Annual review of the system operator's performance

For the year 1 July 2019 to 30 June 2020

28 January 2021

Executive summary

This review of the system operator's performance is for the period 1 July 2019 to 30 June 2020.

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 planning and carrying out the major HVDC outage in early 2020
- its handling of the disruption cause by COVID-19
- its collaborative working relationship with the Authority
- its engagement with and reported satisfaction from wider industry.

However, large increases to the estimated capital cost of the real-time pricing project were disappointing. In contrast, the trend in the first four years of the current System Operator Service Provider Agreement (SOSPA) is toward underspend. We would value improved accuracy in the system operator's financial estimation of project costs.

The system operator exceeded its performance metrics target

The system operator met 81.25 per cent of its applicable performance metrics, which exceeds the 80 percent target at which the full incentive payment is paid.

We have identified an area of possible risk

The system operator is not currently expected to verify third party data and takes it at face value. There is potential for this to produce significant problems in the future and we have made a recommendation on this basis.

We have made three recommendations

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

Recommendation 1:	*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.*
Recommendation 2:	The system operator improve its financial forecasting of projects.
Recommendation 3:	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.

We look forward to continuing to work positively 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. It also provides supporting services, such as security of supply forecasting, and outage planning and coordination.

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 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 2020 (the review period).

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 This review of the system operator's performance is structured in the following sections:

(a) "2: System operator performance at a glance" – the system operator's performance against its performance metrics and how it has responded to recommendations

(b) "3: Delivering a secure power system" – how the system operator performed in its core role of "keeping the lights on" and delivering a secure power system over the review period.

(c) "4: Enabling a more efficient market." This section details the market improvements the system operator has enabled during the review period. Many of these projects are collaborations with the Authority.

(d) “5: Improving the system operator’s service.” How the system operator’s interaction with the Authority has performed over the review period.

(e) “6: Learning from others.” This section outlines steps the system operator has taken to engage with other parties to learn how to improve their practices.

(f) “7: Financial performance.” A review of the system operator’s finances.

1.7 In addition to our review of the system operator’s performance, we have included discussion about opportunities for improving our monitoring of system operator performance. This is included in Appendix A.

2 System operator's performance at a glance

2.1 Overall, we consider that the system operator continued to perform at a high level in the review period.

2.2 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 further improve its performance.

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

2.4 We note that the system operator met 16 of the 19 applicable performance metrics. This converts to an 81.25 percent score, slightly above the 80 percent required to trigger the maximum incentive payment to the system operator, indicating another good year's performance.

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

2.5 The system operator has made progress towards meeting our two recommendations in the 2019 performance review. 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 2018-19 performance review	Our view on the system operator's response to recommendations
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's self-review includes an appendix dedicated to performance over time and trends. Only one adverse trend was reported, and this was explained well. We note that appendices 2.3 and 2.4 are subsections of "Appendix 2: Trends", but do not show any trend information. We look forward to further development of trend analysis in future self-reviews.
Recommendation 2: Review the effectiveness of security of supply practices.	The system operator addressed this recommendation in two stages. The progress it has made so far is to improve its tools to allow it to model the system more easily and reliably. It also committed to undertake an audit to verify its changes have been implemented appropriately. We support the system operator's implementation of more tractable modelling tools, as the now defunct tools contributed to inefficiency and errors.

The system operator exceeded its performance metrics target

2.6 The 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 review period, but only 11 of the 20 performance metrics contribute to the incentive payment calculation, and some metrics are weighted more heavily than others. The system operator's performance against the contributing performance metrics determines the size and direction of the incentive payment.

2.8 The performance metric for on-time special event preliminary reports was not applicable for the review period because the system operator was not required to prepare any special event preliminary reports during the review period.

