Meeting Date: 12 March 2020

Performance of the system operator for the year ending 30 June 2019

Security and Reliability Council

The Electricity Authority's review of the system operator's performance concluded that "New Zealanders should feel assured that Transpower is fulfilling the system operator role to a high standard and is striving to improve." This paper provides the SRC a second and final opportunity to provide any comments on the performance of the system operator for the year ending 30 June 2019.

Note: This paper has been prepared for the purpose of the Security and Reliability Council. Content should not be interpreted as representing the views or policy of the Electricity Authority.

1. Background

1.1. The Security and Reliability Council's (SRC) functions under the Electricity Industry Act 2010 include providing advice to the Electricity Authority (Authority) on the performance of the system operator. The Electricity Industry Participation Code requires both the system operator and Authority to perform an annual review of the system operator's performance.[1]

1.2. At its 24 October 2019 meeting, the SRC considered the system operator's self-review for the year ending 30 June 2019, as well as the Authority's initial assessment of the system operator's performance for the same period. The SRC's advice arising from that meeting was that:

a) the system operator's performance for 2018/19 was good as was the quality of its report, especially the trend toward more scenario testing

b) the SRC encourages the system operator to provide performance trends in its reporting and demonstrate watchfulness of proper separation of Transpower's system operator and grid owner roles.

1.3. The SRC's advice resulted in a new recommendation by the Authority:

> "Ensure that future self-reviews include trends that demonstrate performance over time and discussion of any adverse trends (including trends from the results of the customer satisfaction survey)."

1.4. Since the SRC's 24 October 2019 meeting:

a) The system operator provided an addendum to its self-review with information about the system operator's financial performance.

b) The Authority has since completed its review of the system operator's performance. The review was published on 17 December 2019.

1.5. The purpose of this paper is to obtain any further feedback from SRC members on the performance of the system operator.

2. Questions for the SRC to consider

2.1. The SRC may wish to consider the following questions.

Q1. What further information, if any, does the SRC wish to have provided to it by the secretariat?

Q2. What advice, if any, does the SRC wish to provide to the Authority?

3. Appendices

3.1. Appendix A: System operator's financial performance addendum

3.2. Appendix B: *Annual review of the system operator's performance, for the year 1 July 2018 to 30 June 2019* (Authority)

[1] The requirements of both the system operator and the Authority with respect to the annual processes to review the system operator's performance are specified in clause 7.11 of the Code.

Financial Performance Addendum

As a regulated entity, Transpower is required to publicly disclose financial information under the Transpower Information Disclosure Determination [2014] NZCC 5.

This information is an addendum to the System Operator: Annual Self-Review and Assessment // 2018 - 2019

SCHEDULE SO1: SYSTEM OPERATOR	Transpower	Disclosure Date	30 June 2019
		Disclosure Year (year ended)	30 June 2019

SO1(i): Return on Investment

		2018/19 ($000)	2018/19 ($000)
	Operating surplus/(deficit)	18,573.3	
less	Assets purchased or commissioned	6,104.3	
less	Tax payable	3,391.5	
	Notional cash flows for the year		9,077.5
	Opening fixed assets		(28,163.1)
	Closing fixed assets	25,463.5	
plus	Lost assets	-	
less	Found assets	-	
	Adjusted closing fixed assets		25,463.5

	2014/15	2015/16	2016/17	2017/18	2018/19
Vanilla ROI	16.31%	16.86%	16.11%	27.69%	26.69%
Leverage (%)	44.00%	44.00%	44.00%	44.00%	44.00%
Cost of debt (%)	6.27%	5.11%	4.21%	4.39%	4.29%
Corporate tax rate (%)	28.00%	28.00%	28.00%	28.00%	28.00%
Post-tax ROI	0	16.23%	15.59%	27.15%	26.17%

SO1(ii): Regulatory Profit

		2014/15 ($000)	2015/16 ($000)	2016/17 ($000)	2017/18 ($000)	2018/19 ($000)
	Total revenue	41,404.8	42,964.6	45,254.8	40,849.9	41,099.4
less	Operating expenditure	22,505.0	22,439.1	22,151.3	20,599.3	22,526.1
	Operating surplus/(deficit)	18,899.8	20,525.5	23,103.5	20,250.6	18,573.3
less	Total depreciation	11,401.6	12,378.8	14,479.0	9,703.0	8,804.0
	Regulatory profit/(loss) before tax	7,498.2	8,146.7	8,624.4	10,547.6	9,769.3
less	Tax payable	1,773.1	2,583.6	3,697.0	3,227.0	3,391.5
	Regulatory profit/(loss) after tax	5,725.2	5,563.1	4,927.4	7,320.7	6,377.9

SO1(iii): Revenue

	2014/15 ($000)	2015/16 ($000)	2016/17 ($000)	2017/18 ($000)	2018/19 ($000)
Revenue					
System operator service provider agreement revenue - operating	25,032.5	25,238.1	25,893.8	25,621.8	25,915.9
System operator service provider agreement revenue - capital	15,685.3	16,615.0	18,867.1	14,270.2	14,450.5
Technical services advisory revenue	534.4	660.2	493.9	958.0	733.1
Other gains /(losses) (provide details)	152.6	451.3	-	-	-
Total revenue	41,404.8	42,964.6	45,254.8	40,849.9	41,099.4

	2019/20 ($000)	2020/21 ($000)	2021/22 ($000)	2022/23 ($000)	2023/24 ($000)
Revenue forecast					
System operator service provider agreement revenue - operating	26,045.7	26,319.2	25,777.8	26,040.7	26,494.4
System operator service provider agreement revenue - capital	15,433.9	15,673.8	15,203.1	17,429.2	17,896.7
Technical services advisory revenue	253.2	255.9	258.5	261.3	264.0
Other gains /(losses) (provide details)					
Total forecast revenue	41,732.8	42,248.8	41,239.5	43,731.2	44,655.0

