

# Review of system operator performance

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For the year 1 July 2020 to 30 June 2021

17 January 2022



## Executive summary

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.

In our role as industry regulator, we are responsible for defining the role of the system operator and assessing Transpower'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.

The Authority commissioned MartinJenkins to prepare a report, assessing the performance of the system operator and ourselves in terms of our management of the security of supply concerns in the second quarter of 2021.

There are currently four other reviews that are relevant to the system operator's performance. These are reviews of the power system event of 9 August 2021 and are outside of the 2020/21 annual review period. For completeness, there is an Authority workstream underway that will consider the range of recommendations arising from these reviews.

### ***Overall, the system operator has performed well in the review period***

The system operator performed well in the period from 1 July 2020 until 30 June 2021. We were particularly impressed with the system operator's:

- ✓ Diligent and effective delivery of key projects (real-time pricing, extended reserve)
- ✓ Continued strong and positive response to challenges posed by the ongoing COVID pandemic
- ✓ Communication efforts responding to stakeholders' security of supply concerns in the second quarter of 2021
- ✓ Achievement of 100% of the financially incentivised performance metrics.

While the system operator was proactive in its communication of security of supply forecasting, we also consider the system operator should work to improve its published documentation of the non-confidential assumptions it uses and why. There may be other lessons arising from the review by MartinJenkins.

There were various modelling errors during the review period. Given the volume of modelling work that occurs, this is not unexpected. However, three of those had a market impact greater than \$40,000. Outside of the review period, the system operator provided assurance to our System Operations Committee about the system operator's ongoing programme to prevent and mitigate modelling errors. The Authority is supportive of the system operator's Modelling Working Group and keen to ensure it remains of importance to the system operator.

### ***We have made two recommendations***

The system operator responded well to the three recommendations in our previous annual review of its performance. This year, we have made the following two recommendations:

1. The system operator should report on the progress of the Modelling Working Group in its quarterly and annual performance reports, and consider the merits of additional resourcing for the Group.

2. The system operator should, once the lessons from 2021 are known, revise the work programme of its security of supply function and report on progress in its quarterly performance reports.

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# 1 Introduction

## **The system operator's nationally critical service**

- 1.1 New Zealand's electricity consumers, whether they are aware of it or not, rely on the system operator every hour of every day. Most consumers must take it on past experience (and some amount of trust) that electricity will be available, as they haven't the time or expertise to verify it for themselves.
- 1.2 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.
- 1.3 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.
- 1.4 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."<sup>1</sup>

## **Reviewing the system operator's performance**

- 1.5 There are three entities with formal obligations to review the system operator's performance: Transpower itself, the Electricity Authority and the Security and Reliability Council (SRC).
- 1.6 This report is the Authority's annual review of the system operator's performance, for the year ending 30 June 2021. 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.
- 1.7 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.

# 2 Long-term planning

## **Strategic planning**

- 2.1 The system operator's main instrument of strategic planning is its strategy for the system operator service. During the year, the system operator consulted with us on its proposed strategy. We were largely happy with the proposed strategy and had minor suggestions. The system operator adapted its final strategy in light of our suggestions.

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<sup>1</sup> Clause 7.1A(1) of the Electricity Industry Participation Code

- 2.2 Additionally, the strategy for the system operator service is brought to life by the strategic roadmap and capex roadmap.
- 2.3 Finally, the system operator has developed an internal strategy specifically for its security of supply function. There was no need to change this strategy in the year under review and therefore it was not updated.

### **International engagement**

- 2.4 The system operator's engagement with international counterparts and other experts is largely invisible to New Zealand stakeholders, including ourselves. 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.
- 2.5 Transpower's General Manager Operations, Dr Stephen Jay, is 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 trust that engagement opportunities are also seized by the system operator's technical experts.
- 2.6 In previous years, the system operator had been asked by the SRC to review particular power system incidents with an eye for lessons in New Zealand. No such events were reviewed this year. We trust the system operator and SRC to stay alert to further learning opportunities.

## **3 Medium- to short-term activities**

### **Delivery of joint work**

#### ***Joint work planning***

- 3.1 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.
- 3.2 The JWPT has worked well in the review period. We are satisfied with the system operator's planning efforts and the time and focus given to the group.

#### ***Real-time pricing***

- 3.3 The real-time pricing project is making wholesale electricity prices more certain, and more efficient by determining the price in real-time, rather than afterwards.
- 3.4 In the previous review period, we were satisfied with the quality and timeliness of the system operator's work on the project, but expressed major dissatisfaction with the large increase in budget.
- 3.5 This year, the system operator has kept within the new, higher budget. We have been impressed with the quality of the system operator's work on the project. Their project team has been well-managed and responsive to our team. They have met their deadlines.
- 3.6 The project's governance team has also worked well and been given suitable attention by the system operator.

### ***Extended reserve***

- 3.7 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.
- 3.8 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. We were especially impressed with the system operator's accommodating and collegial approach to all aspects of the project. The system operator also demonstrated openness to new ways of achieving project outcomes.
- 3.9 Project governance has operated seamlessly.

### ***Technical advisory services***

- 3.10 In the review period, the system operator provided technical advisory services on:
  - (a) The Authority's Future Security and Resilience project. The substantive deliverables fall outside of the review period, though early engagement has been positive.
  - (b) Distributed energy resources. The system operator investigated what the Authority could change to unlock more value from distributed energy resources. The investigation focussed on enabling inverter-connected generation. We look forward to further investigation steps.
- 3.11 The system operator also provided technical advisory services on the real-time pricing and extended reserve projects. Our assessment of those services is covered in the preceding sections.

## **Service maintenance**

### ***Maintaining tools***

- 3.12 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.
- 3.13 The system operator has maintained its key market software (Scheduling Pricing Dispatch (SPD) and Reserve Management Tool (RMT)), making many changes in the review period. 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.
- 3.14 Following on from the review of the Planned Outage Coordination Protocol (POCP) in the previous review year, the system operator has worked well with us to encourage accurate and efficient use of the software by asset owners. The system operator has further encouraged this by publishing guidelines on the reporting of asset outages.
- 3.15 The system operator investigated the merits of sensitivity schedules to illustrate pricing and emission impacts of variation in electricity load. The system operator did this by running a three-month proof of concept trial, which received a limited amount of industry feedback. Based on the responses from the trial, the system operator did not consider this justified increasing the priority for a full market solution over other planned work at this stage. We support the work and agree with its conclusion.

### ***Maintaining risk assessments***

- 3.16 The system operator's System Security Forecast assesses potential risks and constraints at a regional level. The system operator published a revised System Security Forecast in December 2020 following its standard approach. One respondent to the system operator's annual customer survey suggested the system operator should seek feedback from industry stakeholders before finalising each report.
- 3.17 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 reviewed the risk assessments of interconnecting transformers and concluded only minor changes were needed to reflect current risks.

### ***Maintaining procedures***

- 3.18 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 responded to our questions and suggestions on the draft System Operator Policy Statement they had submitted to us. We found the system operator to be thoughtful and accommodating.
- 3.19 The Ancillary Services Procurement Plan documents how the system operator will procure ancillary services (such as frequency-keeping and instantaneous reserve) from the market. The system operator had planned to propose amendments to the Ancillary Services Procurement Plan during the review period, but deferred this due to higher workloads in its security of supply function. We concur that this was a good candidate for deferral in the circumstances.

### ***Assisting prospective generators***

- 3.20 Rising wholesale electricity prices and falling costs of some generating technologies have incentivised prospective generators to investigate investment opportunities. This has led to what are likely record-high numbers of enquiries with the system operator.
- 3.21 Many of these enquiries are from companies new to New Zealand's generation market and involve non-traditional technologies. The system operator has had to adapt to support this increased demand for their expertise.
- 3.22 It has been timely that the system operator published a guideline for asset owners needing to complete power system studies enabling the compliant connection of their assets. The system operator engaged with us on this and we are supportive of the work.

### ***Stakeholder engagement***

- 3.23 The system operator gives two pages of examples of its stakeholder engagement during the review period. We are rarely present at these engagement forums, so cannot comment generally on the quality of the engagement. However, we do consider the system operator has met the requirement of the Education and Engagement Plan they agreed with us for the period.
- 3.24 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 attends every meeting, and usually contributes 3-5 papers for discussion with the SOC.



- 3.25 Overall, the system operator has made a positive contribution to the SOC's oversight. The quality of the system operator's papers has generally been good, the system operator is well prepared for meetings, and system operator attendees are engaged and knowledgeable. The system operator plans ahead for SOC meetings, communicates superbly and rarely has delays to the delivery of papers.

## 4 Real-time management

### Power system events

- 4.1 As noted in the executive summary of this review, the highly significant 9 August 2021 incident is under review and falls outside of the 2020/21 review period.
- 4.2 The system operator's preparations were successful at managing a 144 MW loss of injection on 30 October 2020. The power system's safety nets functioned as planned and shielded consumers from any unplanned loss of supply.
- 4.3 The lack of more significant incidents is partly and indirectly influenced by the system operator's outage planning and coordination. This is a sizable function within the system operator. The system operator has been encouraging asset owners toward more timely disclosure of outages. As with previous years, we have no concerns with the system operator's performance of this function, despite a challenging quantity of outages.

### Business-as-usual system operations

- 4.4 Efficiently and securely dispatching the power system necessarily involves extensive use of models by the system operator.
- 4.5 As noted, there were, not unexpectedly, a number of modelling errors during the review period. The number of modelling errors was consistent with the overall downward trend. However, three of those had a market impact greater than \$40,000. The absolute market impact of these was approaching \$1 million. This is unusually high.
- 4.6 Outside of the review period, the system operator provided assurance to the SOC about the system operator's ongoing programme to prevent and mitigate modelling errors. The Authority is supportive of the system operator's Modelling Working Group and keen to ensure it remains of importance to the system operator.
- 4.7 Accordingly, we have made a formal recommendation:

**The system operator should report on the progress of the Modelling Working Group in its quarterly and annual performance reports, and consider the merits of additional resourcing for the Group.**

### Security of supply forecasting and management

- 4.8 The review period saw a confluence of factors driving perceived concerns with security of supply: a La Niña weather pattern resulting in lower inflows to lakes with hydro generation and a sustained loss of natural gas production. Natural gas remains important for fuelling some gas-fired electricity generators.
- 4.9 We commissioned MartinJenkins to review the performance of the system operator and ourselves in terms of our management of the security of supply concerns in the second quarter of 2021 (the review). The review will be released for wider industry feedback in early 2022.

- 4.10 Overall, the review found the system worked as intended, and that the 2021 dry year demonstrated the resilience of New Zealand’s electricity market mechanisms. The larger market participants were prepared for a dry year with plans in place to manage risk. The Authority and Transpower were also prepared for a dry year, but with opportunities to improve policies, communications, and transparency within the regime.
- 4.11 The system operator accommodated the larger workload that arises in such a year, and we were generally pleased with the system operator’s communication with ourselves.
- 4.12 While the system operator has already acknowledged the need for this in its annual self-review of performance, we have made a formal recommendation:

**The system operator should, once the lessons from 2021 are known, revise the work programme of its security of supply function and report on progress in its quarterly performance reports.**

### **COVID-19 response**

- 4.13 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.
- 4.14 The system operator’s regular and consistent communication has helped inform our own response. The system operator’s July 2020 workshop to learn lessons from its response is commendable and evidence of a mindset of continuous improvement.

## **5 Other outcomes**

### **Annual self-review**

- 5.1 The system operator’s self-review of the 2020-21 year is itself a deliverable in the 2021-22 year, so not strictly in scope for this review. However, in order to provide timely feedback on the self-review, we note this was an excellent self-review. Between the ‘lessons learned’ and the verbatim quotes (positive and negative) from the customer survey, the system operator showed an open and frank approach we have rarely seen and often requested. This was appreciated and we hope it will continue.
- 5.2 In our 2019-20 annual review of system operator performance, we made three recommendations. The system operator’s detailed response to those recommendations appears on page seven of its self-review.

**Table 1: Comments on 2019-20 recommendations**

2019-20 recommendation	Latest comments
The system operator reviews its approach to monitoring the accuracy and compliance of third party information, and advises the Authority of the findings of the review and any potential improvements to the relevant regulatory arrangements.	We are satisfied this was completed. No significant improvements to the regulatory arrangements were identified.

2019-20 recommendation	Latest comments
The system operator improved its financial forecasting of projects.	This could never have been completed in a year. The system operator identified some improvements. We consider the better test will come during the 2022-23 year when revised performance metrics will have been agreed.
The system operator's annual self-review should better reflect on areas of poor performance during the period and what the system operator has learned from those experiences.	As noted in paragraph 5.1, this was well completed this year (but the value lies in an enduring approach).

### **Performance metrics**

- 5.3 We agree with the system operator every year on 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. To ensure the incentive payment remains a meaningful incentive to improve or maintain high performance levels, 13 of the 23 performance metrics contribute to the incentive payment calculation, and some metrics are weighted more heavily than others. Although the remaining 10 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.
- 5.4 The system operator's performance against the contributing performance metrics determines the size and direction of the incentive payment. The performance metric for on-time special event preliminary reports was not applicable for the review period as the circumstances never arose.
- 5.5 This year, the system operator achieved 100% of the incentivised metrics. Of the four unincentivised metrics the system operator failed to achieve, two only just fell below the performance target.
- 5.6 Figure 1 sets out the system operator's complete results against the performance metrics for the review period.

Figure 1: Results against the 2020-21 performance metrics

Performance metrics dashboard				Annual Target	Actual	Pass/Not Achieved	Incentive payment weighting
<b>We are smart about money</b>							
Perception of added value by participants				80%	79%	Not Achieved	
<b>Our customers are informed and satisfied</b>							
Annual participant survey result				82%	84%	Pass	5
Annual participant survey result response rate - First tier stakeholders				80%	100%	Pass	
On-time special event preliminary reports <sup>1</sup>				90% ≤ 10 business days	None this year	N/A	5
Reports	Future thinking report			≥ 1	1	Pass	5
	Longer Market Insight reports			≥ 4	4	Pass	5
	Bite-sized Market Insights			≥ 45	48	Pass	
Quality of written reports				100% of agreed standard	100%	Pass	
Role impartiality				80%	93%	Pass	5
<b>We maintain Code compliance and meet our SOSPA obligations</b>							
Market impact of breaches remain below threshold				≤ 3 @ ≥ \$40k	3	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
<b>We deliver projects successfully</b>							
Project delivery	Service Maintenance projects			≥ 60% achieved for approved time	28%	Not Achieved	
				≥ 60% achieved for approved budget	79%	Pass	
	Market Design and Service Enhancement projects			≥ 60% achieved for approved time	0%	Not Achieved	
				≥ 60% achieved for approved budget	100%	Pass	
Accurate capital planning				≥ 50%	58%	Pass	10
<b>We are committed to optimal real time operation</b>							
Sustained infeasibility resolution				80% ≤ 10am business day 1 or as required	94%	Pass	5
High spring washer resolution				80% ≤ 10am business day 1 or as required	100%	Pass	
<b>Our tools are fit for purpose</b>							
Capability functional fit assessment score				75.00%	68.80%	Not Achieved	
Technical quality assessment score				65.00%	68.10%	Pass	
Sustained SCADA availability				99.90%	99.99%	Pass	10
Maintained timeliness of schedule publication				99.00%	99.99%	Pass	10
Score = 85/85 = 100%				Points where target met - 85		Total points: 85 <sup>1</sup>	
<sup>1</sup> There were no special events in 20/21; points associated with this metric are disregarded when calculating performance							

Source: Page 36 of the system operator's self-review for 2021-22

## 6 Financial results

### Increase to capital revenue has resulted in an increase to the system operator's regulatory profit

- 6.1 The system operator provided audited financial information as an addendum to its annual self-review of performance. The system operator's 2020/21 financial year showed an increase to their return compared with recent history (see Table 3 below for details of various financial measures).

**Table 3: Changes to system operator's financial information in 2020/21**

Financial measure	Changed by (\$M)	Changed to (\$M)	Per cent change	Reasons for change
Revenue	\$0.64 ↑	\$42.53	1.52% ↑	The increase is primarily due to the end of a SOSPA (see period clause 3.4 of Schedule 1 of the SOSPA) and the 'CPI minus X' adjustment factor (refer paragraph 6.3(a) below).
Operating expenditure	\$0.67 ↓	\$20.71	3.12% ↓	Decrease attributable to higher commissioning compared to previous years.
Depreciation	\$1.49 ↑	\$10.59	16.31% ↑	Depreciation is driven by an increase in the Asset base during the year.
Fixed Assets (RAB)	\$13.12 ↑	\$46.67	39.11% ↑	Real Time Pricing phase one was completed, \$5.7m. MS Simplification <sup>2</sup> commissioned, \$7.4m.
Regulatory profit (after tax)	\$0.39 ↑	\$8.42	4.85% ↑	Regulatory profit has increased, driven by both the increase in revenue and lower costs (above), partially offset by higher depreciation due to commissioning.

- 6.2 The system operator's 'vanilla' return on investment decreased from 31.1% to 23.52%.

- 6.3 We remain satisfied the SOSPA incentivises the system operator to improve efficiencies and enables consumers to benefit from such improvements in the long term. 2020/21 is the final year in the five-year period under the SOSPA.

- (a) The system operator's 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.

<sup>2</sup> MS stands for 'the market system' which is the main suit of software including SPD, RMT, SFT, and a few others.

(b) 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).

6.4 The system operator expects to deliver the 'Cost of services reporting' data under the SOSPA towards the end of 2021. Once the information is received, staff will consider whether the 'Cost of services reporting' data is useful to publish.