Review of system operator performance

For the year 1 July 2021 to 30 June 2022

Final report

6 March 2023

Executive summary

1.1 Transpower, in its role as the electricity system operator, is responsible for the secure, efficient operation of the power system in real time. The system operator's role is broad, complex and critically important to New Zealand.

1.2 In our role as industry regulator, the Electricity Authority (Authority) is responsible for defining the role of the system operator and assessing the system operator's performance. We require the system operator to carry out its obligations with skill, diligence, prudence, foresight, good economic management and in accordance with recognised international good practice.

1.3 Overall, the Authority is satisfied with the system operator's day to day business. However, a notable event in the 2021-22 performance was the 9 August 2021 event, where the system operator's performance during the event fell short, and over 34,000 consumers were disconnected during the coldest night of the 2021 winter.

1.4 During the period from 1 July 2021 until 30 June 2022, we were satisfied with the system operator's:

- ✓ Engagement with the Authority on collaborating on the system operator's refresh of its performance metrics, which continues into this financial year.
- ✓ Communication and development with the Authority and other stakeholders on the future security and resilience (FSR) programme.
- ✓ Continued engagement on implementing real-time pricing (RTP) with the Authority, NZX, and the industry as a whole.
- ✓ Continued strong and positive response to challenges posed by the ongoing COVID pandemic.
- ✓ Communication with stakeholders on a fortnightly basis with a focus on operations.
- ✓ Continued work on improving processes, as a result of the 9 August 2021 reviews.

1.5 The system operator has acted on the recommendations made in the 2020-21 financial year, in particular:

(a) Establishing a modelling working group to regularly meet and focus on improvements to the system operator's modelling processes. During the 2021-22 financial year, there has not been a decrease in the number of modelling errors. From a compliance perspective, the Authority considers further improvement is required in this area.

(b) Continuing to work with the Authority on finalising the recommended changes to the Security of Supply Forecasting and Information Policy (SOSFIP) and Emergency Management Policy (EMP).

1.6 The Authority has four recommendations for the financial year 2022-23:

(a) The Authority recommends a joint review of the process of engagement between the Authority and system operator on large capex projects spanning multiple years, including the integrated product life cycle (IPLC) process.

(b) The Authority acknowledges it can be challenging to engage with all sectors of the industry and encourages the system operator to continue to undertake

engagement with participants. Continued engagement will ensure a system-wide approach to security and focus is on the right risks at the right time.

(c) The ‘further opportunities’ sections in the system operator’s self-review are a welcome addition but highlight that the system operator will continue to operate as it has in the past, with small changes. In these sections, the Authority recommends the system operator show further leadership about how the system operator will respond to the uncertainty that is coming.

(d) The Authority recommends the ‘lessons learned’ sections from previous reviews is re-instated alongside the newly added further opportunities sections. In previous reviews including a separate lessons learned section demonstrated an understanding of the difference between feedback received (lessons learned) and supporting continuous improvement (opportunities).

Contents

Figures

2 Introduction

2.1 New Zealand's electricity consumers rely on the system operator to ensure that electricity will be available when they need it.

2.2 Verifying the performance of the system operator is complicated, as the breadth and depth of the system operator's functions is large. It provides a nationally critical infrastructure service, and the risks are often asymmetric and hard to estimate.

2.3 Given the inter-dependency of infrastructure industries upon one another, it is difficult to overstate how important it is that the system operator performs its role to a high standard.

2.4 On behalf of New Zealanders, we require Transpower to fulfil the system operator's function with "skill, diligence, prudence, foresight, good economic management, and in accordance with recognised international good practice, considering—

(a) the circumstances in New Zealand; and

(b) the fact that real-time co-ordination of the power system involves complex judgements and inter-related events."

Reviewing the system operator's performance

2.5 There are three entities with formal obligations to review the system operator's performance: Transpower itself, the Electricity Authority (Authority), and the Security and Reliability Council (SRC).

2.6 This report is the Authority's annual review of the system operator's performance, for the year ending 30 June 2022. The inputs to our review include the system operator's annual self-review for the same period, our own observations, and the SRC's advice on the topic.