	2014/15 ($000)	2015/16 ($000)	2016/17 ($000)	2017/18 ($000)	2018/19 ($000)
Actual vs. forecast					
Historical forecast revenue	41,252.2	42,513.3	45,265.3	42,239.0	40,706.7
Actual revenue	41,404.8	42,964.6	45,254.8	40,849.9	41,099.4
Variance ($)	(152.6)	(451.3)	10.5	1,389.1	(392.8)
Variance (%)	(0%)	(1%)	0%	3%	(1%)

SO1(iv): Operating Expenditure

Operating expenditure	2014/15 ($000)	2015/16 ($000)	2016/17 ($000)	2017/18 ($000)	2018/19 ($000)
Operating Costs	17,568.4	17,316.9	17,385.3	16,167.5	18,115.7
IT Operations	4,936.6	5,122.2	4,766.0	4,431.8	4,410.4
Opex category 3 (provide description)					
Opex category 4 (provide description)					
Opex category 5 (provide description)					
Other opex					
Total operating expenditure	22,505.0	22,439.1	22,151.3	20,599.3	22,526.1

**Insert additional rows and update calculation of totals as needed*

Operating expenditure forecast (see note below)	2019/20 ($000)	2020/21 ($000)	2021/22 ($000)	2022/23 ($000)	2023/24 ($000)
Operating Costs	16,319.8	16,646.2	16,428.7	16,757.2	17,092.4
IT Operations	4,249.4	4,334.4	4,278.8	4,364.4	4,451.7
Investigation Expenses	1,176.3	1,199.8	1,223.8	1,248.2	1,273.2
Opex category 4 (provide description)					
Opex category 5 (provide description)					
Other opex					
Total forecast operating expenditure	21,745.5	22,180.4	21,931.3	22,369.9	22,817.3

Actual vs. forecast operating expenditure	2014/15 ($000)	2015/16 ($000)	2016/17 ($000)	2017/18 ($000)	2018/19 ($000)
Historical forecast operating expenditure	25,032.5	23,580.5	23,151.2	22,811.2	21,494.8
Actual operating expenditure	22,505.0	22,439.1	22,151.3	20,599.3	22,526.1
Variance ($)	2,527.5	1,141.4	1,000.0	2,211.9	(1,031.3)
Variance (%)	10%	5%	4%	10%	-5%

SO1(v): Capital Expenditure: Commissioned capex

Capital expenditure	2014/15 ($000)	2015/16 ($000)	2016/17 ($000)	2017/18 ($000)	2018/19 ($000)
Buildings and grounds	449.2	163.2	1,700.7	2,208.4	279.3
IT market systems	7,653.2	9,395.7	4,618.9	3,527.8	5,150.3
IT market changes	103.6	126.2	4,049.1	276.2	272.8
Other	1,214.8	277.9	1,088.6	470.0	401.9
Capital Expenditure	9,420.7	9,963.1	11,457.2	6,482.4	6,104.3

**Insert additional rows and update calculation of totals as needed*

Capital expenditure forecast (see note below)	2019/20 ($000)	2020/21 ($000)	2021/22 ($000)	2022/23 ($000)	2023/24 ($000)
Buildings and grounds	362.6	-	6,662.5	70.2	62.5
IT market systems	14,613.8	4,118.0	10,727.7	12,302.1	5,600.4
IT market changes	-	2,680.7	3,590.9	12,703.4	-
Other	516.2	1,829.3	1,052.1	-	-
Total forecast capital expenditure	15,492.6	8,628.0	22,033.2	25,075.7	5,662.9

Actual vs. forecast capital expenditure	2014/15 ($000)	2015/16 ($000)	2016/17 ($000)	2017/18 ($000)	2018/19 ($000)
Historical forecast capital expenditure	5,934.1	15,910.2	16,237.7	16,449.2	7,625.1
Actual capital expenditure	9,420.7	9,963.1	11,457.2	6,482.4	6,104.3
Variance ($)	(3,486.6)	5,947.1	4,780.5	9,966.8	1,520.8
Variance (%)	(59%)	37%	29%	61%	20%

SO1(vi): Fixed Assets: RAB equivalent values

		2014/15 ($000)	2015/16 ($000)	2016/17 ($000)	2017/18 ($000)	2018/19 ($000)
	Opening fixed assets	38,802.1	36,821.2	34,405.4	31,383.6	28,163.1
plus	Found assets					
less	Disposed assets					
less	Lost assets					
plus	Assets purchased or commissioned	9,420.7	9,963.1	11,457.2	6,482.4	6,104.3
less	Total depreciation	11,401.6	12,378.8	14,479.0	9,703.0	8,804.0
plus	Adjustment resulting from asset allocation					
	Closing fixed assets	36,821.2	34,405.4	31,383.6	28,163.1	25,463.5

Annual review of the system operator's performance

For the year 1 July 2018 to 30 June 2019

17 December 2019

Market Performance

Executive summary

This review of the system operator's performance is for the period 1 July 2018 to 30 June 2019.

The system operator has continued to perform at a high level

Overall, we consider that the system operator continued to perform at a high level over the review period. The system operator's role requires excellence in a breadth of disciplines applied across a long and diverse list of activities that collectively deliver a nationally critical service. Our review concludes that New Zealanders should feel assured that Transpower is fulfilling the system operator role to a high standard and is striving to improve.

Highlights include the system operator's performance in most aspects of the real-time pricing (RTP) project, its collaborative working relationship with both the Authority and NZX, and its stakeholder engagement.

The system operator's performance in some areas did not meet our expectations, including:

- some aspects of the dispatch services enhancement (DSE) project
- the system operator's process for assessing risk in the lead up to the HVDC outage planned for November 2018
- the time (12 months) it took for the system operator to identify an error in the update to the Reserves Management Tool (RMT)
- the system operator's approach to some investigations and event reporting.

However, we note the system operator has listened to feedback and made improvements based on the above (and other) matters.