2.9 Table 2 sets out the system operator's results against the performance metrics for the review period.

2.10 We agree with the system operator that it failed to meet six of the performance metrics, two of which contribute to the incentive payment calculation. With respect to those failures:

(a) The "service maintenance projects" and "market design and service enhancement projects" components of "successful project delivery" did not meet the targets for timing or for budget. This metric does not contribute to the overall performance score. There is no discussion on these metrics in the system operator's self-review. We regard these metrics and targets as a first step to gain visibility for development of better-refined metrics and targets.

(b) The "capability functional fit" target was not met, and this is the third year in a row that the system operator has failed to meet this metric. The system operator states that it 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 in the next 2-3 years. This metric also does not contribute to the overall performance score.

(c) The system operator achieved 25% for "accurate capital planning", well below the 50% target. This metric contributes 10 points to the overall performance score, indicating that it should be considered a higher priority. We note there is a small number of projects contributing to this result.

(d) The system operator also failed to publish a future thinking report in the review period. This metric contributes five points to the overall performance score.

2.11 The system operator has performed notably worse against the metrics that do not contribute to the overall performance target. Nonetheless, the system operator's overall performance was good. We look forward to further refinement of the performance metrics in the future and an improvement in the system operator's performance against unweighted metrics.

Table 2: System operator's performance against the performance metrics

Metric		Target	Actual	Weighting	Pass/fail
Customers are informed and satisfied					
Annual participant survey result		≥ 81%	92%	5	Pass
Survey response rate for first tier		≥ 80%	80%	0	Pass
On-time special event preliminary reports		90% ≤ 10 bus. days	N/A	5	N/A
Leadership and insights	Future thinking report	≥ 1	0	5	Fail
	Market insights	≥ 8	14	5	Pass
Quality of written reports		100% of standard	100%	0	Pass

Metric		Target	Actual	Weighting	Pass/fail
Code compliance maintained and SOSPA obligations met					
Market impact of breaches remain below threshold		≤ 3 @ ≥ $40k	0	10	Pass
Breaches creating a security risk remain below threshold/within acceptable range		≤ 3	0	10	Pass
On-time Code and SOSPA deliverables		100%	100%	10	Pass
Successful project delivery					
Project delivery	Service Maintenance projects	≥ 60% on time	50%	0	Fail
		≥ 60% on budget	50%	0	Fail
	Market Design and Service Enhancement projects	≥ 60% on time	0%	0	Fail
		≥ 60% on budget	50%	0	Fail
Accurate capital planning		≥ 50%	25%	10	Fail
Commitment to real-time operation					
Sustained infeasibility resolution		80% ≤ 1 business day	87%	5	Pass
High spring washer resolution		80% ≤ 1 business day	100%	0	Pass
Fit-for-purpose tools					

Capability functional fit assessment score	75%	67.61%	0	Fail
Technical quality assessment score	60%	65.60%	0	Pass
Sustained SCADA availability	99.90%	99.98%	10	Pass
Maintained timeliness of schedule publication	99%	99.99%	10	Pass
Total			Total points:80	65/80 = 81.25%

3 Delivering secure power system operation

3.1 The system operator's primary role is to maintain secure power operation and it has performed this well over the review period.

3.2 One of the recommendations from last year's performance review was to conduct a review of the system operator's security of supply practices and the system operator has made good improvements in this area.

3.3 The system operator was presented with a new challenge in the 2020 financial year with COVID-19. We were pleased with the system operator's preparation for COVID-19 and their response during the level three and four nationwide lockdowns.

3.4 The system operator has also shown some initiative in preparing for future changes in the electricity industry by commissioning a report into disruptive technologies[1] and contributing to Transpower's *Whakamana i Te Mauri Hiko* in March 2020.

The system operator responded well to the COVID-19 threat

3.5 The COVID-19 threat presented a new challenge for the system operator, to which it responded prudently and appropriately. Simplistically, 'keeping the lights on' is the system operator's core purpose, and it should be commended for maintaining uninterrupted operations during the latter half of the review period.

3.6 The system operator's response to the COVID-19 threat included both taking steps in February and March to prepare for possible operational contingencies (such as non-availability of some staff), as well as updating procedures to minimise disruption during the subsequent level four nationwide lockdown.

