC, and provision of a final report to the Authority.

## TAS 110 – Winter 2023 Options – Permanent Implementation

In 2022 the Authority released its Winter 2023 Consultation Paper, seeking feedback on possible options to promote consumer interests during periods of peak demand in Winter 2023. Early in 2023, the Authority commissioned TAS 105 for the system operator to investigate the technical feasibility of implementing four of the Authority’s proposed Winter 2023 options by 1 May 2023. The Authority decided to implement several of the options as interim solutions ahead of Winter 2023.

On 19 March 2024, the Authority approved TAS 110 for the system operator to investigate further improvements to the above implemented solutions (relating to options A, B, and D), and to develop a ROM for the permanent implementation of option B.

The output of the investigation was documented in the TAS 110 report.

### *2024 Red Hat Innovation Award*

Red Hat, a global provider of open-source solutions, recognised Transpower as a Red Hat Innovation Award winner for a multi-year programme that included the delivery of the biggest change to the wholesale electricity market since it was created in 1996.

The launch of real-time pricing in late 2022 demonstrated the value of undertaking a complex ten-year programme to modernise the market system and enable rapidly evolving technologies like battery storage and smart appliances that depend on more accurate and timely prices.

Note: [Transpower wins 2024 Red Hat Innovation Award!](#)

## 6.2 Development of the electricity system and market

We have continued to work with the Authority to advance its Future Security and Resilience (FSR) programme. We supported the Authority’s review of Part 8 Common Quality Requirements towards its suite of three consultation papers published in June and its consultation on Code amendments to address insufficient information sharing and ensuring the Code is fit-for-purpose to enable new technologies, which is signalled to commence in October 2024.

Our activities in support of the Authority included:

- completing frequency studies to investigate thresholds for generators to be excluded from obligations in the Code, and the impacts of changing generation mix on frequency excursions and fluctuations within the normal frequency band
- completing voltage studies to investigate the likelihood of voltage deviations due to an increasing amount of inverter-based variable and intermittent generation being connected to the grid and investigating the impact on system strength and potential network performance issues when these inverter-based resources disconnect from the power system
- working with the Authority on its two draft options consultation papers on frequency management and, voltage management and fault ride through, and their discussion paper on the management of harmonics, which were all published in June
- engaging with the Common Quality Technical Group (CQTG) to support its review of our draft frequency and voltage studies technical reports, and address its comments as we finalised them to be included in the Authority’s consultation package
- Engaging with the Authority on a list of changes to Part 8 to make the Code more aligned to emerging technologies and an evolving operating environment, and work with the Authority in drafting the consultation papers.

We have also worked with the Authority to help prioritise FSR work for next year, and identify areas we can assist with.



The Authority and system operator project team has worked well together, with weekly coordination, the assistance of a project manager, with the system operations engineers providing technical and Code assistance.

From our exploration into Distributed Energy Resources (DER) flexibility we learnt that the current market mechanisms do not incentivize participation from flexibility aggregators and high levels of aggregation does not provide the level of visibility required by the system operator.

Queries received from industry during events have shown the need to make public the instances in which scarcity pricing will or won't apply which have been agreed between the Authority and the system operator.

### 6.2.1 Further opportunities

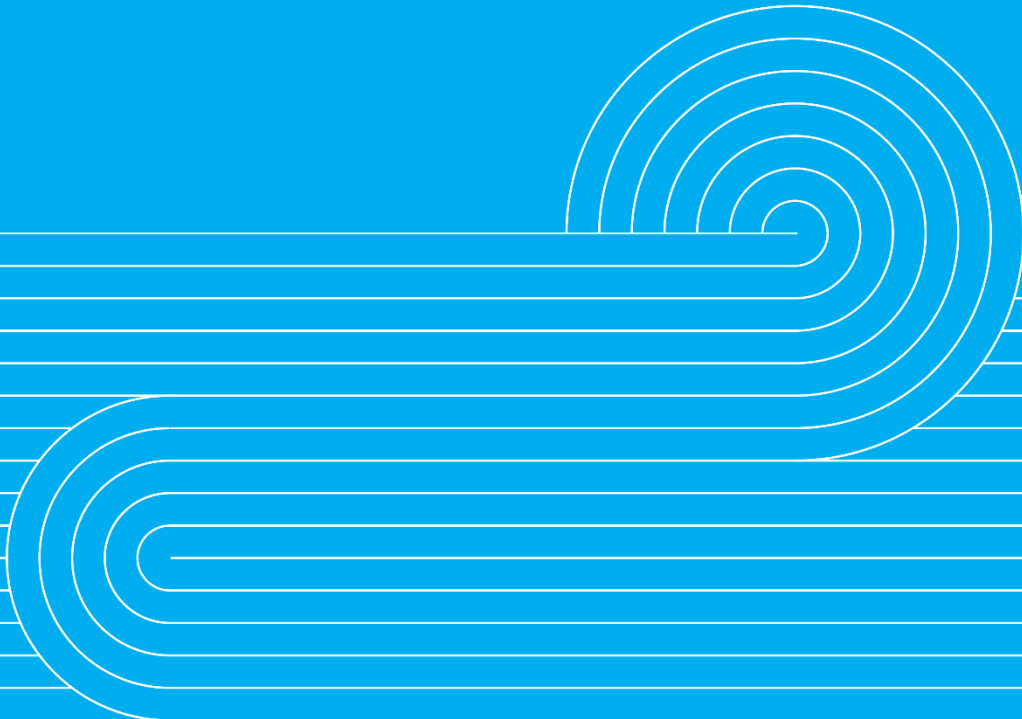
The last FSR TAS of the financial year noted opportunities for improvement in governance and collaboration across the FSR work. In addition, there are opportunities to work through current transition issues more closely such as obligations for new technologies that are connecting ahead of potential Code changes.

We have continued as one of [11] representatives appointed to ensure the CQTG comprises a broad array of expertise in the electricity industry, providing independent advice to the Authority as it progresses its review of Part 8 of the Code.

During Winter 2023, Ara Ake, SolarZero, Transpower, and the Authority carried out the Winter Peak Innovation Pilot to test whether distributed energy resources (DER) solar-battery systems could be triggered by the system operator in advance of a low residual event, aggregated to a grid exit point, and bid into the market via WITS. If needed, these resources could then be dispatched into the market by Transpower using existing market mechanisms.

Following the North Island Flexible DER Pilot we plan to expand on the success of the pilot project and continue learning and finding innovative solutions for different DER flexibility providers to make their resources visible to market participants and coordinators in system operator control rooms. Understanding and removing barriers to greater use of flexible DER will benefit the New Zealand energy system as a whole, as it transitions to a more highly renewable and electrified future.