The system operator exceeded its performance metrics target

The system operator met 79 per cent of its applicable performance metrics, which is in excess of the 70 per cent target.

We have made two recommendations for further improvement

We have made two recommendations to the system operator in this performance review:

Recommendation 1:	*Ensure that future self-reviews include trends that demonstrate performance over time and discussion of any adverse trends (including trends from the results of the customer satisfaction survey).*
Recommendation 2:	*Review the effectiveness of security of supply practices.*

We look forward to continuing to work with the system operator.

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1 Introduction

The system operator's role

1.1 The system operator is a market operation service provider that performs a crucial role for the electricity industry in New Zealand. The system operator manages the processes to meet demand at least cost. This is done in real time, without overloading grid assets, while employing resources to mitigate specific threats of power supply interruptions.

1.2 The system operator also has a role in working with us to support and facilitate industry development and day-to-day operations that promote competition, ensure reliable supply, and promote efficient operation of the electricity industry, for the long-term benefit of consumers.

We have reviewed the system operator's performance

1.3 Part 7 of the Electricity Industry Participation Code 2010 (Code) requires us to regularly review how the system operator is performing its role. More detail on these requirements is set out in Appendix A. This review of the system operator's performance covers the year ending 30 June 2019.

1.4 The key inputs into this review were the system operator's self-review of its performance for the same period (self-review) and comments from:

(a) our staff who have worked with the system operator during the review period

(b) the Security and Reliability Council (SRC), based on a draft summary of our annual review

(c) the System Operations Committee of the Authority Board (SOC), based on a draft version of our annual review

(d) the system operator, based on both draft and near-final versions of our annual review.

This performance review covers all aspects of the system operator's performance

1.5 In conducting our review, we have aimed to:

(a) cover all aspects of the system operator's performance—both positive and negative

(b) provide constructive feedback, wherever possible, for the purpose of continuous improvement in performance.

1.6 We have assessed the delivery of the system operator's service in four areas—delivering a secure power system operation, enabling a more efficient market, improving its service, and learning from others.

2 System operator's performance at a glance

2.1 Overall, we consider that the system operator continued to perform at a high level over the 2018-19 financial year. The system operator's role requires excellence in a breadth of disciplines applied across a long and diverse list of activities that collectively deliver a nationally critical service. Our review concludes that New Zealanders should feel assured that Transpower is fulfilling the system operator role to a high standard and is striving to improve.

2.2 The system operator made good progress responding to the recommendations in last year's system operator performance review. We have not repeated any of last year's recommendations.

2.3 We note that the system operator met 15 of the 19 applicable performance metrics. This is a 79 per cent success rate, just less than the 80 per cent rate required to trigger the maximum incentive payment to the system operator, however this should not detract from what was otherwise another good year's performance.

The system operator has made progress responding to last year's recommendations

2.4 The system operator has made progress towards meeting our five recommendations in the 2017-18 performance review. However, we believe the system operator can still do more to respond to some of the recommendations. Table 1 sets out our view on the system operator's response to last year's recommendations.

Table 1: System operator response to last year's recommendations

Recommendations in 2017-18 performance review	Our view on the system operator's response to recommendations
Recommendation 1: *Ensure that it acts proactively and strategically when planning the needs of its security of supply function.*	We consider that the system operator has shown evidence of working proactively and strategically in their security of supply function. Furthermore, the system operator developed a strategic plan for their security of supply function (released just after the end of the review period). However, while we are satisfied that the system operator has made some improvements in their consideration of gas supply (for generation), these improvements were reactive as they only came following the Pohokura gas outage.
Recommendation 2: *Ensure that it continues to improve its organisational capability for economic analysis, including cost benefit analysis.*	The system operator wasn't required to do much economic analysis over the review period, so we haven't been able to assess whether the system operator's organisational capability for economic analysis has improved.

Recommendation 3: *Improve meaningful participation in customer satisfaction surveys.*	The low response rate (15 per cent) to the online customer satisfaction survey was insufficient to meet the agreed performance metric of 25 per cent. We note that the response rate has increased from seven per cent last year, but the improved response rate is due to the system operator surveying fewer customers (only 86 this year compared to 328 last year). Given the substantial reduction in the number of customers surveyed (to focus on getting better quality responses), we would have expected the system operator to get much closer to its agreed performance metric of 25 per cent. However, we note the system operator met its agreed performance metric for first-tier stakeholders.
Recommendation 4: *Ensure conflicts of interest are well managed and highly transparent.*	We remain cautious about the extent of the independence of the system operator role from the grid owner. While the system operator has made progress on ensuring conflicts of interest between the system operator and grid owner are better and more transparently managed, we encourage the system operator to seek robust justification when contemplating any changes that would reduce the system operator's independence (or perceptions of it). This matter is discussed further in paragraphs 3.24 to 3.26.
Recommendation 5: *In next year's self-review include more insights and detail on how it plans to continually improve.*	We acknowledge the system operator's changes it has made to the structure of its self-review to include more insights and detail on how it plans to continually improve. The new structure clearly shows the improvements that the system operator has made and is planning to make. The system operator has taken on our feedback that it needs to be more honest about its faults and has provided evidence of how it plans to improve. We recommend (see recommendation 1 below) the system operator in future self-reviews to provide performance trends in its reporting to show how it performed over time.

2.5 The following table sets out the new recommendation arising from the above discussion of previous recommendations.

Table 2: Recommendation 1 of 2 in this review of performance for 2018-19

Recommendation 1:	***Ensure that future self-reviews include trends that demonstrate performance over time and discussion of any adverse trends (including trends from the results of the customer satisfaction survey).***

The system operator exceeded its performance metrics target

2.6 The system operator service provider agreement (SOSPA) requires the system operator and the Authority to annually agree a set of objective measures for the next financial year, against which the quality of the system operator's provision of the service will be measured.