3.7 The lockdown presented a challenge for the system operator because large changes in New Zealanders' behaviour led to significant changes in demand. This had follow-on effects for management of automatic under-frequency load shedding (AUFLS), voltage and instantaneous reserves. The system operator responded well to this challenge while fulfilling its security of supply functions.

3.8 The system operator also published market insights during this period, outlining how demand had changed during different phases of New Zealand's COVID-19 response. This was useful to the Authority and wider industry.

3.9 The system operator's control room functions were not noticeably disrupted by COVID-19. Although ultimately there was little direct impact from COVID-19, some of the system operator's reporting projects were delayed. However, we acknowledge that this is an understandable outcome and reflects a prudent re-prioritisation of tasks.

3.10 During the nationwide lockdown levels three and four, Transpower (including the system operator) produced regular status reports for stakeholders, including the Authority. These reports were of good quality, timely and of a consistent format.

3.11 Looking to the future, the system operator's preparations for and experiences during earlier lockdowns should allow it to respond well if the country undertakes lockdown measures again in the future.

The system operator's planning for an HVDC outage was greatly improved

3.12 The system operator successfully planned and executed its functions in relation to the major HVDC outage in early 2020. The overall performance was particularly noteworthy given that our 2019 performance review highlighted concerns around a similar HVDC outage in late 2018.

[1] Which was eventually published in August 2020 – slightly after the end of the financial year in review.

3.13 The primary concerns raised at the time were about correctly accounting for gas availability and notifying industry of planned interruptions.

3.14 To better consider gas supply risk, the system operator updated its New Zealand Generation Balance report to include a low wind and low gas scenario. This is a prudent development that reflects the changing dynamic of the New Zealand electricity system. The amount of wind generation capacity on the system is increasing, both in absolute terms and as a proportion of total generation. Additionally, gas supply has been more unreliable in recent years with frequent disruptions to the Pohokura gas field.

3.15 The Authority was also pleased with the communications from the system operator to the market during the planning phase of the project. As a result of feedback from industry, Transpower as grid owner rescheduled bipole outages to weekends.

3.16 The system operator also successfully planned and performed a large number of other outages this year. The Authority has no concerns with the system operator's performance in this area.

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

3.17 We are satisfied with the system operator's performance of its security of supply function.

3.18 In last year's performance review the Authority recommended that the system operator review the effectiveness of its security of supply practices. This was a deliberately open-ended recommendation with wide scope for interpretation and initiative.

3.19 In response to this recommendation, the system operator noted that it updated its analytical tools to "more easily consider and produce scenarios in response to changing conditions." We support the system operator's implementation of more tractable modelling tools, as the now defunct tools contributed to delays and errors.

3.20 The system operator has also committed to commission an external review of its practices to verify its improvements were implemented appropriately. We support this verification step.

The system operator's fuel supply modelling has improved

3.21 The availability of fuel is a key input to the system operator's security of supply modelling. Historically, this has primarily referred to hydrology, but more recently thermal fuel supply has become more unreliable and has therefore become a more relevant concern.

3.22 We consider that the system operator's modelling of any constraints on the ability of thermal plant to provide energy is now much better than in the past. However, the transparency around this area is still relatively limited because much of the information used by the system operator is supplied by participants on a confidential basis. The system operator must balance the need to respect the confidentiality of data with a requirement to publish future security of supply risks.

The system operator dealt with operational events competently

3.23 There were four separate loss of supply events in the 2020 financial year relevant to the system operator performance review:

(a) on 27 November 2019, there was an approximate 180 MW loss of supply to the Northland region while operating at N-security

(b) on 12 March 2020, a bus tripped causing a loss of supply to 157 MW of load in the Wellington region

(c) on 8 June 2020, towards the end of the morning peak, there was a loss of supply event affecting the Far North, due to a tripping of the Kaikohe-Maungatapere circuit 1, while circuit 2 was out of service for a protection upgrade

(d) on 8 June 2020, tripping of a transformer at Henderson during the evening peak coincided with planned outages of Ōtāhuhu-Mt Roskill circuits 1 & 2 and Albany-Wairau Road circuit 4. This resulted in approximately 40 MW of load having to be shed at Mt Roskill under a grid emergency.