# 7 Security of supply





## 7.1 Security of supply – long-term

In June we published our annual Security of Supply Assessment (SOSA) which assesses the ability of the electricity system to meet New Zealand’s winter energy and capacity standards over the next ten years. In November we asked for comment on the reference case and sensitivities we use for the annual SOSA and in May released our draft SOSA for industry consultation requesting feedback. The final SOSA report released in June details how the South Island Winter Energy Margin (SI-WEM) has worsened relative to last year’s SOSA due to an increased South Island energy demand forecast and an absence of supply pipeline development. The New Zealand and South Island Winter Energy Margins highlight the importance of existing thermal generation and its fuel supplies in maintaining margins above the security standards until sufficient renewable generation comes to market. Like previous year’s assessments, the North Island Winter Capacity Margin (NI-WCM) highlights the need for flexible resources such as batteries, peaking generation and demand response. This is because majority of the new investments are intermittent renewable resources (wind and solar) which help with the winter energy margin but have lower contributions during winter peak load periods.

*“SO has been very proactive in all areas”*

Market Participant



Ongoing engagement with industry stakeholders on the security of supply risks is important for the market and wider industry to understand the evolving risks facing the industry as the system transitions with increasing renewable penetration and electrification. This will help inform stakeholders whether the market is delivering the required level of investment. A key part of this process is the timeliness and accuracy of industry-supplied information and assumptions. These include participant-supplied information of fuel availability, future investment plans and the security standards assumptions document.

### 7.1.1 Further opportunities

We are working to investigate evolving security of supply approaches to reflect challenges in the market and system, as discussed in our paper "[Evolving security of supply assessment in New Zealand](#)" released in July 2023. The purpose of this work is to acknowledge our system is changing with increasing proportions of intermittent renewable generation and increasing electrification, and security of supply approaches will need to change with it to ensure the changing risks, economics and expectations are considered.

We intend to continue evolving our security of supply processes to maintain and improve relevance, efficiency, communications with and engagement from the industry. This will also include updates required in response to the Authority releasing the updated Security Standards Assumptions Document (SSAD).

## 7.2 Security of supply – medium-term

As system operator we monitor security of supply to track whether there is enough generation and transmission capacity to meet New Zealand’s needs, and regularly inform and update the industry of the current situation. This includes our monthly assessments of the Electricity Risk Curves<sup>8</sup> which indicate the risks of running out of hydro storage over the next 12 months (“energy” risks). The New Zealand Generation Balance (NZGB) provides an indication of the ability of available generation capacity (taking into account plant outages) to meet forecast system peaks over the next 200 days (“capacity” risks).

We published two market insight papers regarding winter capacity challenges. The October 2023 paper focused on reviewing the performance of the electricity system and market response over the 2023 winter period. The paper released in January 2024 built on the earlier paper by providing a forward-looking analysis of the energy and peak capacity issues for winter 2024. We’ve also taken the opportunity to share these with the wider industry presenting at these topics at the system operator industry, Energy Trader and Ara Ake forums.

During winter 2024, a combination of factors resulted in an increased rate of decline on already below average hydro storage levels. These contributing factors include gas production constraints, ongoing lower than average hydro inflows, very low wind generation, and increased demand especially during an unseasonably cold May. This together with practical implications of and interactions of some reservoir resource consents resulted in a mismatched drawdown of hydro storage lakes and the risk that one or more reservoirs could reach their contingent storage boundary (normal “minimum”) while aggregate storage remains above the default Alert status trigger. Our assessment indicated the inability to access contingent storage could impact system security with insufficient South Island peaking generation to supply the South Island peak load and impacts on the system energy requirements (accounting for current and potential fuel availability). To alleviate these system security risks, we consulted with industry on adjusting the buffer<sup>9</sup> component of the contingent storage release boundary (CSRB) related to the Alert status curve. Following a review of submissions, we decided to raise this buffer to remove barriers on contingent storage access to alleviate near-term system security risks but limited this increase to September and October 2024 to ensure this was time-bound reduce impacts on 2025.

### 7.2.1 Further opportunities

Several participants raised as part of their submissions that a wider review of the risk reporting framework was required. We consider the discretion allowed for under the SOSFIP to adjust the buffer has been applied in this case in-line with the intent. Nevertheless, we consider every situation provides an opportunity to review and improve the current processes and security frameworks and any longer-term review of the SOSFIP will be discussed with the Authority considering resourcing and priorities.

## 7.3 Security of supply - short-term

The market is responsible for co-ordinating sufficient resources in the short-term (7 days out to real-time). We have undertaken a number of initiatives to improve the market information and co-ordination. These include publishing a guidance note on improving market inputs into the WDS<sup>10</sup>, working with

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<sup>8</sup> The process is outlined in the Security of Supply Forecasting and Information Policy (SOSFIP).

<sup>9</sup> The adjustment of the buffer component by the system operator is to allow for operational considerations where contingent storage may not be operable.

<sup>10</sup> See [here](#)

industry participants to improve the quality of intermittent generation offers in the market, providing the market with pre- and post-event assessments via our industry briefings (in the lead up to events), as well as after events as part of our weekly market insights<sup>11</sup> and fortnightly system operator industry forums. This helps participants understand the operational risks the system operator observes in the lead-up to real-time and how these interact with current market settings.

We published our paper “Evolving market resource co-ordination in Aotearoa New Zealand”, which highlights how the co-ordination functions (temporal, geographic and security) will be challenged during the energy transition with increasing intermittency and different technologies. This paper poses questions to participants and stakeholders to gain insights to consider for future development work.

### 7.3.1 Further opportunities

Ensuring the right market settings is key to balance the risks being observed. We’ve observed the current scarcity settings resulting in reserve and energy shortfalls being scheduled ahead of market resources increasing the need for the use of system operator discretion. While no market solution will be “perfect” there will always be situations where the market solution does not reflect the system operator’s obligation to meet its PPOs and the system operator will need to employ its powers of discretion. Nevertheless, these situations can be useful to further educate industry participants and evolve trader behaviour, operational practices and market settings.

## 7.4 System Operator Rolling Outage Plan (SOROP)

The System Operator Rolling Outage Plan (SOROP) is one of our key security of supply planning and policy documents. It is used to determine when an electricity supply shortage would be declared and how this would be managed.

We conducted a desktop exercise with some industry participants in 2022 that identified areas where the plan could be refreshed and improved. As a result, we committed to review the SOROP in 2023/24. We prepared a consultation package on a proposed update to the SOROP and received consent to consult from the Authority on 25 January. Consultation ran from 7 February to 20 March, during which time we ensured consumer representatives the Consumer Advocacy Council, Transpower’s Consumer Advisory Panel members and the independent retailers were aware of our process. We received and published ten submissions and five cross submissions.

We took into consideration the submissions and on 31 May submitted our proposal (including our response to feedback received from stakeholders) to the Authority for its consideration. On 21 August we received notification from the Authority the new SOROP will come into effect on 1 September.