2.7 The parties agreed on 20 performance metrics to measure the system operator's performance over the 2018-19 financial year. The system operator's performance against those performance metrics determines the size and direction of the incentive payment.

2.8 Only 19 of the 20 performance metrics are applicable for measuring the system operator's performance over the 2018-19 financial year. The performance metric for on-time special event preliminary reports was not applicable because the system operator was not required to prepare any special event preliminary reports during the review period.

2.9 Table 3 sets out the system operator's results against the performance metrics for the 2018-19 financial year.

2.10 We agree with the system operator that it failed to meet four of the performance metrics. With respect to those failures:

(a) The online survey response rate is low despite the system operator reducing the number of participants it surveyed this year. The system operator failed to meet this performance metric, though we have agreed to remove this metric for 2019-20. This matter is discussed further in paragraph 6.7.

(b) The improved project delivery targets for service maintenance projects and market design and service enhancement projects were not met due to a few of the system operator's projects having delayed delivery dates or budget overruns. These metrics do not adequately capture the system operator's usual high standard of project delivery and will be reviewed this year.

(c) The capability functional fit failure was not large (six percentage points below the target of 74 per cent). However, this is the second year in a row that the system operator has failed to meet this metric. We note that the system operator has focussed on meeting technical quality initially before more actively focusing on functionality aspects. The system operator expects to start getting closer to this capability functional fit metric. This matter is discussed further in paragraphs 5.25 to 5.27.

2.11 We consider the system operator met 15 of the 19 applicable performance metrics. That is a 79 per cent success rate, which is just short of the 80 per cent rate required to trigger the maximum incentive payment to the system operator. This is a good result and we look forward to further refinement of the performance metrics in the future.

Table 3: System operator's performance against the performance metrics

Metric	Target	System operator view of performance	
		Actual	Pass/fail
System operator maintains Code compliance and meets SOSPA obligations			
Market breaches below threshold	≤ 3/year > $45k	1	Pass
Security risk breaches below threshold	≤ 3/year	0	Pass
On-time Code/SOSPA deliverables	100%	100%	Pass
System operator customers are informed and satisfied			
Participant survey overall result	≥ 80%	85%	Pass
Participant survey response rate – online	≥ 25%	15%[1]	Fail
Participant survey response rate – first tier	≥ 80%	80%	Pass
On-time special event preliminary reports	90% ≤ 10 business days	N/A	N/A
Edge technology report	≥ 1/year	1	Pass
Market insights report	≥ 8/year	14	Pass
System operator delivers projects successfully			
Service maintenance project delivery	≥ 60%	33.33%	Fail
Market design/service enhancement project delivery	≥ 60%	0%	Fail
Accurate capital planning	≥ 50%	66.67%	Pass
System operator is committed to optimal real-time operation			
Infeasibility resolution	100% ≤ 2 business days	100%	Pass
Infeasibility resolution	80% ≤ 1 business day	98%	Pass
High spring washer resolution	100% ≤ Code obligation	100%	Pass
High spring washer resolution	80% ≤ 1 business day	100%	Pass
System operator's tools and technologies are fit for purpose			
Capability functional fit	74%	67.6%	Fail
Technical quality	60%	63%	Pass
SCADA/MS availability	99.9%	99.97%	Pass
On time schedule publication	99%	99.99%	Pass

[1] The system operator reported in its self-review that the participant survey response rate – online was 16 per cent, but has since informed us that it was actually 15 per cent.

3 Delivering secure power system operation

3.1 The system operator largely delivered a secure power system over the review period. The system operator made some improvements to its security of supply function, but we would like the system operator to review the effectiveness of its security of supply practices.

3.2 We were satisfied with the system operator's contribution to the system operator's review of the Security of Supply Forecasting and Information Policy (SOSFIP) and our review of Official Conservation Campaigns (OCC).

3.3 We note the system operator's continued focus in improving the credible event review, which investigated the classification of busbars during the review period.

3.4 The system operator has also shown some initiative in preparing for future changes in the electricity industry.

The system operator dealt with most operational events competently

3.5 There were no particularly significant power system events during the review period. There were two weather-related system events, but these events had no significant impact and were dealt with appropriately by the system operator.

3.6 Two separate under-frequency events (UFEs) occurred during the review period on 13 December 2018 and 14 December 2018. We were satisfied with the system operator's management of the UFE that occurred on 13 December 2018.

3.7 The system operator recommended that there was no causer of the 14 December 2018 UFE, whereas we determined in our draft determination that Transpower, as the grid owner, was the causer of the UFE. Given the system operator's interpretation of the Code when it came to finding the grid owner was not the causer of the 14 December 2018 UFE, we think it should have (without our prompting) investigated the 13 December 2018 UFE differently from its usual process in case there was evidence that would convince the system operator (under its interpretation) that Genesis Energy was not the causer.

3.8 We note that the system operator is planning to engage further with us around the 'UFE causer' process (particularly around interpretation of the Code) once we have made our final determination on the 14 December 2018 UFE.

3.9 We are pleased that the system operator has considered how it can improve its practices following the occurrence of some operational events. In particular, the system operator has:

(a) considered how to mitigate the impact of higher ambient temperatures following the temperature at Haywards rising above the temperature used for asset ratings

(b) reviewed the high voltages experienced at Te Kowhai in March 2019 to improve its voltage management practices.

The system operator's back-up systems worked well

3.10 The system operator's back-up tools and processes performed when required. The system operator successfully performed dispatch using its stand-alone dispatch (SAD) application on 2 July 2018, and successfully applied its business continuity processes in April 2019.

3.11 We are pleased with the system operator's continued approach to the credible event review.

3.12 The system operator investigated the classification of busbars in its staggered approach to the credible event review. We are pleased with the staggered approach and the economics principles applied by the system operator.