3.24 As part of its SOSPA obligations, the system operator investigated these outages. The system operator's reporting was satisfactory. Our Market Monitoring team has an enquiry underway in relation to paragraph 3.23(d) above and will publish findings if anything substantive is identified.

3.25 The number of frequency excursions outside the 49.8 Hz to 50.2 Hz normal operating band was elevated in early 2020 due to the extended HVDC outage. Ignoring this period, the number of excursions was similar to previous years. The system frequency fell below 49.2 Hz only once during the review period, and this occurred during the same quarter as the HVDC outages.

3.26 SCADA availability was 99.98% during the period, which is well in excess of the minimum 99.90% performance metric. However, two SCADA system failures occurred on 31 October 2019, one of which was considered a 'Moderate incident' under the incident reporting process. The system operator identified two breaches of the Code as a result of the moderate incident. The system operator prepared a detailed report into the incident, which identified six recommendations for senior leadership teams to consider. The Authority is satisfied that the system operator has taken appropriate steps to learn from the incident.

The accuracy of third party data may present a security risk

3.27 The system operator relies on information from third parties, including data that it receives under the asset capability statement process. During the year in review this data has at times been inaccurate or incomplete, and at times asset owners have not provided data when they should have. This has led to some minor problems with system dispatch. The system operator has dealt with these problems well, but they highlight the potential for further such issues to arise.

3.28 We have recommended that the system operator reviews:

(a) its approach to monitoring the accuracy and compliance of third party information

(b) advises us of the findings of that review and any potential improvements to the relevant regulatory arrangements.

Recommendation 1: The system operator reviews its approach to monitoring the accuracy and compliance of third party information, and advises the Authority of the findings of that review and any potential improvements to the relevant regulatory arrangements.

The system operator's credible event review has continued

3.29 The system operator continued to investigate whether risks should be classified as a contingent event, an extended contingent event, or "other".

3.30 The system operator investigated the classification of busbar risk, and as a result the Manapouri bus was reclassified as an "other" risk, where previously it had been treated as an extended contingent event.

3.31 The system operator engaged well with the industry during this process. The Authority has no concerns about the outcomes of the review.

Transpower largely maintained the separation between the system operator and grid owner

3.32 Overall, we are pleased to see the system operator's ongoing commitment to maintaining independence from the grid owner. This was a key focus of the Authority's performance reviews in recent years. The system operator has improved the transparency of its active management of conflicts of interest.

3.33 However, the Authority is disappointed that the system operator's controls were insufficient to prevent Transpower as grid owner from sharing the same legal counsel in relation to an under-frequency event. We alleged a Code breach against the system operator, on the basis that it appears unlikely any other asset owner could have engaged the same legal counsel.

3.34 The system operator does not consider that the handling of the under-frequency event was a breach of the Code, but has implemented changes to prevent the situation from happening in the future.

The system operator has performed well in compliance-related areas

The system operator met its principal performance obligations

3.35 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 number of Code breaches continues to decline

3.36 The system operator self-reported 14 breaches of the Code during the review period. The Authority identified one additional breach of the Code, which has been accepted by the system operator. The total of 15 breaches continues the downward trend of breaches in recent years and is below the seven-year average of 18.

3.37 The system operator states that none of the breaches identified had a noticeable market impact. We understand this is because the majority did not affect final pricing, and those that did were negligible in magnitude.

3.38 However, the Authority notes that a majority of breaches affected real time pricing or real time dispatch schedules. The system operator was able to detect and rectify most of these breaches in the period between real time and the publication of final pricing schedules. With the introduction of real time pricing in the future, such a delay will no longer exist and therefore similar breaches would have more market impact.