We are currently working to implement the new SOROP which will include modelling, working with distributors and direct connects.

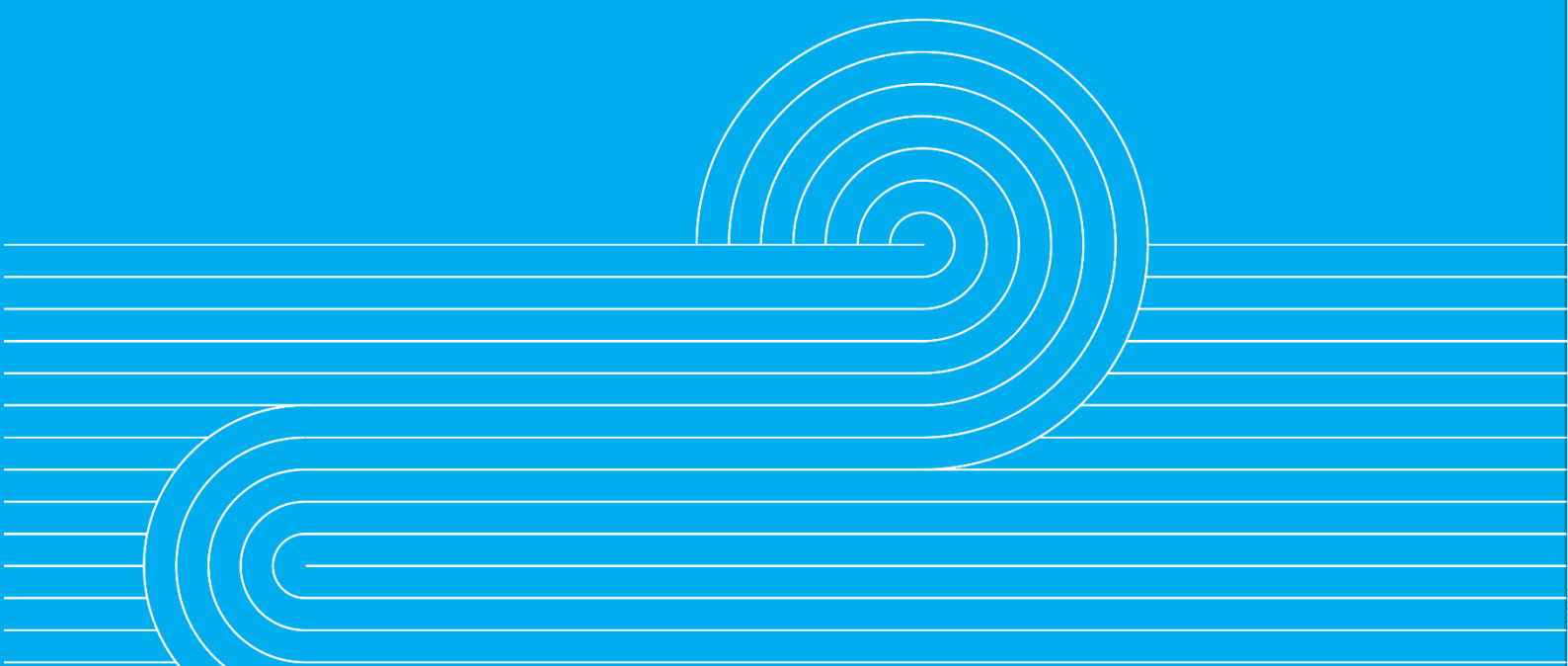


We’ve identified through the SOROP desktop exercise the importance of stress testing (with industry) infrequently used processes and procedures to ensure they remain fit-for-purpose.

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<sup>11</sup> See [here](#) and [here](#)

# 8 Risk & Assurance



## 8.1 Risk assessment

We have completed our annual review of the all the critical controls, performed as two six-monthly control self-assessments:

- November 2023: 24-hour real-time operations, business support, incident preparedness and response, power systems planning and support, and delivery of critical tools
- May 2024: People management, Stakeholder management, monitor and evaluate potential operating environment, connected asset and system monitoring, and change management.

In these assessments, we identified 12 component actions with a maturity rating of 2 (ratings are between 1(low) and 4(high), although we have no ratings at 1). These component action with a rating of 2 signify there is room for improvement in how these particular elements of the processes can be carried out. These actions are tracked as part of the performance metric measures and regularly reviewed. The majority of these actions were completed by their original due dates. However, the completion of some of these actions was affected due to the prioritisation of other work, in particular the preparations for winter.

We prepared a paper on risk management for the Authority's Market Operator Committee (MOC) in February to provide an overview of our risk management framework and our work on identifying future risks to system operations. In response to MOC feedback, to demonstrate Transpower was considering the system operator risks appropriately, we developed a system operator--specific risk appetite statement and matrix. The main differences between Transpower's enterprise matrix and the system operator matrix relate to the consequence categories.

We have also developed a draft risk register (risk log) to serve as an input to our risk bowtie and to help identify threats/risk controls which have not yet been captured. This internal risk log is not the means by which we primarily manage risk and fulfil regulatory compliance, but is instead a log to improve visibility of the identified risks. The aim of the risk log is to assure that the threats contained in the system operator risk bowtie are appropriate and cover all identified scenarios. In doing so, this increases confidence that the system operator has appropriate controls in place. The log has undergone two internal management evaluation sessions and will be reviewed and updated every six months (or more frequently if a new detailed threat scenario is identified). Our aim to improve the review process is to seek a full view of the risk landscape by including input sought from external parties, including the Authority.



During the year, we have had several discussions with the Authority, the MOC, and internally with our System Operator Committee about our risk management framework and in particular our risk appetite statement and risk matrix. We listened and responded with a system operator specific matrix that more accurately reflects how we have used the matrix in practice.

### 8.1.1 Further opportunities

We have drafted system operator-specific risk appetite and risk matrix documents. This year we will work on:

- applying these through our risk management framework
- illustrating the application of these in our risk deep dives for the MOC

- holding a workshop with the Authority on the risk log, or register, that we have created to improve visibility of the identified risks.

## 8.2 Business continuity plan testing

The business continuity plan (BCP) is written to enable the system operator to be prepared in the event of any unplanned interruption to our system operator service and minimise the disruption to the industry. Each year we must carry out a simulation to test the effectiveness of our business continuity plan.

This year we did not enact a separate exercise focused on business continuity, but we did join both the May industry exercise and the GridEx exercise, both of which involved BCP processes.

### 8.2.1 Further opportunities

Much of our BCP overlaps with our Coordinated Incident Management System (CIMS) approaches and our emergency management procedures. We see opportunities to review and restructure our BCP to be explicit about these overlaps and restructure the BCP documentation as a result.

## 8.3 Business assurance audits and plans

The five business assurance audits completed this year were:

- **System Operator Gatekeeper Actions**

The audit outcome was effective, with two low risk (priority 3) findings relating to:

- Exploring and adopting solutions to reduce manual handling of data
- Improving the effectiveness of communication channels for information sent by the Gatekeeper to various teams.

- **Discretion on demand/generation**

The audit outcome was effective, with four low risk (priority 3) findings for action. These relate to:

- The processes related to peer reviews of discretion decisions
- Logging and reporting of discretionary actions
- The use of discretion during black start procedures
- The future challenges from increased workloads and increased variability in generation (a wider finding than just related to this audit subject area).

- **Management of Inputs to RMT**

The audit outcome was effective, with two low risk (priority 3) findings for action. These relate to:

- Completing the current work to document the Wrapper procedure and to also bring together the RMT modelling and IST data processing
- Improving the capture of recommendations from RMT events (post-event) and ensuring systems are developed to track completion.

- **Synchronise and Reconnect an Island**

The audit outcome was that there is effective design and implementation of controls, one medium risk (priority 2) and two low risk (priority 3). These relate to:

- Reviewing the manual synchronisation process to confirm the reliance on service providers is appropriate in an event and how the grid owner provides assurance to the system operator that manual synchronisation capability exists (Priority 2)
- Improving the capture of recommendations from RMT events (post-event) and ensure systems are developed to track completion (Priority 3)
- Reviewing the adequacy of the training and simulation exercise to ensure that they adequately meet any business continuity requirements (Priority 3)

- **Shortage of Supply Management**

The audit outcome was effective, with three low risk (priority 3) findings for action. These relate to:

- Ensuring the capability of the design agency is reviewed on an annual basis and to consider securing a .gov web address for any potential OCC as part of the preparation process
- Considering improvement to the documentation and evidence maintained when individual PROPs are approved
- Considering establishing a delegation to authorise rolling outages.

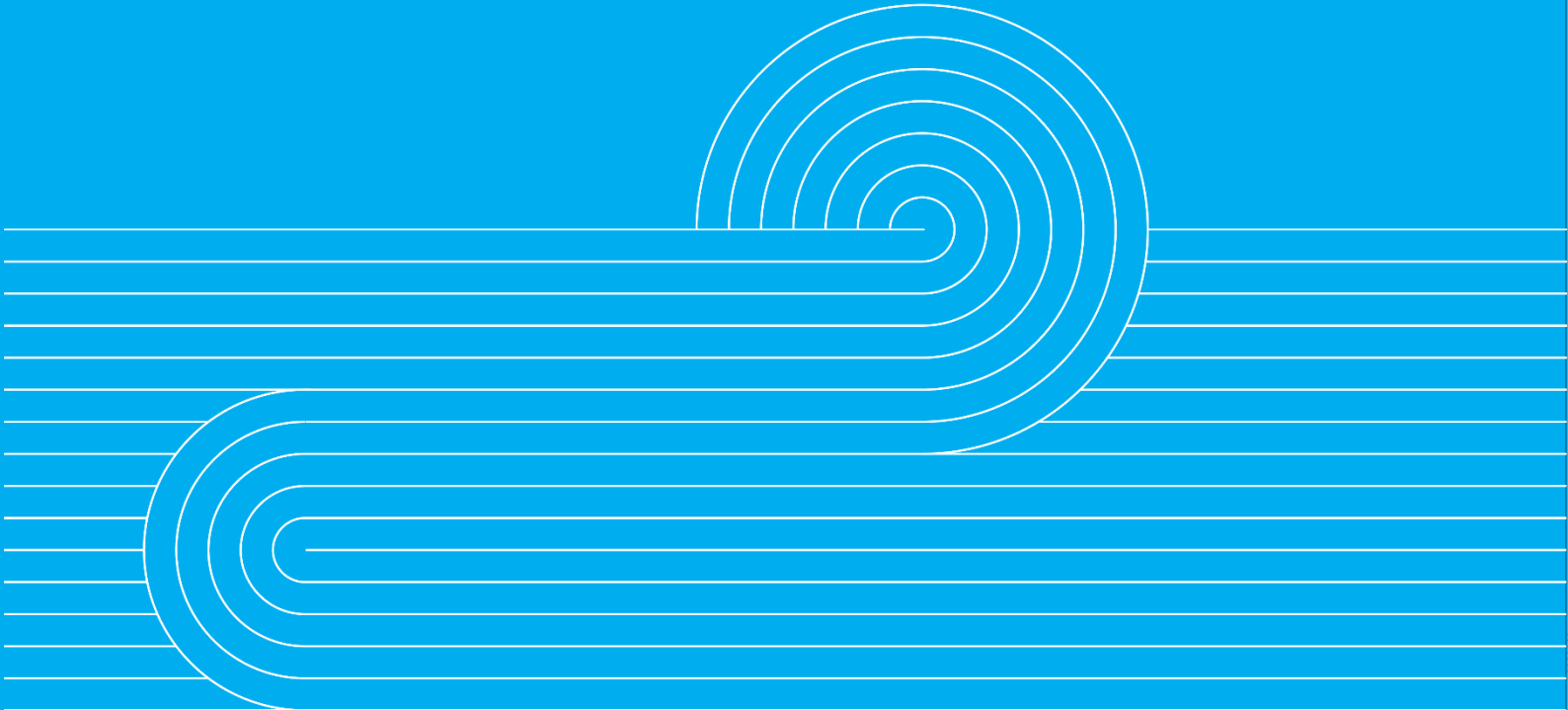
For the 2024-25 year we have agreed with the Authority on the system operator business audit plan and identifies the following four business assurance audits for next year:

- Commissioning and Decommissioning Requirements
- Manage a National SCADA EMS Failure
- Electricity Risk Curves Modelling
- Manage Security Constraints.

### 8.3.1 Further opportunities

We have had constructive feedback from the Authority on our business assurance audits and are amending our standard audit scopes to include some of the Authority's recommendations, particularly in asking the Auditors to consider future challenges for each procedure under audit.

# 9 Compliance and impartiality





## 9.1 Compliance

In our role as system operator, we not only monitor our own compliance with the Code, but we also monitor the compliance of participants (including Transpower as the grid owner) with their Code obligations. If we believe we may have breached our obligations, we will investigate internally and self-report any breaches which have occurred. While ultimately Compliance is monitored by the Authority, our central role within industry gives us visibility of many participant activities subject to compliance obligations, for instance compliance with dispatch instructions. We take this requirement seriously and in the example of dispatch instruction compliance we have an agreed monthly reporting process with the Authority highlighting instances of potential non-compliance for further investigation. In most instances our preference is for participants to self-report their own breaches once we have brought a potential non-compliance to their attention.

We reported one system operator self-breach this year. On 5 December 2023, which related to a modelling error in two real-time dispatch schedules on 4 May 2023. The event was caused by an error in the automatic internal processing within the Market System, which resulted in generation receiving a dispatch instruction while it was physically disconnected from the power system. This error had not occurred previously and could not have been detected. The error caused a market impact of \$14,000 - \$18,000. We have subsequently implemented several corrective and remedial actions and are confident the error will not recur.

We responded to two warning letters from the Authority relating to breaches raised in the previous financial year. Both letters refer to the Authority's concern around compliance with the modelling provisions in the Code. Being mindful of increasing the Authority's visibility and exposure to our operations, we delivered a presentation to the Authority on modelling complexity and development of a modelling quality assurance framework to deliver improvements in this space. The modelling quality assurance work is currently in progress.

During the year our observations and follow up discussions with participants led to several participants self-reporting breaches of the Code, including the grid owner.

### *Authority referral to Rulings Panel - VSAT*

On 5 June 2024, the Authority filed a notice of formal complaint with the Rulings Panel in respect of Transpower in its role as system operator.

The complaint alleges Transpower, as a result of errors in the system operator's voltage stability assessment tool (VSAT), failed to correctly apply security constraints between 28 January 2022 and 13 April 2022.

## 9.2 Impartiality

In carrying out its system operator role Transpower must operate as a completely independent System Operator (ISO) would do, with diligence and in accordance with recognised international good practice. Transpower has ensured that the system operator has implemented and embedded policies, procedures, processes and controls to manage independence threats and ensure any potential conflicts of interest are actively monitored and mitigated.

A key control is our Corporate Counsel – Compliance & Impartiality position which reports to the EGM Operations and is responsible for: the system operator compliance and impartiality framework, monitoring and reporting on compliance with and breaches of the Code, monitoring and reporting on system operator role impartiality, managing the Event reporting process, Code change applications, management of the Policy Statement (incorporated by reference into the Code), and ensuring the

Operations annual assurance programmes support effective system operator management of system operator functions identified where conflicts of interest and questions of independence and impartiality may arise.

### 9.2.1 Application of impartiality

Currently, there are five system operator functions identified where conflicts of interest and questions of independence and impartiality may arise.

- Procurement of ancillary services: The system operator procures ancillary services (e.g. frequency keeping, instantaneous reserve) to enable it to fulfil its obligations under the Code. The grid owner could compete with third-party service providers to provide ancillary services to the system operator and therefore any decision on this would need to be made through a transparent and fair process. However, as the grid side of Transpower's operations do not provide any ancillary services this risk is easily managed.
- Dispensation and equivalence arrangement decisions: All asset owners have performance obligations under the Code. If they cannot meet those obligations, they can apply to the system operator for a dispensation (non-compliance) or an equivalence (equivalent compliance via alternative means). The system operator must ensure applications from all asset owners, including the grid owner, are assessed consistently.
- Code compliance monitoring and reporting: The system operator has a responsibility to monitor compliance with the Code by all participants, including the grid owner, and must hold the grid owner to account in the same way it holds other participants to account.
- Outage co-ordination: The system operator coordinates outages across the grid and needs to manage and prioritise the competing outages of both the grid owner and all other asset owners.
- Managing Information about Security of Supply and Emergency Management: In performing its role in relation to the security of supply and emergency management, the system operator receives commercially sensitive and confidential information. It is important that all information is kept secure and confidential and is managed consistently.

In addition, there are two further areas where practically the system operator role exercises its impartiality.

- System planning: The grid owner system planning is informed by the system operator's unique expertise and expectations for the future system, and the system operator adopts the grid owner's demand forecasts for its annual 10-year ahead Security of Supply Assessment. As well as removing potential duplication, common demand forecasts support better engagement with stakeholders and more consistent information to support asset owner investment decisions. system operator impartiality is protected by ensuring the system operator has no decision rights for system planning or transmission investment by the grid owner.
- Communications and engagement: The system operator releases specific market reports (as required by the Code) as well as thought pieces and other documents supported by funding from the Authority. The reports are limited to topics related directly to the system operator function and are largely developed independent of input from the grid owner teams. Similarly, Transpower may send different representatives to the same industry forums wearing different 'hats' and there are also consultations run by government and other agencies where Transpower will make different submissions from the system operator and grid owner teams if required. Transpower is also very careful that public statements made by the Executive General Manger,

Operations (EGM Operations) in their role as system operator, are impartial and are constrained to areas of their mandate in support of the Authority.

### 9.2.2 Conflict of Interest Guideline and Register

The system operator's obligations in the Policy Statement are developed in our Conflict of Interest Guideline document. The Guideline specifies roles and responsibilities (processes to follow when a potential conflict arises).

The Conflict of Interest Guideline is a Transpower controlled document and is reviewed every 2 years.

The Corporate Counsel - Compliance & Impartiality is responsible for maintaining the Conflict of Interest Register, which captures all system operator conflicts of interest (potential and actual, active and closed). Any changes to the Conflict of Interest register are reported monthly to Transpower Management and to the Authority.

Two permanent risks are retained on the register: a risk to impartiality covering all employees with dual system operator/grid owner roles, and a risk covering all potential conflicts of interest arising through system operator employees' personal relationships.

Three potential conflicts of interest were raised this year. These related to an internal acting management appointment, a planned transmission outage, and the accelerated processing of a dispensation application. All three were closed following an assessment and in the case of the internal acting appointment, a mitigation plan was implemented.

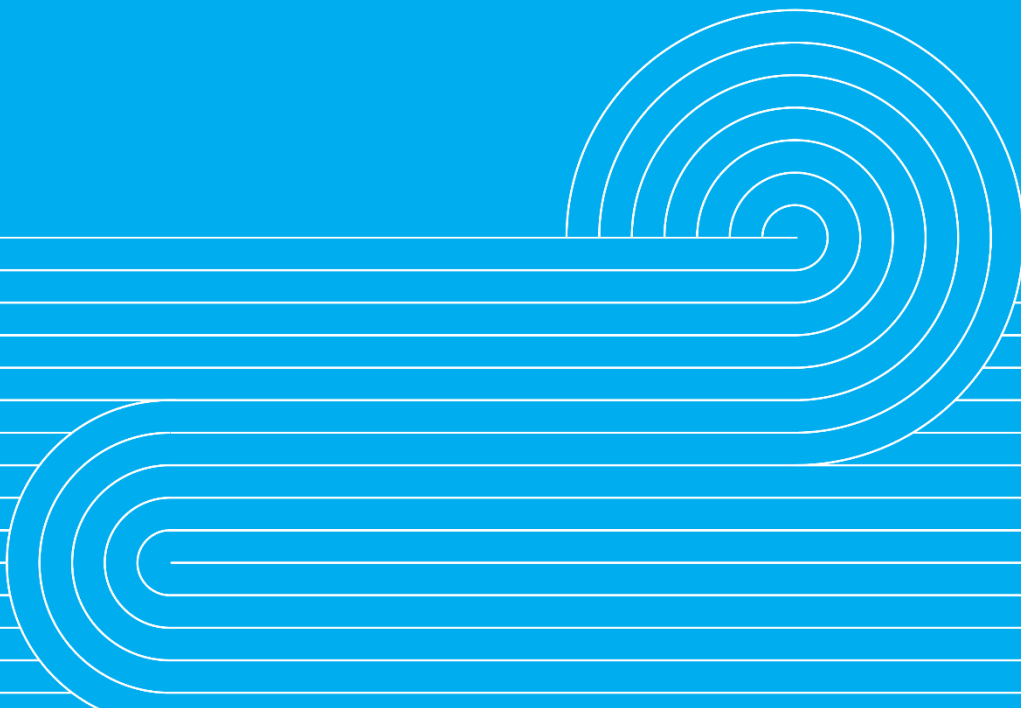
Transpower's legal team has a process to manage the provision of independent advice to each of the system operator and the grid owner where there is a perceived, potential or actual conflict-of-interest between those roles. The process covers expert advice received from legal, accounting, financial and engineering professionals, whether provided from within Transpower or from external parties.

### 9.2.3 Review and continuous improvement of impartiality and independence mechanisms

Transpower continually looks for opportunities to improve the mechanisms it uses to ensure it performs its system operator service in an impartial and independent manner. This includes:

- Identifying and addressing gaps including through regular document review cycles and independent reviews
- Utilising the Board System Operator Committee to review key publications, audit plans and actions and other performance reporting
- Improving transparency of the way the system operator makes decisions impacting asset owners (often including the grid owner)
- Improving the accessibility of system operator information sources available to participants and stakeholders including providing updates through the system operator industry forum on real time operational decisions e.g. May 9 and 10
- Improving the visibility of alignment between decisions the system operator makes and the Authority's statutory objectives
- Improving training materials and onboarding processes for new employees
- Considering and addressing feedback received in relation to impartiality and independence of the system operator

# 10 Strategic and business planning



## 10.1 Statutory objective workplan

The statutory objective work plan (SOWP) is a requirement outlined in the SOSPA.<sup>12</sup> The SOWP sets out the steps the system operator must take towards delivering its service in a manner that assists the Authority to give effect to its statutory objective and consider the impact on participants in its decision making.

The 2023/24 SOWP contained two objectives:

- to review the current scope and timing of SOSPA deliverables, and
- to identify the activities and themes we will use to support the SOSPA reset for 1 July 2025.

We completed a review of the scope and timing of SOSPA deliverables and changes will be agreed as part of the negotiation to reset the SOSPA for the third contractual period commencing 1 July 2025 (SOSPA3).

We identified activities and themes to support the SOSPA reset including through an ongoing series of Authority and system operator workshops. The initial SOSPA3 proposal, submitted to the Authority on 1 July 2024, provided the Authority with a view of the business activities and investments the system operator will need to deliver our critical electricity system role now and into the future.

### 10.1.1 Further opportunity

The collaborative workshops helped inform the ongoing SOSPA3 negotiations by identifying potential opportunities for the scope and timing of system operator deliverables to be more efficient and effective, including through better alignment with respective business planning cycles and the Authority's appropriations processes.

## 10.2 Strategic and business planning

Each year we prepare the [System Operator Strategic Plan](#), which sets out the strategy and principles according to which Transpower provides the system operator service.

The following table details our activities for the year against our strategic focus areas for the 2023-24 year.

Strategic Focus Areas	Examples of supporting activities
<b>Enabling whole system development</b>	<ul style="list-style-type: none"><li>• Ongoing engagement with Future Networks Forum and FlexForum to develop a shared vision of distribution system operation in New Zealand, and begin to define operations at the TSO/DSO interface</li></ul>
<b>Integrating new asset technologies</b>	<ul style="list-style-type: none"><li>• Commissioned and completed market integration of two new asset classes – the first utility-scale battery energy storage system and two new solar farms</li><li>• Completed market integration of Solar Zero's virtual power plant (VPP) peak capacity offering</li></ul>

<sup>12</sup> SOSPA, clause 5.5(b)

Strategic Focus Areas	Examples of supporting activities
<b>Providing market information in operational timeframes</b>	<ul style="list-style-type: none"> <li>Completed implementation of the Winter 2023 initiatives and completed scoping for their permanent operation in the market</li> </ul>
<b>Enhancing scalability and adaptability</b>	<ul style="list-style-type: none"> <li>Completed a continuous improvement review into the generator commissioning process</li> </ul>
<b>Data-driven decision making</b>	<ul style="list-style-type: none"> <li>Commenced deployment of enhanced market data warehouse</li> <li>Improved the short-term capacity adequacy assessment processes to include estimates of uncertainty in projected wind capacity</li> </ul>
<b>Event preparedness and response</b>	<ul style="list-style-type: none"> <li>Led the annual industry exercise improving processes around managing grid emergencies</li> </ul>

The 2024-25 Strategic Plan was developed using a similar methodology developed in the previous year, which:

1. Defines system operator strategic objectives as a synthesis of the Transpower and the Authority's strategic priorities
2. Undertakes an environment scan and identifies risks and opportunities that are arising and developing in our increasingly complex operating environment, and
3. Sets out areas of focus for the coming 5 years and beyond, which together directs how we will apply resources to improving our capabilities and respond to those changing needs.

Overall, our strategic direction remains consistent with previous years. Both Transpower and the Authority's strategies have been refreshed to consider the rapidly changing industry and electricity consumer. Our System Operator Strategic Objectives are:

- Enhance trust and confidence
- Ensure a reliable electricity system
- Drive innovation
- Enable the transition to electrification
- Facilitate and efficient electricity market
- Deliver an effective service.

For the coming year we have shifted focus slightly from providing operational information that supports effective self-commitment decisions in the market, to providing more insight into forward price signalling and information to support investment decision-making. This was a conscious shift recognising the success implementing the Winter 2023 initiatives which expanded the information available to participants in the scheduling timeframe.



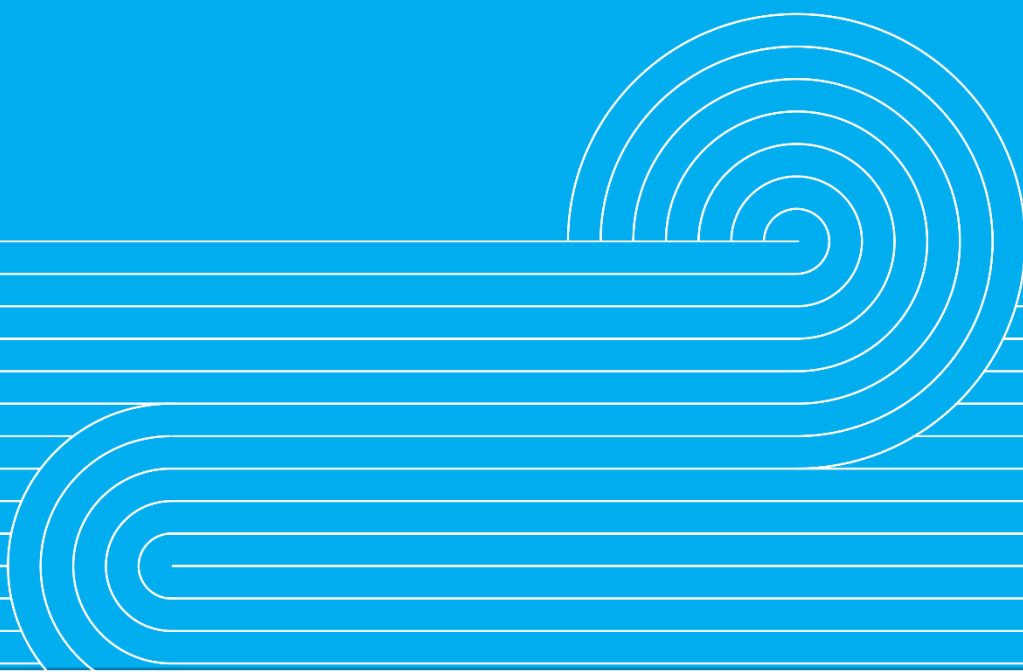
This year the strategic planning process benefitted greatly from a bottom-up review of our internal capabilities, that informed our planning for the next SOSPA period. This review validated our strategic focus and allowed us to identify specific activities which would address the key drivers impacting our service.

We shared early drafts of the Strategic Plan with the Authority staff and board and received positive and critical feedback, allowing us to improve our strategic alignment with the Authority's goals.

### 10.2.1 Further opportunities

We recognised through this process there is considerable effort exerted refreshing the system operator's strategy, despite the strategy being reasonably enduring. The better application of effort is examining key external drivers and adjusting strategic focus areas to better adapt our capabilities. In the next SOSPA period we will split the Strategic Plan and produce an enduring system operator strategy, while preparing focus areas that inform investment in line with the Authority's appropriations processes.

# 11 Performance metric and monitoring





## 11.1 Performance metrics 2023-24

Under the Statutory Objective Workplans for 2021/22 and 2022/23, the system operator and Authority have been working together to perform a comprehensive review of the performance metrics. For the 2023/24 year, the performance measures were updated to encompass seven high-level outcomes that the Authority wants the system operator to prioritise.

The scores for each of the seven-high level outcomes are determined using both quantitative and qualitative components.

The quantitative component is influenced by one or more performance metrics. The relationship between the metrics and outcomes, along with the weight each metric carries towards each outcome, is agreed annually by the system operator and the Authority prior to the beginning of the financial year.

The qualitative component is evaluated annually, at the end of each financial year. While the metrics are designed as a measure of performance, in some circumstances they may not fully represent all aspects of system operator performance for an outcome. To recognise this, the qualitative component provides an opportunity for both parties to make proposed adjustments to the quantitative score for an outcome, based on relevant evidence. The adjustment to the score can be made in either direction, reducing or increasing the final score, and must be supported with evidence.

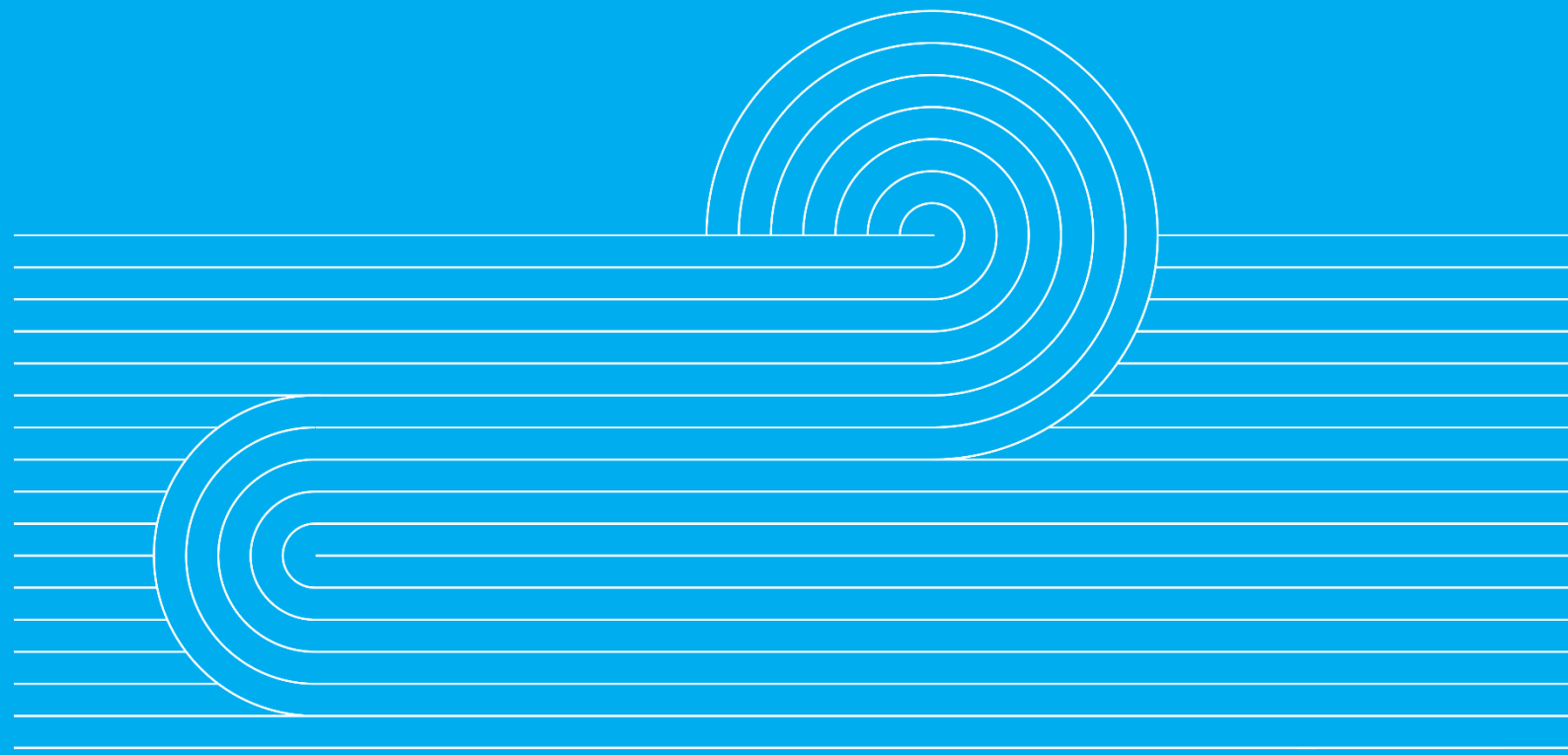
### 11.1.1 Outcome Score

O1	O2	O3	O4	O5	O6	O7	Overall score	Performance %
New security and reliability risks are identified and appropriately managed	Significant events are appropriately scoped, understood, prepared for and managed	The Authority is supported to evolve and develop the electricity market and power systems	Relevant market information is made accessible to stakeholders	Stakeholders are effectively informed on and included in decisions where relevant	Stakeholders are satisfied with our service	SOSPA delivery provides value		
20%	25%	20%	10%	10%	10%	5%	3.83	78%
2.85	3.70	3.85	4.75	4.64	4.00	4.49		

## 11.1.2 Performance Metrics

Risk register has been updated and tested externally with the Authority and widely among industry participants	PM1 Score <b>3</b>	On time delivery of significant event reports	N/A	Average score from stakeholders on their perception of SO impartiality	PM13 Score <b>5</b>
% of SMART actions from the control self-assessment with maturity ratings of 1 or 2 will be addressed by the planned due date	PM2 Score <b>2</b>	Average satisfaction score from stakeholders, as per responses received to transactional surveys taken at forums an...	PM8 Score <b>5</b>	Number of thought leadership publications on specific areas of system operator work that affect and/or are of interest to the industry	PM14 Score <b>4</b>
At least one pan-industry event exercise held to test existing controls	PM3 Score <b>5</b>	All categories of stakeholders are actively engaged by the system operator throughout the year	PM9 Score <b>5</b>	Active contribution by the SO to Authority led-forums and consultations; and industry-led consultations	PM15 Score <b>5</b>
% of actions from industry exercises which were completed on time	N/A	% of industry submissions, made in response to system operator consultations, which are responded to	PM10 Score <b>5</b>	# of SO Industry Forums held	PM16 Score <b>5</b>
Average score of internal process assessments arising from significant events	N/A	Stakeholder engagement in project delivery	PM11 Score <b>5</b>	% of key SOSPA documents delivered on time to the Authority	PM17 Score <b>3</b>
Percentage of actions from significant events which are closed on time	PM6 Score <b>3</b>	Average satisfaction score from stakeholders from Annual Survey	PM12 Score <b>5</b>	Quarterly update/challenge/brainstorm sessions	PM18 Score <b>4</b>

# 12 Appendices



## APPENDIX 1: DELIVERY AGAINST THE EDUCATION AND ENGAGEMENT PLAN FOR 2023-24

Activity	Description	Examples
3	Facilitate winter peak management	<p>Deliver further improvement to our processes and capability to manage winter peaks</p> <p>We worked with the Authority and industry participants to improve both real-time market information and the quality of information provided to industry in the forward market schedules. As the project will not deliver a centralised wind forecast pre-winter 2024, we worked on interim solutions. We raised the importance of market participants providing accurate, up-to-date information in our Winter 2024 outlook paper.</p> <p>We published a 2024 Outlook paper and held an extended system operator Industry Forum on 9 April, both which outlined our approach to winter. We also requested that participants provide more accurate bids into the WDS schedule and drafted a note in response to feedback from participants seeking clarity of what good looked like for the system operator, which is available on our website.</p>
6	Support stakeholders in the development of emerging technology and market evolution	<p>Enable whole system operation through participation in the ENA Future Network Forum's workstream on SO/EDB interfaces</p> <p>We presented on Distribution system operation and the SO / EDB interface at the 12 March 2024 ENA Future Network Forum.</p>
		<p>Inform innovation through ongoing support of the FlexForum initiative</p> <p>We attended and provided contributions to online webinars and document reviews.</p>
		<p>Supporting and facilitating industry innovation initiatives</p> <p>We consulted on 14 papers from across the industry and presented at several industry led forums including the ENA FNF Innovation Forum, Energy Trader Forum, Taranaki Energy Update and the Ara Ake Forum.</p>
		<p>Market insight publications and thought pieces</p> <p>We published three market insight papers:</p> <ul style="list-style-type: none"> <li>• Evolving Security of Supply Assessment</li> <li>• Winter 2023 review</li> <li>• Winter 2024 Outlook</li> </ul> <p>A fourth paper Evolving Market Resource Coordination was published in the first week of the 2024/25 review year.</p>
7	Enhance customer data interfaces	<p>Customer portal – adding functionality for dispensations</p> <p>The new system operator Register went live in the Operations Customer Portal in October, replacing the Dispensations and Equivalences database. Asset Owners can use the register to apply for an equivalence arrangement or a dispensation if they cannot comply with their performance obligations or a technical code obligation. We will use the register to manage and consult on application draft decisions and to maintain a public registry of the final decisions.</p>
8	Facilitate cross-industry relationships and market coordination	<p>Industry exercise</p> <p>On 1 and 8 May 2024 we held a two-part industry exercise with the Authority covering a major power system event.</p>
		<p>One annual workshop to review risk register</p> <p>This year we have been developing a risk register (risk log) to provide a greater level of detail of individual risks sitting behind the high-level risks in the risk bowtie. This does not replace the risk bowtie methodology; we continue to use the risk bowtie as our mechanism to identify and manage risk. A workshop will take place once the risk log has been finalised.</p>

Activity	Description	Examples
10	Continue to improve relationships with and understand the needs of our industry stakeholders	<p>Continue and enhance fortnightly system operator industry forums</p> <p>We held 24 Fortnightly Industry Forums throughout the 2023-24 year, including an extended system operator industry forum about our approach to the winter capacity challenge.</p> <p>Develop new approaches to seek timely and targeted feedback from stakeholders to inform continuous improvement</p> <p>We created surveys for our weekly Market Insights newsletter and the fortnightly system operator industry forum so we are able to receive purposeful and constructive feedback.</p>

## APPENDIX 2: OBLIGATION TO SELF-REVIEW PERFORMANCE

This report is Transpower's review of its performance as system operator from July 2023 to June 2024, in accordance with clauses 7.11 of the Electricity Industry Participation Code 2010 (the Code):

### 7.11 Review of performance of the system operator

(1) No later than 31 August in each year, the **system operator** must submit to the **Authority** a review and assessment of its performance in the previous 12-month period ending 30 June.

(2) The self-review must contain such information as the **Authority** may reasonably require from time to time to enable the **Authority** to review the **system operator's** performance during the period in relation to the following:

(a) the **policy statement**:

(b) the **security of supply forecasting and information policy**:

(c) the **emergency management policy**:

(d) the joint development programme prepared under clause 7.7(1):

(e) the work programmes agreed with the **Authority** under the **system operator's market operation service provider agreement**:

(f) the **system operator's** engagement with **participants**:

(g) delivery of the **system operator's** capital and business plans:

(h) the financial and operational performance of the **system operator**



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