The system operator has made improvements in its security of supply function

3.13 We are largely satisfied with the system operator's performance of its security of supply function. The system operator has made improvements to its subscription email service and webpage reporting (such as moving from static to dynamic risk meters), developed educational material for stakeholders, prepared concept material for use in official conservation campaigns and has tightened its processes somewhat.

3.14 In last year's system operator performance review we recommended that the system operator ensure it acts proactively and strategically when planning the needs of its security of supply function.[2] We believe that the system operator has shown more proactivity. We note that the system operator has developed a strategic plan for their security of supply function (released just after the end of the review period) and look forward to the system operator implementing the activities set out in its strategic plan.

3.15 While we were satisfied that the system operator made some improvements in their consideration of gas supply (for electricity generation), these improvements only came following the Pohokura gas outage.

The system operator needs to ensure it follows its own policies in security of supply

3.16 In response to questions from us, the system operator reconsidered and rescinded a long-standing practice of increasing New Zealand-wide risk curves when their South Island-only counterparts were higher. The practice had the potential to create a breach of the Code in the event an official conservation campaign was declared.

3.17 We note that in one of the weekly reports released prior to hydro storage dipping below the watch curve in early 2019 the system operator overstated the risk of going into 'watch' status. This was consistent with the system operator not understanding its own policy that specified that 'watch' status would only be triggered if the one per cent risk curve was breached *and* it was forecast to remain that way for a week. There was 220 GWh of Lake Tekapo contingent hydro storage becoming available within that week and heavy rain forecast.

3.18 The system operator noted in its self-review that to help participants better understand and manage risk it (among other things):

(a) reclassified 220 GWh of contingent storage at Lake Tekapo as controlled storage and included it in the risk curves, pushing up storage levels

(b) published thermal fuel scenarios to demonstrate the impacts of different thermal fuel assumptions on the risk curves.

3.19 However, we consider that in both these cases, the system operator wasn't following its own policies and these changes were in response to the system operator being told they were in breach. The system operator should have been candid that those improvements were necessary to correct a system operator error and an omission. We note that the system operator's thermal fuel scenarios were more thorough than strictly required to meet its own policy.

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[2] Electricity Authority, *Annual review of the system operator's performance: for the year 1 July 2017 to 30 June 2019*, March 2019, page 6.

3.20 In light of the above factors, we have recommended that the system operator review the practices of its security of supply function to provide assurance of the effectiveness of its practices to achieve their intended purposes (including compliance with the Code).

Table 4: Recommendation 2 of 2 in this review of performance for 2018-19

Recommendation 2:	***Review the effectiveness of security of supply practices.***

The system operator performed satisfactorily in the SOSFIP and OCC reviews

3.21 The system operator and the Authority collaborated closely on the system operator's review of the SOSFIP and our review of the OCC in parallel over the 2018-19 financial year. The system operator's performance on these projects was satisfactory, but there were some issues around the system operator's responsiveness and time management, and the final consultation paper could have been better quality (for example, by including descriptions of the pros and cons of all options tabled). However, the knowledge and expertise of system operator staff was excellent and we were (aside from the consultation paper) impressed with the quality of the system operator's stakeholder engagement.

The system operator has shown initiative in preparing for the future

3.22 The system operator has continued to show initiative in preparing for future changes in the electricity industry. The system operator's work has included:

(a) a project to automate the treatment of special protection schemes (SPS) in its market system tools to enable the system operator to manage an increasing number of these schemes

(b) an investigation into the implications of increased volumes of distributed battery energy storage systems on system operations and the power system.

3.23 We note the system operator's plans to work with the Australian market operator in 2020 on proposed changes to the inverter standard AS/NZS 4777.2—this forward-thinking is important with the changes expected to the New Zealand power system in the coming years.

Transpower treated our reservations about the independence between the system operator and grid owner very seriously

3.24 We think it is important that conflicts of interest between the system operator and grid owner are managed effectively. We are confident that Transpower took our reservations about the increased integration between the grid owner and system operator very seriously in the review period, and continues to do so.

3.25 We are pleased that the system operator has become more transparent about the conflicts of interest that exist. The system operator now publishes an extract from its conflicts of interest register in its monthly and quarterly performance reports and is more proactive in ensuring that staff document conflicts of interest in the conflicts of interest register. The system operator undertook refresher training with its staff to promote this.

3.26 We encourage the system operator to remain vigilant and seek robust justification when contemplating any changes that would reduce the system operator's independence (or perceptions of it).

4 Enabling a more efficient market

4.1 The system operator made some excellent contributions to projects over the review period, including the real-time pricing and wind offer arrangements projects, which will help enable a more efficient market. However, the system operator's engagement with us in the dispatch services enhancement (DSE) project was not of the system operator's usual high standard. Despite this, the DSE project is expected to deliver a high-quality product that is a great improvement.

4.2 We have concerns with some of the system operator's actions around the HVDC outage that was planned for November 2018, particularly its process for assessing risk. We acknowledge that the system operator has subsequently made some improvements to its outage planning and real time outage management processes.

The system operator appeared to have a flawed process for assessing risk prior to the November 2018 HVDC outage

4.3 We have concerns with some of the system operator's actions around the HVDC outage planned for November 2018, which the grid owner recalled at the eleventh hour. The system operator's risk assessment processes leading up to the outage, in particular the failure to assess the impact of the Pohokura gas outage are of particular note.[3]

4.4 The first public announcement of the Pohokura outage was on 28 September 2018—55 days before the HVDC outage was due to start—so there was enough time for the system operator to reconsider how it was assessing the capacity of the power system in light of the outage. The system operator relied on systems that didn't reflect the reduced capability of gas-fired electricity generators. The unexpected HVDC outage recall had a significant impact on the plans and actions of some industry participants.

4.5 However, we acknowledge that the system operator:

(a) subsequently set up a working group to consider improvements to its outage planning and real time outage management processes

(b) implemented many of these improvements in advance of the 2020 HVDC outage.