The system operator reviewed documents incorporated into the Code by reference

3.39 The Code requires the system operator to regularly review various documents that are incorporated into the Code by reference.[2] The system operator submitted its regular two-yearly reviews of:

(a) the Policy Statement, and

(b) the Ancillary Services Procurement Plan.

3.40 The associated documentation was of acceptable quality. The Policy Statement was delivered on time. While the system operator believed—based on its interpretation of the Code—it had delivered the Ancillary Services Procurement Plan on time, it subsequently accepted our breach allegation that this was provided late.

3.41 The system operator also undertook an ad hoc review of the Security of Supply Forecasting and Information Policy (SOSFIP) during the period. The SOSFIP review documents were of good quality.

[2] 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).

4 Enabling a more efficient market

4.1 We work with the system operator to implement market improvements that achieve the Authority's statutory objective to "promote competition, reliable supply and efficient operation of the market for the long-term benefit of consumers."

4.2 The system operator made some excellent contributions to projects over the review period, including the real-time pricing (RTP) and extended reserves projects (ERP), which will help enable a more efficient market.

4.3 Additionally, the dispatch services enhancement (DSE) project is operational and has seen uptake by market participants.

4.4 However, the system operator's development of dispatch accuracy has been slower than ideal. Concerns were expressed by staff and some Authority Board members about the lack of progress.

4.5 Despite good progress overall, we were disappointed with some specific aspects of the RTP and ERP projects (see below). Both projects encountered unexpected problems that put pressure on timings and budgets.

Incorporation of disruptive technologies

4.6 While the system operator failed to deliver its 'future thinking' report within the review period,[3] we have been impressed with the system operator's openness to adapt to commercial and technological trends that are disrupting the status quo.

4.7 The system operator contributed to Transpower's *Whakamana i Te Mauri Hiko* report, outlining how New Zealand's electricity sector can help enable the decarbonisation of New Zealand's economy.

4.8 The system operator formally proposed amendments to its Ancillary Services Procurement Plan that make that plan more technology-neutral and publicly committed itself to further improvements. The system operator provided us valuable advice on opportunities to reduce or eliminate undue barriers to various distributed energy resources.

4.9 We look forward to working with the system operator on various initiatives to enable innovative technologies, acknowledging this will be an ongoing effort.

There is value in the system operator increasing its inhouse economic expertise

4.10 In previous review periods, we have had concerns with some aspects of the system operator's analysis of economic impacts and made recommendations accordingly. We have no specific concerns in this review period, though we remain of the view that economic considerations need to be embedded deeper into the system operator's skillsets and planning and operational processes.

4.11 We think the system operator's continued development in economics expertise augments and complements its traditional strength in engineering and operational disciplines.

Planned Outage Coordination Process review

4.12 The system operator undertook a review of the Planned Outage Coordination Process (POCP) and published the final report in March 2020. The review involved establishing a Technical Advisory Group (TAG) to investigate areas of possible improvement.

[3] It was published in August 2020

4.13 The system operator managed the TAG process well, acted efficiently as the secretariat and did significant work between meetings to ensure the review progressed at pace.

4.14 The review had widespread involvement from industry, and the system operator made effort to involve parties not directly represented on the TAG. Despite some differing views from TAG members, the system operator developed clear recommendations that had broad agreement from most members.

4.15 The system operator has augmented POCP with tentative grid owner outages. This provides useful information to industry. The Authority anticipates the implementation of other recommendations, as these will help increase the efficiency and robustness of outage planning across the sector.

The system operator continued to develop our real time pricing project

4.16 In general, the Authority is pleased with the system operator's performance on our RTP project. This continues last year's overwhelmingly positive feedback.

4.17 The system operator has appointed a dedicated project manager which has resulted in very focussed and organised management. Various parts of Transpower are involved directly as needed and this has made communication and milestone management far better. Project status reports are of high quality.

4.18 However, the Authority was disappointed with the delivery of the project business case.

(a) It was delayed by about three weeks. There was a mismatch of understanding of the project scope, with the Authority believing the scope included functionality the system operator had in fact excluded in its estimation process. The parties resolved that mismatched understanding by agreeing on a project change request.