2.7 This report assesses the system operator's performance in the following sections:

(a) Long-term planning

(b) Medium- to short-term activities

(c) Real-time management

(d) Other outcomes.

3 Long-term planning

Strategic planning

3.1 The system operator's main instrument of strategic planning is its strategy for the system operator service. The system operator developed a long-term plan (2030 Ambitions) which is reflected in its strategy.

3.2 During the year, the system operator collaborated with us on its proposed strategy. We sought some changes to the proposed strategy, some of which the system operator included, while others will be discussed as part of the next planning cycle. We look forward to continuing to collaborate with the system operator on its strategic plan.

3.3 The system operator also launched its Operational Excellence programme which assessed the current state, determined the desired future state, and proposed a

roadmap to address the gaps in real time operations. We look forward to the more detailed implementation roadmap being developed.

3.4 Additionally, the strategy for the system operator service is brought to life by the strategic roadmap and capex roadmap.

3.5 Finally, the system operator closely collaborated with us on the future security and resilience (FSR) programme, developing the phase 1 FSR report and phase 2 FSR report (roadmap). The Authority is satisfied with the system operator's communication and development with the Authority and other stakeholders on the FSR programme.

International engagement

3.6 The system operator's engagement with international counterparts is an important part of the system operator's function. Robust engagement is an indicator of organisational health, as it signals a willingness to devote resources to long-term payoffs and a humility to learn from others.

3.7 Transpower's General Manager Operations, Dr Stephen Jay, is the current President of the Electricity Engineer's Association, and a Board member of the Association of Power Exchanges (APEx) and the International Council on Large Electric Systems (CIGRE). We endorse this as a valuable use of executive time, and note that engagement opportunities are also taken up by the system operator's technical experts.

3.8 The system operator organised and facilitated discussions with overseas operators and counterparts, including several in the UK. We support the system operator's efforts to increase its knowledge sharing with its peers overseas as it will enable meaningful benefits from international experiences.

3.9 However, it is not clear to the Authority how the lessons learnt from international engagement are applied in New Zealand, or are consistently shared with the Authority or other stakeholders. More visibility of the system operator's actions arising from international engagement, in the annual self-review and in papers presented to the Authority, Security and Reliability Council, and industry (as appropriate), would be beneficial.

4 Medium-to-short-term activities

Delivery of joint work

Joint work planning

4.1 We work collaboratively with the system operator to promote well-prioritised project decisions across the programme of projects. The Joint Work Planning Team (JWPT) oversees the Joint Development Plan that sets out what the system operator will be working on.

4.2 While the JWPT has worked well in the review period, we recommend a joint review of the process of engagement between the Authority and system operator on large capex projects spanning multiple years, including the integrated product life cycle (IPLC) process.

Real-time pricing

4.3 The real-time pricing project has been years in development and will make wholesale electricity prices more certain and more efficient by determining the price in real-time, rather than afterwards.

4.4 In the previous review period, we noted that the system operator has kept within the new, higher budget for RTP. We have been impressed with the quality of the system operator's work on the project. The system operator's project team has been well-managed and responsive to our team and have met its deadlines.

4.5 This year, the system operator team has continued to produce high quality work and has worked well with Authority staff. However, a change request seeking further funds and a re-prioritisation of RTP deliverables was received by the project steering committee.

4.6 While the decision on that re-prioritisation is outside the scope of this review, it is worth noting the re-prioritisation was approved as a separate change request to preserve the 1 November 2022 delivery date, but the funding increase was rejected until project spend had reached an agreed threshold. The funding increase has now been approved in the 2022/23 year in principle by the Authority to allow the final phase of RTP to be completed.

4.7 The project's governance team has worked well and been given suitable attention by the system operator.

Extended reserve

4.8 The extended reserve project is changing how the 'last line of defence' in the power system (automatic under-frequency load shedding, or AUFLS) mitigates risks of major power outages.

4.9 As with previous years, we consider the system operator has made a positive contribution to the project. The project proceeded on time, under budget and achieved high quality. The system operator has managed the transition of the BAU aspects of this work well and continued to deliver on the project outcomes.

Technical advisory services

4.10 In the review period, the system operator provided technical advisory services on:

(a) Batteries offering reserve: The system operator worked cooperatively with NZX and the Authority to continue work started in 2020/21 which sought to implement a simplified approach to enabling large battery energy storage systems (BESS) to offer their full capacity (spanning both charging and discharging battery states) as instantaneous reserve. The coordination and flexibility exhibited by project coordinators at the system operator, NZX, and the Authority were critical success factors that saw the new arrangements coming into force in May 2022, well in advance of any large BESS seeking connection to the grid.

(b) 2019 UTS actions to correct: The system operator completed its part of the actions to correct from the 2019 UTS. The system operator worked well with the clearing manager and pricing manager to ensure the appropriate data was available to calculate correct prices and invoices. This was a rather unusual situation with a significant amount of work required, the Authority appreciates the effort put in by the system operator.

4.11 The system operator also provided technical advisory services on the real-time pricing, FSR, and extended reserve projects. Our assessment of those services is covered in the preceding sections.

Service maintenance

Maintaining tools

4.12 The system operator maintains a work programme specifically aimed at maintaining the service. This includes a wide variety of projects, such as deploying new versions of third-party software and augmenting in-house software. The system operator has autonomy to determine its service maintenance projects, and we get visibility on this through our JWPT that seeks to avoid clashes through the joint work programme.

4.13 The system operator has maintained its key market software (Scheduling Pricing Dispatch (SPD) and Reserve Management Tool (RMT)), making some changes in the review period, particularly for real-time pricing. The system operator met its auditing obligations with respect to SPD and RMT. This entails an annual audit of all changes, and ad hoc audits before deployment of each individual change.

Maintaining risk assessments

4.14 The system operator's Credible Event Review is an important tool for keeping risk assessments current. The Credible Event Review works on a five-year cycle, assessing different asset classes each year. This year, the system operator undertook a minor updated to interconnection transformer classifications due to changes of assets on the system.

Maintaining procedures

4.15 The System Operator Policy Statement sets out requirements for the system operator on topics such as power system security and conflicts of interest. During the review period, the system operator submitted a review that was initially completed in 2020 and updated in 2021. This was a regular review required by the Code. In addition to a number of editorial changes, the main changes were to clarify the classification of various events, and to strengthen the conflict-of-interest clauses.

4.16 The Ancillary Services Procurement Plan documents how the system operator will procure ancillary services (such as frequency-keeping and instantaneous reserve) from the market. During the review period, the system operator submitted a review. This was a regular review required by the Code. The main changes were to improve the reliability of ancillary services and to enable the participation of battery storage in the reserves market.

4.17 In response to the Authority's suggestions and the recommendations from the MartinJenkins report on the 2021 dry year event, the system operator initiated a review of the security of supply forecasting and information policy (SOSFIP) and the emergency management policy (EMP).

4.18 Overall, the Authority has concluded that the system operator's performance of this review and its engagement with the Authority during the development of the proposal for consultation could both have been performed to a higher standard.

Assisting prospective generators

4.19 During the report period, the system operator continued to support prospective generators in the market, with a large number of enquiries about solar generation. The Authority is pleased the system operator is engaging with prospective generators on the feasibility, planning, and commissioning of generation.

Stakeholder engagement

4.20 The system operator has met the requirement of the Education and Engagement Plan they agreed with us for the review period. The system operator provides many engagement forums which are positively received. The Authority acknowledges it can be challenging to engage with all sectors of the industry and encourages the system operator to continue to undertake engagement with participants. Continued engagement will ensure a system-wide approach to security and focus is on the right risks at the right time.

4.21 Our Board's sub-committee, the System Operations Committee (SOC), meets four times a year to provide governance-level oversight of the system operator's performance. The system operator has attended every meeting, and usually contributes 2-3 papers for discussion with the SOC.

4.22 Overall, the system operator has made a positive contribution to the SOC's oversight. The quality of the system operator's papers has been good, the system operator is well prepared for meetings, and system operator attendees are engaged and knowledgeable.

5 Real-time management

Power system events

5.1 9 August 2021 was one of the coldest nights of the year, and when New Zealand experienced a new record national demand for electricity more than 34,000 households were left without power.

5.2 The system operator's annual self-review characterises this event as one caused by generation shortfall. However, the Authority takes a different view. Several reports were commissioned into that event, including by the Authority, the Minister of Energy and Resources, and the system operator itself. Those reports cover the causes of 9 August in detail and make it clear that there was not a single cause of the event. In line with this, the reports resulted in a range of recommendations – many were for the system operator to improve its practices, but there were also some for the Authority, including to hold the system operator more firmly to the rules and contracts that bind it.

5.3 During the review period, most of those recommendations were satisfactorily progressed and many were completed. The detail of these has been reported to the Minister on a quarterly basis, and these progress reports are available on the Authority's website. Following the review period, the Authority and the system operator have continued to work on completing the remaining recommendations.

5.4 The system operator's preparations were successful at managing events in April and June:

(a) Extreme operating conditions in the Southland region (April): the system operator planned and communicated well with affected parties and participants, including coordination of outages.

(b) Generation shortfall (June): the system operator declared a grid emergency and used its updated procedures (from the review of 9 August event). The event was managed well by the system operator and resolved without any consumers being disconnected.

Security of supply forecasting and management

Security of supply

5.5 The system operator is required to produce a medium term forecast of electricity supply and demand to assess the ability of the electricity system to meet New Zealand's needs over the decade ahead. The analysis looks at existing generation as well as planned generation at different stages of the development process to determine whether there is enough electricity generation in the system to meet total demand across the country under a range of supply and demand scenarios.

5.6 During the review period, the system operator reviewed and updated the security of supply assessment (SOSA), a key assessment to ensuring a reliable supply for consumers.[1] The system operator sought stakeholder feedback through two consultations, with the industry being mainly supporting, particularly regarding the value of having a range of sensitivities.

5.7 The system operator will continue this work by engaging further with electricity distribution businesses and industrial users on demand sensitivity for future analysis.

Power system operations

5.8 The system operator's key function is to manage the power system to ensure a safe and stable supply through its principal performance obligations. This involves dispatching generation and demand, maintaining frequency, procuring reserves, and producing various power system analysis and forecasting to assist its real time operations. The system operator is a part of the wholesale electricity market, and provides scheduling and dispatch data for other parts of the wholesale market.

5.9 During the review period, the system operator successfully implemented a new load forecasting as a service solution, which has improved forecast accuracy by 30% to 50%. The Authority commends the system operator for this work and notes the increased confidence in the load forecasting.

5.10 The system operator also made two updates to its system security forecast (SSF), with a full review to be completed by end of 2022. The Authority welcomes the completion of the 2022 SSF which will include new generation and grid upgrades.

5.11 We are pleased with the system operator's improved communications with industry stakeholders, including by implementing new channels (such as fortnightly forums and monthly email updates) and the conduct of a pan-industry exercise in May. Communication with stakeholders was one of the key areas recommended for improvement following the events of 9 August 2021, and the Authority expects the system operator to continue to improve in this regard. This includes further industry exercises and additional improvements to the wording on standard notices.

[1] The SOSA assesses the power system's ability to meet prudent winter energy and peak requirements over the next 10 years.

Business as usual system operations

5.12 Efficiently and securely dispatching the power system necessarily involves extensive use of models by the system operator. During the review period, the system operator established a modelling working group which meets regularly and focuses on improvements to its modelling processes. We welcome this working group and the opportunities for further improvement in this area. Modelling errors remain an area of focus for us, and we will continue to engage with the system operator on modelling error trends.

Covid-19 response

5.13 As with the previous reporting period, we found the system operator to be vigilant and communicative throughout its response to the COVID-19 pandemic. The system operator's response to the pandemic and alert level changes ensured the system operator was able to maintain services and were prepared in case the pandemic worsened.

6 Other outcomes

Annual self-review

6.1 The system operator's annual self-review of the 2021-22 period is in itself a deliverable of the 2021-22 year. In order to provide timely feedback on the self-review, we note this was a very good self-review which included our suggestion to make the report more efficient. The system operator has continued to build on an open and frank approach that we appreciate and hope will continue.

6.2 For the 2021-22 review period, we have two recommendations relating directly to the report itself:

(a) The 'further opportunities' sections are a welcome addition, but highlight that the system operator will continue to operate as it has in the past, with small changes. In these sections, the Authority recommends the system operator show further leadership about how the system operator will respond to the uncertainty that is coming.

(b) The Authority recommends the 'lessons learned' sections from previous reviews is re-instated alongside the newly added further opportunities sections. In previous review, including a separate lessons learned section demonstrated an understanding of the difference between feedback received (lessons learned) and supporting continuous improvement (opportunities).

6.3 In our 2020-21 annual review of the system operator we made two recommendations. The system operator's response to those recommendations is on page six of its self-review.

6.4 The system operator has acted on, and we are satisfied with, the recommendations made in the 2020-21 financial year, in particular:

(a) Establishing a modelling working group to regularly meet and focus on improvements to the system operator's modelling processes. As noted previously, modelling errors remain an area of focus for us, and we will continue to engage with the system operator on modelling error trends.

(b) Continuing to work with the Authority on finalising the recommended changes to the Security of Supply Forecasting and Information Policy (SOSFIP) and Emergency Management Policy (EMP).

Performance metrics

System operator's performance for the 2021-22 period

6.5 Every year, we agree with the system operator a set of performance metrics and incentives that the system operator must strive to meet. The system operator provides a broad range of services, so the parties agreed on 23 performance metrics to measure the system operator's performance over the review period.

6.6 To ensure the incentive payment remains a meaningful incentive to improve or maintain high performance levels, 12 of the 23-performance metrics contribute to the incentive payment calculation, and some metrics are weighted more heavily than others. Although the remaining 11 measures do not contribute to a financial incentive, they cover areas of importance so are still measured. The performance metrics system allows the incentivised metrics to change if there needs to be increased focus or incentive on particular areas.

6.7 The system operator's performance against the contributing performance metrics contributes to the size of the incentive payment, and determines whether it is made to the system operator, or made by the system operator to the Authority.

6.8 For the financial year 2021-22, the system operator reported it had achieved 94% of the incentivised metrics. However in light of the significance of the 9 August event, the system operator and the Authority agreed a reduction to the amount of the incentive payment made.

Figure 1 sets out the system operator's results against the performance metrics for the review period.

Figure 1 System operator performance metrics for 2021-22

Performance metrics dashboard

		Annual Target	Actual	Pass/Not Achieved	Incentive payment weighting
We are smart about money					
Perception of added value by participants		80%	73%	Not Achieved	
Our customers are informed and satisfied					
Annual participant survey result		83%	95%	Pass	5
Annual participant survey result response rate	First tier stakeholders	80%	80%	Pass	
On-time special event preliminary reports		90% ≤ 10 business days	None this year	N/A	5
Reports	Future thinking report	≥ 1	1	Pass	5
	Longer Market Insight reports	≥ 4	3	Not Achieved	5
	Bite-sized Market Insights	≥ 45	49	Pass	
Quality of written reports		100% of agreed standard [1]	100%	Pass	
Role impartiality		80%	92%	Pass	5
We maintain Code compliance and meet our SOSPA obligations					
Market impact of breaches remain below threshold		≤ 3 @ ≥ $40k	1	Pass	10
Breaches creating a security risk remain below threshold/within acceptable range		<2	0	Pass	10
On-time SOSPA deliverables		100%	100%	Pass	10
We deliver projects successfully					
Project delivery	Service Maintenance projects	≥ 60% achieved for approved time [2]	43%	Not Achieved	
		≥ 60% achieved for approved budget	79%	Pass	
	Market Design / Service Enhancement projects	≥ 60% achieved for approved time	0%	N/A	
		≥ 60% achieved for approved budget	0%	N/A	
Accurate capital planning		≥ 50%	50%	Pass	10
We are committed to optimal real time operation					
Sustained infeasibility resolution		80% ≤ 10am business day 1 or as required [3]	87%	Pass	5
High spring washer resolution		80% ≤ 10am business day 1 or as required	100%	Pass	
Our tools are fit for purpose					
Capability functional fit assessment score		75.00%	69%	Not Achieved	
Technical quality assessment score		65.00%	72%	Pass	
Sustained SCADA availability		99.90%	99.99%	Pass	10
Maintained timeliness of schedule publication		99.00%	99.99%	Pass	10
				Total points =	**90**

Figure 1 : Performance metrics 2021

No. points allocated to metrics which reported this year = **85** ***(there were no special events in 2020/21)***
No. points allocated to metrics which passed = **80** ***(did not pass number of market insight reports)***
Level of performance = **80/85**
= **94%**

Refresh of performance metrics

6.9 The last in-depth review of the system operator's performance metrics was undertaken in 2019. To ensure the performance metrics remain fit for purpose, the system operator is collaborating with us on a fundamental refresh. We appreciate the high level of skill and knowledge the system operator brings to the refresh of the performance metrics.

6.10 During the review period, phase 1 was completed, resulting in an additional metric for system events for the 2022-23 year. This metric is designed to better reflect the nature of events such as occurred on 9 August 2021. A second phase of work will continue during the 2022-23 year which should see a fully revised set of performance measures in place for the 2023-24 year.

7 Financial results

7.1 The system operator provided audited, by Ernest & Young, financial information as an addendum to its annual self-review of performance. The system operator's 2021-22 financial year showed an increase to its return compared with recent history (see Table 1 below for details of various financial measures).

Table 1 Changes to system operator's financial information in 2021-22

Financial measure	Changed by ($M)	Changed to ($M)	Per cent change	Reasons for change
Revenue	$0.94 ↓	$41.59	-2.21% ↓	The reduction is primarily due to 2020-21 being the end of a SOSPA period and including the final wash up of fees for the period.
Operating expenditure	$2.41 ↑	$23.12	11.65% ↑	Increase attributable to higher costs associated with 9 August event, higher resourcing costs due to accrued leave (Covid) and lower capitalisation. IT support costs relating to Situational Intelligence have increased.
Depreciation	$1.66 ↑	$12.25	15.70% ↑	Depreciation is driven by the Fixed Asset Register. The Asset base has increased during the year.
Fixed Assets (RAB)	$3.46 ↑	$50.13	7.40% ↑	Real Time Pricing phase two was completed, $4.7m. SCADA/EMS & Market System EMP Software Refresh commissioned $2.5m. MS Simplification 2 commissioned, $2.7m.
Regulatory profit (after tax)	$3.38 ↓	$5.03	-40% ↓	Regulatory profit includes revenue, operating expenditure and depreciation and has reduced, driven by both the decrease in revenue and higher costs (above), offset by higher depreciation due to commissioning.

7.2 The system operator's 'vanilla' return on investment decreased from 23.52% to 10.96%.

7.3 We remain committed to ensure that the SOSPA incentivises the system operator to improve efficiencies and enables consumers to benefit from such improvements in the long term. We are looking to strengthen current arrangements by working with the system operator to revise the applicable performance measures (and associated incentive payment) and its strategic direction. 2021-22 is the first year of the four-year SOSPA period.

7.4 The system operator's Opex revenue is adjusted annually by the consumer price index minus an adjustment factor (a 'CPI minus X' approach). This means that within each

five-year period, the system operator's regulatory profit will tend to reduce if its operating costs rise faster than the consumer price index minus the adjustment factor.

7.5 If the system operator implements efficiencies beyond that needed to maintain its regulatory profit, the system operator retains the benefit of those reductions in operating expenditure during the then-current five-year period. Every reset period, revenue is renegotiated with consideration of actual performance (such as enduring reductions or increases in operating expenditure).