The system operator is better prepared for planned outages

4.6 The system operator appears to have learned from the issues it had with the November 2018 HVDC outage and is now better prepared for planned outages.

4.7 The system operator was proactive in its preparations for the HVDC planned outage in May 2019 and undertook additional analysis to ensure there would be sufficient generation margins under a range of scenarios. The system operator received positive feedback from stakeholders on its management of the May 2019 HVDC outage.

4.8 There are major outages of the HVDC poles scheduled for early 2020. In preparation for these outages the system operator has communicated with the industry and grid owner, as required, and estimated the generation balance margin under different scenarios. While this is outside the review period, it helps to demonstrate that the lessons and improvements from the review period have been embedded.

[3] An error in the update to the Reserves Management Tool also affected Transpower's decision on when they brought the HVDC back. This is discussed in paragraph 5.18.

4.9 The system operator also made changes to the New Zealand Generation Balance (NZGB) report during the review period, which will make it better prepared for future planned outages.

The system operator successfully made refinements to the National Market for Instantaneous Reserves

4.10 The system operator implemented the National Market for Instantaneous Reserve (NMIR) in November 2016. In March 2019 the system operator successfully made refinements to the NMIR that deliver additional operational and market benefits.

The system operator made an invaluable contribution to the wind offer arrangements project

4.11 We initially procured the system operator's advice on the wind offer arrangements project under the technical advisory service (TAS) provisions of the SOSPA, but it has subsequently become a capital project.

4.12 The system operator made an invaluable contribution to the wind offer arrangements project. The system operator added significant value suggesting changes to the Code amendment so it could be implemented in an unambiguous way. It collaborated well with NZX to implement wind generator offers and constrained-on ramp changes at the same time, which likely saved money. The project progressed well and was very well managed by the system operator.

The dispatch services enhancement project will deliver a high-quality product and provided some lessons

4.13 The system operator's dispatch services enhancement (DSE) project delivered a high-quality product and was overall successful.

4.14 However, we were disappointed with some aspects of the system operator's performance in the DSE project over the review period.

4.15 The system operator underestimated the costs for the DSE project, with systems development and testing expected to cost $0.243m more (a 6.1 per cent increase). Development of the ICCP Block 5 increased the cost a further $0.164m, though this was as a result of a decision to increase the project's scope.

4.16 We were disappointed with some aspects of the system operator's communication with us on the DSE project. Information was often provided late or was not sufficiently clear. We had to ask the system operator to provide meaningful project updates and monthly project reporting. From early 2019, the system operator improved the clarity of its communications in response to these concerns.

4.17 The system operator seems to have engaged well with other stakeholders at industry workshops. However, we consider there was a missed engagement opportunity on this project as discussed later in paragraph 6.3.

4.18 We acknowledge that the system operator initiated an independent review of the DSE project and look forward to seeing the results of this review.

The system operator continued to make an excellent contribution to the real time pricing project

4.19 The system operator's work on real time pricing (RTP) was once against a highlight. The system operator's RTP team exceeded our expectations. The system operator worked collaboratively and effectively with us and engaged well with stakeholders, particularly at industry workshops.

4.20 During the review period, we held concerns that dispatch-lite was regarded by the system operator as an optional RTP deliverable. Ultimately, senior system operator management categorically assured us that dispatch-lite is firmly in scope. Prior to that assurance, there was a breakdown in communication between the system operator and Authority staff on the inclusion of dispatch-lite which created some frustration.

4.21 The system operator has been very committed to the RTP project and this has shown through the excellent performance of the project manager and subject-matter-experts, the delivery of high-quality deliverables, and a big push by system operator staff to get the job done.

5 Improving the system operator's service

5.1 The system operator's market system performance has continually improved over recent years and the system operator has also remained committed to meeting compliance obligations. However, we were disappointed that it took the system operator 12 months to identify an error in the update to the Reserves Management Tool (RMT).

5.2 The system operator has started making improvements to both how it responds to major system events and how it investigates such events. The system operator has also looked at how it can improve its delivery of operations services and its organisational effectiveness.

5.3 The system operator's overall service to the Authority has continued to impress—the system operator is collaborative, constructive, and open with us. The system operator has some staff with excellent technical knowledge and some top-notch project managers.

Lifting the bar

5.4 We are supportive of the system operator's plans to look at how it can improve its delivery of operational services and look forward to the system operator providing us with further details on this programme of work in the 2019-20 financial year.

The system operator has started making some improvements to investigation and event reporting

5.5 The system operator noted in their self-review that their "investigation of certain system events, including the South Island AUFLS event on 2 March 2017 and the 2018 HVDC cable setting errors, identified shortcomings in [its] investigations and event reporting"[4].

5.6 We agree that the system operator's approach to investigations and event reporting has been substandard.

5.7 Transpower (both as system operator and the grid owner) investigated the 2 March AUFLS event and released its final report on the event at the start of the review period (9 July 2018). We noted specific concerns we had with Transpower's investigation into the 2 March 2017 AUFLS event in last year's review of the system operator's performance. Overall, we were disappointed with the process Transpower undertook in response to the event. We considered the process lacked transparency, accountability, and thoroughness.

5.8 The system operator has developed a major incident reporting process to address the lessons learned from the 2 March 2017 AUFLS and 2018 HVDC cable setting errors events.

The system operator has made improvements in how it responds to major system events

5.9 Since the 2 March 2017 event review the system operator has made positive changes in how it responds to major system events. The system operator has completed most of the actions arising from the March 2017 event review. These actions included working with generators to assess what real-time information could assist them with visibility of the system during events, re-emphasising to staff (through regular training) the importance of compliance with policies during restoration after rare events, and working with industry and real-time teams within Transpower to address issues with operational communications.

[4] Transpower, *System Operator: Annual Self-Review and Assessment 2018-19*, August 2019, page 19.