(b) Of greater concern was that the eventual forecast capital cost greatly exceeded the initial budget and Authority staff were given limited warning that this was the case. The large increase in the estimated capital cost, combined with the late delivery made it difficult for Authority staff to respond and keep the project on track.

The extended reserves project was reactivated

4.19 ERP was reactivated in the 2020 financial year. The project has involved developing new relationships between the Authority and the system operator.

4.20 Based on system operator advice, we expected software services for the project could have been procured from either Transpower or an external provider. However, this expectation was not met when the system operator later advised of its strategic preference to use Transpower's IT services to provide the software.

4.21 The estimated cost of those services would have resulted in an overrun of the project budget based on initial forecasts. Ultimately, a solution was reached that satisfied the original budget, but the discussion triggered by this change delayed the start of the project. The system operator overcame this slow start and met the project milestones.

4.22 We realise that this IT provider preference was not solely under the control of the system operator. However, there could have been better communication during the change process. This would have allowed the required discussion to start earlier, reducing the impact on the project start date.

4.23 The Authority is optimistic that despite a slow start, the groundwork is in place to ensure satisfactory delivery of future targets.

The system operator's dispatch services enhancement project nears completion

4.24 The dispatch services enhancement (DSE) project is nearing completion. The new dispatch interfaces were successfully commissioned in August 2019. All participants must be transitioned by the end of December 2020.

4.25 The Authority has had less input to the project during the final stages and has primarily played a supervising role. The system operator has contributed well to project meetings and provides fortnightly written updates or as required.

4.26 A contradiction in the SOSPA led to a dispute about whether our approval was needed for some DSE project costs. The parties were able to resolve the issue and reach a mutually acceptable agreement. The Authority considers this to be a positive outcome, as it demonstrates the ability to work together constructively to resolve a contractual dispute.

New wind offer arrangements went live

4.27 The new wind offer arrangements went live on 19 September 2019, enabling wind generation to be offered in the same way as other generation is offered into the market.

4.28 The implementation had a minor bug that had to be fixed after commissioning. The system operator responded promptly and fixed the problem quickly. The Authority considers that the system operator acted appropriately and is pleased with the delivery of the project.

5 Improving the system operator's service

5.1 The system operator is a service provider to the Authority contracted under a service provider agreement (SOSPA). Part of that agreement covers this review process, which aims to continually improve the service provided by the system operator.

5.2 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.

5.3 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.

5.4 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.

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

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

5.6 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.

5.7 The Authority and the system operator have good processes in place for escalating any disputes that arise. This process works well when required, and management-level staff have good working relationships.

5.8 The system operator's contribution to the Security and Reliability Council (SRC) is also valuable. They came to meetings prepared, and numerous papers were prepared and presented well.

5.9 We look forward to further strengthening the working relationship with the system operator and intend to initiate a review of the relationship charter during the 2020-21 year.

5.10 The system operator and the Authority have a schedule of regular meetings. These include:

(a) Joint Work Planning Team meetings

(b) monthly Management meetings

(c) regular "one on one" meetings at the manager, general manager and chief executive level.

5.11 The system operator contributes well to the meetings and their written reporting is useful.

Overall, we were impressed by the performance of system operator staff

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

5.13 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, though we note some concerns over financial forecasting of projects below in paragraphs 5.20-5.23.

5.14 The system operator's engagement with working groups and other industry meetings has been a highlight. System operator representatives are well prepared, knowledgeable and contribute to discussions. The system operator also provides a range of attendees to assist with providing a broad coverage of all areas of interest.

5.15 In general, the quality of the system operator's written work has been of a high standard. On the few occasions when the written work was been below the usual standard this was when the system operator has had limited time to prepare and has instead focussed on providing the deliverable on a tighter-than-usual timeframe.

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

Financial forecasting

5.17 We acknowledge the complexity involved, but believe the system operator could do better with financial forecasting.

5.18 The system operator spent 79% of its fixed fee capex budget over the four-year 2016-17 to 2019-20 period. Contributing factors to this underspend result were cancellation and deferral of some projects, reprioritisation of projects and some efficiency gains. The single biggest factor appears to have been an overly conservative forecast. As this was the first period in which the system operator operated under a fixed fee for capex, some conservatism is expected as the system operator gained the experience necessary to fully understand the risk of overspend within a fixed fee.

5.19 We believe this variance will be significantly smaller in future years, as the system operator has shown us it more accurately understands its risks and has grounds for more confidence in its programme and project management.

5.20 We also occasionally found it difficult to track capex changes when projects were split up, combined or cancelled. The Authority has requested more consistency over the next four-year period.

5.21 While total capex within the fixed fee paid by the Authority was underspent in aggregate over four years, the RTP project experienced significant cost overruns during this review period. The Extended Reserves project experienced a period of cost uncertainty during the review period. Both the RTP and Extended Reserve projects are charged at actual cost and are in addition to the fixed fee.

5.22 The performance metric for "accurate capital planning" was not met.

5.23 Overall, we consider that these factors suggest a focus on tighter financial forecasting of projects would be beneficial.

Recommendation 2: The system operator improve its financial forecasting of projects.

The system operator's self-review

5.24 The system operator's self-review provides a comprehensive assessment of its activities through the financial year. While we have no doubts about the accuracy of factual content, the evaluative material seems overly positive at times, rather than being a candid reflection on its performance.

5.25 The Authority is confident that the system operator learns from its mistakes and continually strives for improvement. However, we believe that there is opportunity for the system operator to better communicate its experiences in this area.

Recommendation 3: 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.

5.26 The system operator was receptive to some minor opportunities for improvement we identified for future system operator self-reviews.

6 Learning from others

6.1 The system operator has a highly specialised role with skilled staff. We believe there is opportunity for the organisation to learn from others, particularly industry stakeholders who may have useful insight into specific aspects of the electricity system.

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

(a) performance in working and advisory groups, including contributions to the Market Development Advisory Group and the POCP TAG, and

(b) closer working relationship with the gas industry, ensuring that the system operator was kept up to date with gas outages and could plan accordingly.

6.3 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 very good.

The system operator received good feedback in the customer satisfaction survey and increased response rate

6.4 The system operator's customer satisfaction survey showed that 92 per cent of survey respondents rated the system operator's service as 'very good' or 'good'. This exceeded the performance metric target of 81 percent. This result is higher than last financial year (85 percent), and similar to the year before that (93 per cent).

6.5 Encouragingly, the number of responses increased by 50% compared to last year. The system operator made a conscious effort to increase the number of channels for participants to provide feedback, and this appears to have been successful.

6.6 The system operator made some improvements to its processes to get more meaningful participation in its customer satisfaction survey. These improvements included providing a point of contact for respondents should they need to clarify anything and including an option for respondents to add further commentary and/or questions.

Input from industry

6.7 The system operator puts considerable effort into communicating with industry, including workshops, one-on-one meetings, and improving its online interfaces. It both receives feedback and provides information through these avenues, and the Authority is happy with the system operator's efforts in this area.

6.8 The Authority encourages the system operator to provide more examples of how it has listened to industry participants in its self-review. Such commentary would be helpful to assure industry participants that their input is valuable.

The system operator has learned lessons from international events

6.9 The system operator has studied the reports of power system disruption events in different jurisdictions. In the review period, the system operator reviewed reports on:

(a) a large event on the Australian National Energy Market (NEM) that separated the power system into three islanded regions

(b) a major loss of power in the United Kingdom impacting over 1 million customers

(c) a major blackout in South America

6.10 Although there are large differences between these power systems and New Zealand's the system operator identified numerous recommendations from the reports that may be relevant to the New Zealand context.

6.11 The Authority supports the system operator's continuing to study and learn from international events. This is a valuable way to better understand the risks presented by very rare events, which are otherwise very difficult to assess in a small power system such as New Zealand's.

7 Financial performance

This year, decreases in operating expenditure have increased 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 2019/20 financial year included a 5% decrease in operating expenditure that contributed to its highest regulatory profit in the last five financial years (see Table 3 below).

Table 3: Changes to system operator's financial information in 2019/20

Financial measure	Changed by ($M)	Changed to ($M)	Percent change	Reasons for change
Revenue	$0.8 ↑	$41.9	1.9% ↑	An increase in the capex fee component of revenue explains most of the increase, which was due to the DSE project being commissioned in the year. Revenue from technical advisory services decreased in the year. Revenue was also increased due to inflation adjustments to both opex and capex fees.
Operating expenditure	$1.1 ↓	$21.4	5.1% ↓	Operating expenses fell in all three categories of expenses the system operator reports. Of the decreases, $0.7M related to a change in accounting practices that now treats operating leases as fixed assets. Relative to the 2017/18 year, operating expenses rose.
Depreciation	$0.3 ↑	$9.1	3.4% ↑	As forecast, depreciation increased slightly this year, though it is still only ~60% of depreciation in the 2016/17 year.
Regulatory profit (after tax)	$1.6 ↑	$8.0	25.8% ↑	Regulatory profit includes revenue, operating expenditure and depreciation. The change in accounting practices for operating expenditure (see above), and the commissioning of DSE were the main contributors to the system operator's highest regulatory profit in the last five years.

7.2 The system operator's 'vanilla' return on investment rose from 26.7% to 31.5%. It was a busy year for asset commissioning, which rose from $6.1 million to $17.2 million and increased the asset base.

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. 2019/20 is the fourth 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

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 Opportunities to improve the Authority's monitoring of system operator performance

The Authority is keen to investigate alternative ways to further improve the measurement of performance

A.1 The performance metrics are a useful tool for quantifying system operator performance. They are well refined and encourage efficient behaviour from the system operator in the areas they address.

A.2 However, we believe that the current implementation is limited in that it is only based on outcomes that can be measured within a year. Much of the system operator's function is maintaining equipment and preventing adverse outcomes from happening over significantly longer time frames. For example, the system operator needs to ensure black start procedures are robust, despite hopefully never having to use them in practice.

A.3 Properly assessing performance on functions of this nature is a difficult challenge. We are developing our expertise in this area, and we may look at more significant changes to the performance metric system if it can be improved.

A.4 We will consider the practice of using performance measures and how they fit into the wider performance review once we have undertaken our international review process.

We intend to learn from other regulators in similar positions

A.5 Reviewing the performance of a system operator is inherently challenging, as it is a complex role with many highly specialised tasks that require significant levels of judgement. These factors make it more difficult for an 'outsider' to review performance.

A.6 Furthermore, a key aspect of performance is how well prepared a system operator is to manage a large unexpected system events such as sudden multiple generator failures. Such a triggering event should be inherently rare, making it harder to directly assess the preparedness or responsiveness of a system operator to this type of risk. Instead, indirect measures of performance need to be considered such as the quality of planning and contingency measures, and lessons from near miss events and events from other jurisdictions where the lessons are relevant (or adaptable) to the New Zealand context.

A.7 Given these factors, it is easy to focus on aspects of performance which can be more readily measured, but we are mindful that these might not capture the aspects which are of greatest importance.

A.8 With this in mind and to improve the effectiveness of future review processes, we have reached out to other international regulatory bodies that undertake a similar role. We are not as yet able to present any lessons or improvements from this, but look forward to learning how we can better perform our system operator review process.

A.9 We welcome stakeholders contacting us about problems with, and/or suggestions for, our reviews of system operator performance. Please contact us via marketoperations@ea.govt.nz to arrange a time to discuss.

The Code sets out minimum requirements for our reviews

A.10 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.11 The above requirements provide some scope for flexible approaches. As such, we have no plans to review these Code clauses.