5.10 However, the system operator still has work to do on the following two actions:

> "Identify, review and address performance of risk management controls, specifically focussed on high impact low probability event interactions.
>
> Review Transpower's processes for reporting of major power system events, compliance breaches and material failures by Transpower to comply with its own standards and procedures."

5.11 We encourage the system operator to ensure that these remaining actions are completed in a timely manner.

The system operator plans ahead to manage system security

5.12 The system operator fulfilled its obligations for reviewing and publishing system security forecasts.

5.13 We are supportive of the system operator's review of the Planned Outage Coordination Process.

The system operator has introduced benefits mapping

5.14 We are pleased that the system operator has introduced benefits mapping to more accurately track benefits realisation in each of its projects, and look forward to seeing the results of this benefits mapping.

The system operator has performed well in compliance-related areas

The system operator met its principal performance obligations

5.15 Clause 7.2 of the Code sets out the principal performance obligations (PPOs). We are satisfied that, as required by the PPOs, the system operator:

(a) avoided cascade failure of assets resulting in loss of electricity to consumers

(b) maintained frequency within specified levels (as set out in clauses 7.2A and 7.2B of the Code)

(c) managed frequency time error as required (as set out in clause 7.2C of the Code)

(d) was not required to investigate and resolve a security of supply or reliability problem (as set out in clause 7.2D of the Code) as no requests were received from participants.

The system operator maintained a good level of compliance over the reporting period

5.16 The Code imposes compliance obligations on the system operator, including in documents incorporated into the Code by reference.

5.17 In its self-review, the system operator noted that it breached the Code 16 times during the review period, compared to 12 breaches in the previous financial year. However, the number of breaches is still the second lowest annual total in the last seven reporting periods.

The system operator's Reserves Management Tool breach was disappointing

5.18 We were disappointed that it took the system operator 12 months to identify an error in the update to the Reserves Management Tool (RMT). This was a serious breach that impacted 76 trading periods across the year and contributed to Transpower's decision on when they brought the HVDC back on 22-23 November 2018. The RMT breach affected three of the four peak periods during 22-23 November and may exacerbated the associated market impact.

5.19 The system operator has acknowledged the seriousness of this breach and has commissioned an independent audit of the RMT model change management process.

The system operator reviewed documents incorporated into the Code by reference that relate to security of supply

5.20 The Code requires the system operator to regularly review various documents that are incorporated into the Code by reference.[5] The system operator began its regular two-yearly review of the policy statement in January 2019. The system operator also started its two-yearly review of the procurement plan.

5.21 Under the policy statement, the system operator must also review the identification, assessment, and assignment of potential credible events not less than once in each period of five years.[6] As discussed in paragraph 3.12, the system operator is currently investigating the credible event classification of busbars.

The system operator is taking steps to improve organisational effectiveness

5.22 The system operator continuously looks at how it can improve organisational effectiveness. Over the review period the system operator has:

(a) run its annual business continuity planning (BCP) exercise, in which the scenario was an industry-wide communications failure

(b) commissioned an independent audit of the verbal communications processes that control room coordinators use

(c) made changes to its control room operator training programmes

(d) run black start simulations and tests

(e) invested further in cyber security

(f) made ongoing improvements to its business change management approaches.

5.23 We are pleased with the steps that the system operator took over the review period to improve organisational effectiveness. We encourage the system operator to continue to look at how its organisational effectiveness can be improved.

The performance of the market system has continued to improve

5.24 Over the past six years the number of unplanned outages and the duration of those outages has improved. We acknowledge the system operator's improvement in this area.

5.25 The system operator met the 'improved technical quality' performance target of 60 per cent (achieving 63 per cent). However, the system operator failed to meet the 'capability functional fit' performance target (achieving 68 per cent against a target of 74 per cent).

5.26 The system operator was only six percentage points below the capability functional fit performance target. However, this is the second year in a row that the system operator has failed to meet this metric. We note that the system operator has focussed on meeting technical quality initially before actively focusing on

[5] Clauses 7.5(3), 8.10A, 8.42A, and 9.5(3) of the Code require the system operator to consult on revisions to the SOSFIP, emergency management policy, policy statement, procurement plan, and system operator rolling outage plan (respectively).

[6] Clause 13.1 of the Policy Statement.

functionality aspects. This has involved the system operator choosing a simpler (and limited) solution now instead of using a better approach that would take longer.

5.27 We note the system operator has alerted us that meeting the capability function fit is unlikely to be a focus in the next financial year while it focusses on work to further improve the technical quality of software.

The system operator has worked well with us on joint work planning and agrees a refresh is needed

5.28 Clause 7.7 of the Code requires the system operator and the Authority to agree and publish a Joint Development Programme that coordinates and prioritises:

(a) the items on our industry development work plan on which we intend to liaise with the system operator

(b) the system operator's capital expenditure plan (capex plan) provided to us under the SOSPA.

5.29 The system operator has continued to work well with us in the joint work programme. The system operator has prepared timely reports of a good quality and developed good relationships with our staff. We appreciate the adjustment that the system operator made to TAS reporting to make the report clearer and to reduce the risk of underutilisation.

5.30 The system operator agrees with us that it is time for a refresh of the approach the joint work planning team takes, to ensure it is more governance focussed and provides more detail on risks.

The system operator's working relationship with us has continued to be strong

5.31 The relationship charter signed by the Authority and the system operator in 2014 continues to support a strong working relationship between the two parties.

5.32 The system operator is collaborative, constructive, and open. The system operator keeps us well-appraised of what it is doing, is quick and willing to help us out, and willing to work through complex problems together. Overall, we continue to value the positive working relationship with the system operator and acknowledge the system operator's efforts to build a good relationship with us.

We were impressed by the performance of system operator staff

5.33 We continued to be impressed by the overall performance of the system operator's staff during the review period.

5.34 System operator staff have the skills required to effectively perform their roles, with many staff having excellent technical knowledge and a willingness to share that knowledge. The system operator also has a good group of project managers, some of which are elite.

5.35 However, the system operator's human resources appear to be stretched in some areas. The system operator needs to continue to ensure that its core competencies, including security of supply, are resourced adequately.

5.36 The quality of the system operator's written work has been of a high standard and we have appreciated the system operator asking for more preparation time for SRC and SOC papers as this has improved the quality of the papers.

5.37 We appreciate the system operator's focus on improving diversity and inclusion in its workplace.

6 Learning from others

6.1 We have been impressed with the system operator's engagement with other stakeholders. Of particular note was the system operator's:

(a) collaboration with NZX on implementing wind generation offers and constrained-on ramp changes

(b) performance at stakeholder workshops, including workshops on RTP, the SOSFIP and OCC projects, and DSE.

6.2 The system operator's customer satisfaction survey also indicates that a large majority of the system operator's customers rate the system operator's service as good or better.

The system operator's industry engagement and communications have been impressive

6.3 The system operator's collaboration with NZX on implementing wind generation offers and constrained-on ramp changes was successful. The system operator has also performed well at stakeholder workshops, including workshops on RTP, the SOSFIP and OCC projects, and DSE.

6.4 Ideally, the system operator's early engagement on the DSE project would have identified participants' desire to continue support for modbus (ICCP Block 5), though we acknowledge this is difficult in advance of the detailed design phase.[7]

The system operator got good feedback in the customer satisfaction survey, but continued to have a low response rate

6.5 The system operator's customer satisfaction survey showed that 85 per cent of survey respondents rated the system operator's service as 'very good' or 'good'. This exceeded the performance metric target of 80 per cent. This result is lower than last financial year (93 per cent), but higher than the year before that (81 per cent).

6.6 The system operator made some improvements to its processes to get more meaningful participation in its customer satisfaction survey. These improvements included a personalised email being sent to the four largest generators from the GM Operations (which led to a 100 per cent response rate from those participants), the survey being shortened, and the questions being simplified.

6.7 However, while the system operator noted that the responses to the survey comprised a broad representation of its key stakeholders, we are still concerned that the system operator only got 13 responses to the customer satisfaction survey. This response is lower than the 20 responses the system operator got last year (although the system operator sent the customer satisfaction survey to a smaller number of customers this year). The system operator has once again failed to meet the customer survey response rate performance metric (the system operator had a 15 per cent response rate against a 25 per cent target), despite a substantial decline in its sample size. However, we note the system operator met its agreed performance metric for first-tier stakeholders.

6.8 The system operator's self-review notes highlights from the customer satisfaction survey but does not note any areas the system operator could improve on in light of the survey results.

[7] Modbus is a protocol for communication between embedded systems, devices and industrial applications developed in the 1980s.

7 Financial performance

Increases in operating expenditure have reduced the system operator's regulatory profit

7.1 The system operator provided audited financial information as an addendum to its annual self-review of performance. The system operator's 2018/19 financial year had modest differences compared with recent history (see Table 5 below).

Table 5: Changes to system operator's financial information in 2018/19

Financial measure	Changed by ($M)	Changed to ($M)	Per cent change	Reasons for change
Revenue	$0.25 ↑	$41.1	0.6% ↑	This increase was primarily due to the 'CPI minus X' adjustment factor (refer paragraph 7.3(a) below).
Operating expenditure	$1.9 ↑	$22.5	9% ↑	A review of cost allocation between the grid owner and the system operator found ~$1M that had been inadvertently omitted from system operator costs.[8] Fewer vacancies have increased salary costs.
Depreciation	$0.9 ↓	$8.8	9% ↓	Depreciation continues to decline (albeit slower than last year) due to the age profile of the capital asset base. As the asset base is forecast to increase in 2019/20, there will be a flow-on effect on depreciation.
Regulatory profit (after tax)	$0.9 ↓	$6.4	13% ↓	The calculation of regulatory profit includes revenue, operating expenditure and depreciation. The $1.9M increase in operating expenditure decreased regulatory profit, though the increase in revenue and modest decrease in depreciation slightly reduced the extent of this decrease.

7.2 The system operator's 'vanilla' return on investment was largely unchanged, falling from 27.7% to 26.7%.

7.3 We remain satisfied the SOSPA incentivises the system operator to improve efficiencies and enables consumers to benefit from such improvements in the long term. 2018/19 is the third financial year in the first 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

[8] Because of the SOSPA fixed fee arrangements (refer paragraph 7.3(b)), this ~$1M increase is borne by Transpower.

its operating costs rise faster than the consumer price index minus the adjustment factor.

(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 five-year reset, revenue is renegotiated in light of actual performance (such as enduring reductions or increases in operating expenditure).

Appendix A Requirements for system operator performance review set out in Code

A.1 Requirements for our review of the system operator's performance are set out in Part 7 of the Code. In particular:

(a) Clause 7.8 of the Code requires that we undertake a review at least once each financial year, concentrating on the system operator's compliance with:

(i) its obligations under the Code and the Electricity Industry Act 2010

(ii) the operation of the Code and the Electricity Industry Act 2010

(iii) any performance standards agreed between the system operator and the Authority

(iv) the provisions of the SOSPA.

(b) Clause 7.9 of the Code requires that our review takes into account:

(i) the terms of the SOSPA

(ii) reports from the system operator to us, specifically including the system operator's annual self-review, which it is required to perform each year under clause 7.11 of the Code, and provide to us by 31 August

(iii) the performance of the system operator over time in relation to parts 7 and 8 of the Code

(iv) the extent to which acts or omissions of other parties have impacted on the system operator's performance and the nature of the task being monitored

(v) reports or complaints from any person, and any associated responses by the system operator

(vi) the fact that the real-time coordination of the power system involves a number of complex judgments and inter-related incidents

(vii) any disparity of information between us and the system operator

(viii) any other matter we consider relevant to assess the system operator's performance.

A.2 As set out in the Electricity Industry Act 2010, we have a statutory objective to "promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers".