

Transpower's individual price-quality path from 1 April 2020

Draft decisions and reasons paper

Date of publication: 29 May 2019



Associated documents

Publication date	Reference	Title
28 February 2017	1178-2560	<u>Transpower Input Methodologies Determination 2010 [2012] NZCC 17, as amended and consolidated as at 28 February 2017</u>
28 November 2018	978-1-869456-27-6	<u>Transpower Individual Price-Quality Path Determination 2015 [2014] NZCC 35, as amended and consolidated as at 26 November 2018</u>
1 June 2018	978-1-869456-39-9	<u>Transpower Capital Expenditure Input Methodology determination 2012 [2012] NZCC 2, as amended and consolidated as at 1 June 2018</u>
25 October 2018	978-1-869456-63-4	<u>Our process, framework and approach for setting Transpower's expenditure allowances, quality standards and individual price-quality path for 2020 to 2025</u>
7 February 2019	978-1-869456-82-5	<u>Transpower's individual price-quality path for the next regulatory period - Issues paper</u>

Commerce Commission
Wellington, New Zealand

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Executive Summary

Purpose of this paper

- X1 We are in the process of setting the individual price-quality path (**IPP**) for Transpower New Zealand Limited (**Transpower**) for the next regulatory period from 1 April 2020 to 31 March 2025 (referred to in this paper as **RCP3**). The IPP we are setting will be Transpower's third IPP.
- X2 We are required to set Transpower's IPP under Part 4 of the Commerce Act 1986 (**Part 4**).
- X3 Transpower's IPP, which we determine under Part 4, sets the maximum revenues that Transpower can recover from its customers for its electricity transmission services, as well as the minimum quality standards it must meet for those services, for each year of the regulatory period.
- X4 Rules and processes, referred to as input methodologies, apply to how we set the IPP and how Transpower must comply with it. The price-quality path relates to the transmission services provided by Transpower and excludes system operator revenues.
- X5 This paper provides our draft decisions and supporting reasons for:
- X5.1 our intention to use Transpower's existing IPP as a starting point and how the price-quality path is evolving;
 - X5.2 the enhancements we plan to make to Transpower's existing IPP;
 - X5.3 how we will calculate Transpower's smoothed maximum allowable revenue (**SMAR**) for each year of RCP3, and the effect of incentive mechanisms on Transpower's revenues;
 - X5.4 draft values for key inputs to the IPP, as required by the Commerce Act 1986 (the **Act**), the Transpower Capital Expenditure Input Methodology (**Capex IM**) and the Transpower Input Methodologies (**Transpower IM Determination**);^{1, 2} and

¹ *Transpower Capital Expenditure Input Methodology Determination 2012* [2012] NZCC 2, as amended and consolidated as at 1 June 2018.

² *Transpower Input Methodologies Determination 2010* [2012] NZCC 17, as amended and consolidated as at 28 February 2017.

- X5.5 how we intend to set Transpower’s reporting obligations, including requirements to report on performance against the price path and quality standards, performance measure development, and business improvement initiatives.
- X6 In this paper we invite you to provide your written views within the following timeframes:
- X6.1 Submissions are due by 5pm, Thursday 27 June 2019; and
- X6.2 Cross-submissions on matters raised in submissions by other parties are due by 5pm, Thursday 11 July 2019.
- X7 Although this paper is principally focussed on the decisions we are required to make for RCP3, we are conscious that RCP3 sits in the context of potentially challenging grid investment decisions faced by Transpower in future periods beyond RCP3. We have therefore made draft decisions, particularly on reporting and engagement by Transpower with interested persons, on a forward-looking basis. That forward-looking focus has resulted in our draft decisions to approve modest expenditure by Transpower in RCP3 that would allow Transpower to prepare for those later periods.
- X8 This paper does not include a draft decision in respect of the calculation of the ‘baseline adjustment term’ which is required to be made in RCP3 to determine the value of a recoverable cost.³ We are continuing to evaluate Transpower’s proposed calculation of a forecast amount for inclusion in the RCP3 price path and will consult separately with interested persons on the results of our analysis. We note that the estimated annual revenues shown in this paper include Transpower’s estimate of this recoverable cost in its \$103 million of IRIS recoverable costs. Our own estimate may materially change from Transpower’s estimate.

³ In our 2015/16 IM review decisions, we set out our final decision on the approach to determining the baseline adjustment term. That decision left open the option for us estimating the amount now or during RCP3. The latter option was considered to lead to reduced error/greater accuracy in the calculation model than estimating it now. However, with the smoothing of the RCP3 price path (inclusive of forecast recoverable costs), it is necessary to calculate a preliminary estimate now and potentially wash that up with a more accurate number during RCP3. The current issue is what that preliminary estimate should be. Commerce Commission “Input methodologies review final decision: Transpower Incremental Rolling Incentive Scheme” (29 June 2017), at Chapter 4.

Effects of our draft expenditure decisions

- X9 We consider that the proposed RCP3 price path would promote the long-term benefit of consumers if electricity retailers and local lines companies pass on to retail consumers the price reductions from Transpower. Transpower will pass on to its customers most of the reduction in the WACC rate in transmission charge reductions for RCP3. This will still provide Transpower with the expenditure it needs in RCP3 to meet the quality of service demanded by consumers.⁴
- X10 Table X1 shows our estimated values for the total annual RCP3 revenue we would set for Transpower in November 2019 based on a smoothed price path over RCP3.
- X11 The revenue numbers provided in Table X1 were calculated using the financial model for RCP3 that was provided to us with Transpower's proposal.⁵ These numbers exclude the future revenue relating to unapproved major capex projects and listed projects that we may later approve in the course of RCP3.
- X12 We have made simplifying adjustments to the proposal model to provide estimated revenue results that reflect our draft expenditure decisions.^{6, 7, 8}

⁴ Retail electricity 'consumers' pay for their electricity transmission services through their bills from their electricity retailer or their local lines company, depending on their billing arrangements. Those consumers receive their services from the national grid through lines company networks. Their retailers and lines companies are Transpower's 'customers' and the pricing benefit passed on to consumers is a decision of those customers. Transpower's customers also include electricity generators and large commercial electricity customers that are connected directly to the national grid, rather than through a lines company network.

⁵ On 23 November 2018, we received Transpower's proposal setting out its forecast expenditure and proposed grid output measures for RCP3 (**Transpower's proposal**). Transpower's proposal and supporting documents are available on Transpower's website at: <https://www.transpower.co.nz/keeping-you-connected/industry/rcp3>.

⁶ The final numbers for the maximum allowable revenue for each pricing year in RCP3 will be calculated by Transpower later in 2019 on completion of our consultation process on our draft expenditure decisions. They will be audited and will be signed off by Transpower's directors. We will then include them in the IPP determination.

⁷ The significant simplifying assumption is the use of the most recent WACC rate for electricity distribution information disclosure as an indicator of what we think the WACC rate might be when we finalise it for RCP3 in October 2019. Transpower used an estimated WACC rate of 5.5% in its November 2018 proposal and the WACC rate we are using for this modelling of the price path is 5.13%.

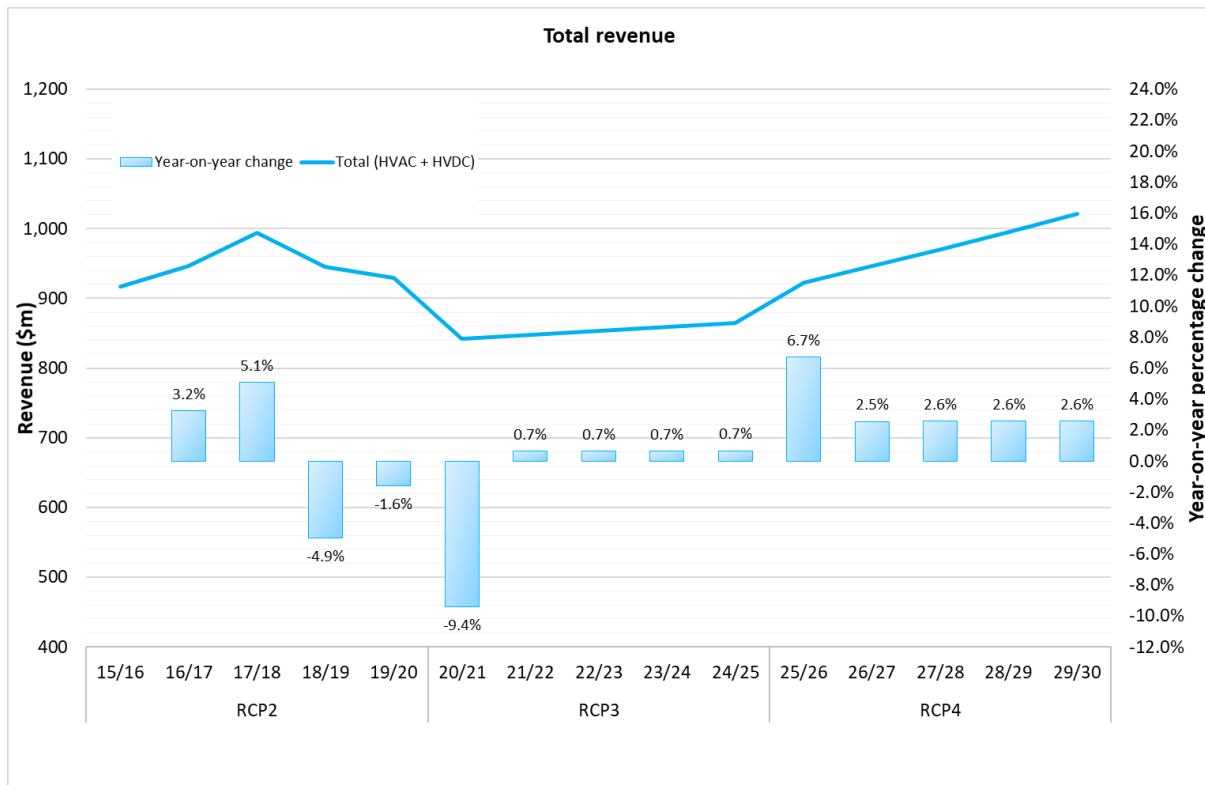
⁸ Transpower's financial model reflects a view on how operating leases might be treated in RCP3. For this estimated revenue purpose we consider this acceptable. However, we have indicated to interested persons that we intend to separately consult on a cross-sector basis on whether our input methodologies should follow GAAP accounting in this respect for the setting of price-quality paths, incentives and information disclosure.

Table X1 Total estimated annual RCP3 maximum allowable revenue

Year	Proposed by Transpower	Estimated based on our draft decisions
	\$m	\$m
2020/21	866	842
2021/22	875	848
2022/23	884	853
2023/24	893	859
2024/25	902	865

X13 Figure X1 shows the estimated annual revenues against the second regulatory period (RCP2) numbers, and on current estimates of the next regulatory period (RCP4).^{9, 10}

Figure X1 Estimated price path for RCP3 in context of RCP2 and a potential RCP4 scenario¹¹



⁹ Although not required by the Capex IM, in its proposal Transpower has estimated a WACC rate for RCP4 of 5.67%. We have also used this as an estimate for illustrative purposes only. It does not reflect any future decision by us in determining the WACC rate for RCP4.

¹⁰ Note that we are required by the Act to make draft decisions for RCP3, not RCP4, so this is just provided to give context for our RCP3 draft decisions using estimated extrapolations of expenditure and revenue looking forward.

¹¹ Figures X1 to X5 were generated using Transpower’s revenue model, with minor modifications to reflect our draft decision.

X14 Figure X2 and Figure X3 break down the estimated price path between Transpower’s high-voltage alternating current (**HVAC**) customers (generally impacting end consumers) and high-voltage direct current (**HVDC**) customers (generally affecting gentailers).

Figure X2 Estimated price path for RCP3 as applied to HVAC customers

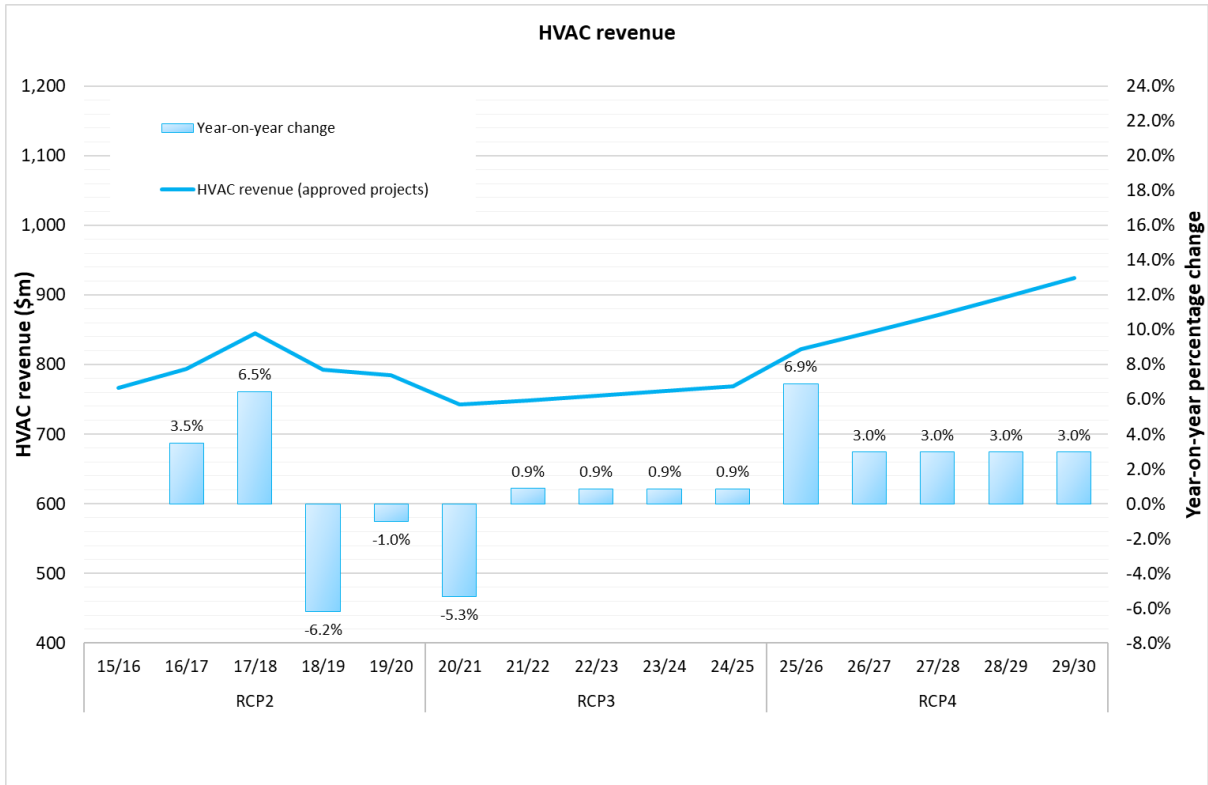
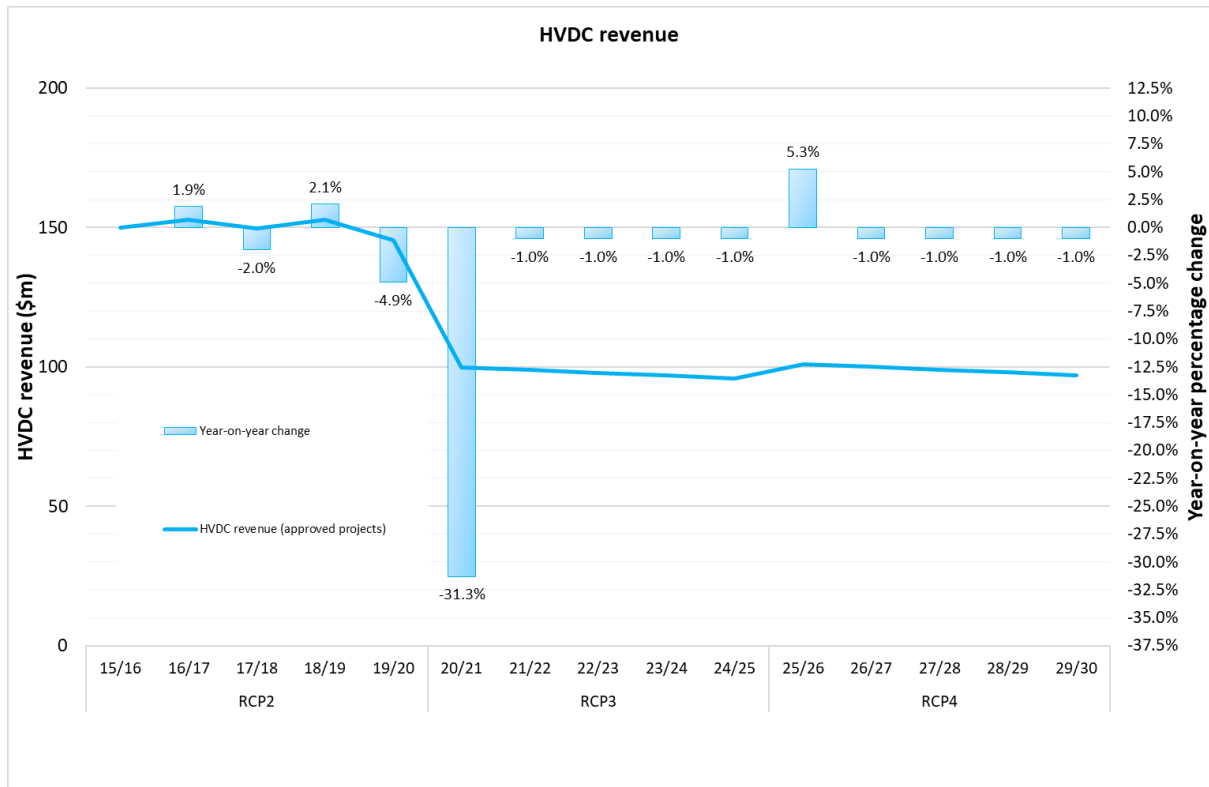


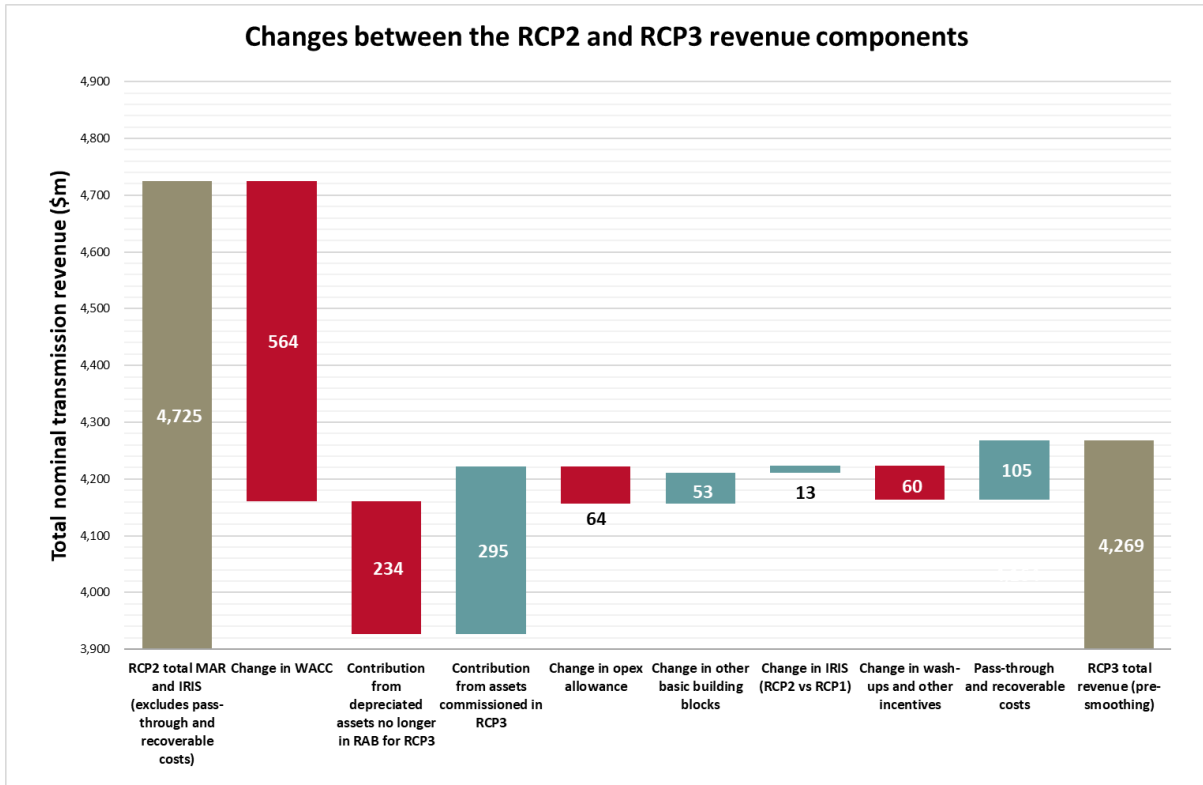
Figure X3 Estimated price path for RCP3 as applied to HVDC customers



X15 We set out in Figure X4 our estimates of the movements in Transpower's total allowed revenue for RCP2 to the forecast total revenue for RCP3 shown in Table X1. The key reduction in allowable revenues is a result of the significant reduction in the RCP2 weighted average cost of capital (**WACC**) rate of 7.19% to the estimated RCP3 WACC rate of 5.13%. This is mainly due to the decline in interest rates over RCP2.¹²

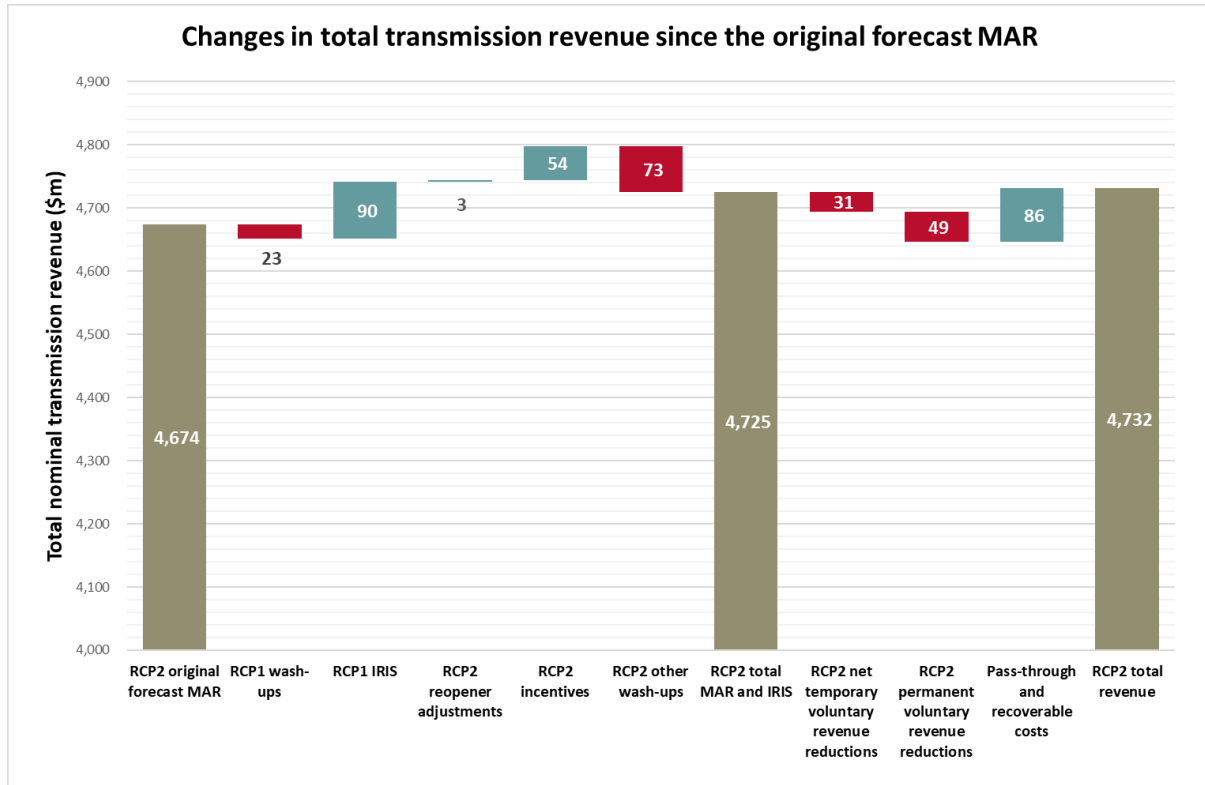
¹² As a result of our draft decision to combine the forecast maximum allowable revenue with the forecast pass-through costs and forecast recoverable costs for the purposes of Transpower's recovery of each of these in the smoothed price path in RCP3, the revenue components in Figure X4 compare the RCP2 total MAR and IRIS amounts exclusive of pass-through costs and recoverable costs with the RCP3 total revenue inclusive of the forecast pass-through costs and forecast recoverable costs. Figure X5 shows the variance between the original forecast MAR and the RCP2 total MAR and IRIS amounts exclusive of pass-through costs and recoverable costs. Figure X5 also shows how this latter number reconciles with the total amount that Transpower charged customers, including charges for pass-through costs and recoverable costs, and then adjusted for one-off voluntary revenue reductions.

Figure X4 Waterfall of key elements of forecast total revenue for RCP3 draft decision versus RCP2 total revenue



X16 We set out in Figure X5 the key elements of how Transpower has performed against its original RCP2 forecast total allowable revenue, which demonstrates that the differences between forecasts and actuals applied in the RCP2 IPP was relatively minor. The final RCP2 revenue number in Figure X5 is the starting revenue number of Figure X4.

Figure X5 Waterfall of key elements of Transpower's performance against RCP2 forecast total allowable revenue



X17 Key non-financial draft decisions we are proposing in the interests of consumers, that we consider will support Transpower to efficiently move forward in RCP3 and to future periods, include:

X17.1 for asset management:

X17.1.1 a requirement on Transpower to produce a roadmap for further developing asset and network risk modelling, combined with a requirement to report annually on implementing asset health models, risk-based decision-making frameworks, and asset life-extension models;

X17.1.2 a mid-period independent expert report on the further development of the asset health and criticality modelling in RCP3, focussed on the significant step up in replacement investment in key assets expected in RCP4; and

X17.1.3 an annual disclosure of how Transpower would have performed in relation to a pilot incentive scheme for asset health;

X17.2 for consumer consultation:

X17.2.1 a requirement on Transpower to publish a customer engagement plan by 1 October 2020;

- X17.2.2 a requirement on Transpower to report annually on the extent and effectiveness of its consultation in relation to actual capital expenditure;
 - X17.2.3 a requirement on Transpower to publish post-project reviews for significant capital expenditure projects; and
 - X17.2.4 Transpower to obtain a mid-period independent expert opinion on its proposed customer engagement process leading up to its RCP4 proposal; and
- X17.3 for cost estimation:
- X17.3.1 Transpower to report annually for completed projects on variances between cost estimates in its capital expenditure proposals to us and the cost estimates in project delivery business cases.
- X18 The reason for the particular focus at this time on future periods beyond RCP3 is that Transpower has signalled a scenario for RCP4 and the following regulatory period (**RCP5**) that would require a noticeable step up in replacement of transmission assets, particularly transmission line conductors, based on their condition.
- X19 We are not required to make decisions at this time for RCP4 and RCP5 and we expect the scenario to be more refined as a result of our RCP3 draft decisions and before we are required to make our RCP4 decisions in 2024. We also tried to ensure that Transpower will have enough expenditure allowed for in RCP3 to carry out planning for investment and consultation with interested persons for its RCP4 scenario.
- X20 More details on each of these non-financial draft decisions are included in Chapter 2, and in Attachment K (Consumer engagement), Attachment L (Asset management) and Attachment H (Cost estimation).

How we went about making our draft decisions

- X21 On 23 November 2018, Transpower submitted to us a quality and expenditure proposal as required by the Capex IM. The proposal included Transpower's proposed operating expenditure (**opex**) and base capital expenditure (**base capex**) allowances, and grid output measures for RCP3.
- X22 Alongside its proposal, Transpower also submitted a report from Synergies Economic Consulting and GHD Advisory (together the **Verifier**) setting out an independent opinion on Transpower's proposal (**Verifier report**).¹³

¹³ Synergies Economic Consulting & GHD Advisory "Independent Verification Report – Transpower's RCP3 Expenditure Proposal (2020-25)" (12 October 2018).

- X23 In reviewing Transpower’s proposal and reaching our draft decisions we have applied the Part 4 purpose, the Capex IMs and the evaluation criteria set out in Attachment B of this paper. Our review also took into account the Verifier’s recommendations to us and an initial consultation process through our process, framework and approach paper of 25 October 2018 (**Process paper**) and our issues paper of 7 February 2019 (**Issues paper**).^{14, 15}
- X24 In assessing Transpower’s proposal, we are guided by whether the proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier of electricity transmission services.¹⁶ This concept is consistent with the purpose of Part 4, which is also a required consideration under the capex evaluation criteria in the Capex IM.
- X25 In applying the concept, we consider that a ‘prudent supplier’ is a supplier whose planning and performance standards reflect Good Electricity Industry Practice (**GEIP**). A useful definition of GEIP, in relation to electricity transmission services, is found in the Electricity Industry Participation Code 2010 (**Code**).¹⁷
- X26 A description of the use of the verification process to support our review of Transpower’s proposal is described in Chapter 2 of this paper. How we applied the Verifier’s opinion in coming to our draft decisions is described in each of the supporting attachments of this paper. This is the first time we have used verification to help us with our IPP evaluation and we consider this has been a useful and effective process by aligning Transpower’s proposal to the expenditure outcome and in helping to inform our assessment process.
- X27 Key steps in our review included:
- X27.1 our consultation with interested persons on our process for evaluating Transpower’s proposal through our Process paper;
 - X27.2 our initial review of Transpower’s proposal and the associated Verifier report;
 - X27.3 our review of Transpower’s financial model and its estimated revenue outputs for RCP3;¹⁸

¹⁴ Commerce Commission “Our process, framework and approach for setting Transpower’s expenditure allowances, quality standards and individual price-quality path for 2020 to 2025” (25 October 2018).

¹⁵ Commerce Commission “Transpower’s individual price-quality path for the next regulatory period – Issues paper” (7 February 2019).

¹⁶ For more information on the expenditure outcome see Chapter 5 in our Process paper.

¹⁷ The Code is available at: <https://www.ea.govt.nz/code-and-compliance/the-code/>.

¹⁸ Attachment E describes the financial model and how we have used Transpower’s financial model to demonstrate the estimated financial effects of the draft decisions in this paper.

- X27.4 our request for the views of interested persons on identified issues through our Issues paper; and
- X27.5 our identification of areas for further work on Transpower’s proposal. We issued Requests for Information (**RFIs**) to Transpower to enable us to do that work.
- X28 In our review we identified that Information and Communication Technology (**ICT**) opex and ICT capex were areas where neither we nor the Verifier were able to conclude whether the proposed expenditure met the expenditure outcome. We engaged Energy Market Consulting associates (**EMCa**), an expert consultant with expertise in the areas of ICT expenditure and cybersecurity to review this expenditure.¹⁹
- X29 Transpower’s proposal and the Verifier report can be found on our website at <https://comcom.govt.nz/regulated-industries/electricity-lines/electricity-transmission/transpowers-price-quality-path/setting-transpowers-price-quality-path-from-2020#projecttab>.
- X30 Our consultation documents are also available on our website, and we will shortly publish EMCa’s report on Transpower’s ICT expenditure.

Key draft decisions

- X31 We have made draft decisions on the following key inputs:
- X31.1 the grid output measures and quality standards for RCP3;
- X31.2 Transpower’s opex and base capex allowances for each year of RCP3; and
- X31.3 the incentive rates that will apply to Transpower’s incentive mechanisms.
- X32 Apart from ICT expenditure, our draft adjustments to the expenditure proposed by Transpower are relatively modest. We attribute this to the effect of the Verifier providing constructive feedback to Transpower to enable it to better align its proposal with the expenditure outcome before the proposal was submitted to us.
- X33 The report from our expert on ICT expenditure recommended that we make expenditure adjustments to the proposed ICT expenditure. We have considered this recommendation and have made draft decisions to reduce the capex and opex allowances for RCP3 ICT expenditure.

¹⁹ EMCa was engaged through our expert consulting contract with Strata Energy Consultants Limited.

- X34 Our draft decisions on the quality standards and grid output measures build on the grid output measures proposed by Transpower. These are part of a continuing refinement of these standards and measures over time.

Quality standards and grid output measures

- X35 Our draft decisions on quality of service set:

X35.1 quality standards specific to each of the performance measures, which is an enhancement on the approach of RCP2, where the quality standards were set to the 'target' values on the grid output measures;

X35.2 quality standards with revenue-linked grid output incentive measures, which include a requirement to comply with the quality standard and will also provide Transpower with financial incentives.²⁰ Our draft decisions put 1.46% of revenue at risk for Transpower under these measures;

X35.3 quality standards with no revenue-linked grid output incentive measures, which include a reporting requirement only;

X35.4 quality standards with 'shadow' revenue-linked grid output measures for a key development area (asset health), which include compliance requirements and will enable us to evaluate the measures over time for possible implementation as future revenue-linked measures;

X35.5 shadow quality standards for some potential grid output measures and a customer service measure, which will allow us to evaluate these for future implementation as quality standards;

X35.6 a 'pooling' approach to compliance for the grid performance quality standards, which allow Transpower to group the compliance and non-compliance with certain quality standards together when considering overall whether enforcement action by us will apply; and

X35.7 quality standards with a 'deadband' zone between the collar value of the grid output measure and the quality standard where we consider it appropriate to reduce the risk of breaches for quality standard variations outside of Transpower's control.

- X36 Subject to the application of the pooling approach to determining a breach of quality standards, we may take enforcement action for breaches of quality standards.

²⁰ A breach of the quality standard may involve us taking enforcement action, which may involve a penalty in addition to any incentive amounts.

Capital expenditure and operating expenditure allowances

X37 We have made draft decisions to set nominal values for the opex and base capex allowances for each year of RCP3. Consistent with RCP2, the base capex allowance does not include any amounts of base capex for 'listed projects.' Indicative amounts for these proposed listed projects are set in a schedule to the draft IPP determination. The capex amounts for these projects, if they proceed in RCP3, will be more accurately quantified during RCP3 as we then consider and approve the base capex of these projects.

X38 Our draft decision is to not allow Transpower the full amount of its proposed base capex. This is because we found aspects of its proposal that we considered did not meet an expenditure outcome consistent with the evaluation criteria described above in paragraphs X23 and X24. In our draft base capex decisions, we have adjusted the proposed base capex allowance for RCP3 down by \$50.0 million due to the following:

X38.1 Enhancement and development expenditure reduced by \$17.4 million; and

X38.2 ICT capex reduced by \$32.6 million.

X39 Our draft decision is to not allow Transpower the full amount of its proposed opex. This is because we found aspects of its proposal that we also considered did not meet an expenditure outcome consistent with the evaluation criteria described above in paragraphs X23 and X24. In our draft opex decisions we have adjusted the opex allowance for RCP3 by \$39.3 million for reductions due to the following:

X39.1 Predictive maintenance expenditure reduced by \$13.2 million;

X39.2 Business support expenditure reduced by \$5.9 million;

X39.3 Insurance expenditure reduced by \$19.8 million; and

X39.4 Asset management and operations (**AM&O**) expenditure reduced by \$0.4 million.

X40 Our draft capex decisions do not include any allowance for further development of the transmission pricing methodology (**TPM**) because the development, timing and amount of expenditure necessary to make that development happen is still not sufficiently certain. However, it appears likely that Transpower will need to respond to finalisation of updated TPM guidelines at some time during RCP3 by making changes to the TPM. An adjustment to the capex allowance may be required during the regulatory period to accommodate this at the request of the Electricity Authority, which is permitted under the Act.²¹

Revenue path design

X41 We have used Transpower’s existing IPP as a starting point for our draft decisions on determining the maximum revenues that Transpower can recover from its customers. Our draft decisions are that:

X41.1 the RCP3 regulatory period will be for five years;

X41.2 Transpower’s forecast maximum allowable revenue (**forecast MAR**) will continue to be calculated using a “building blocks approach” with a “MAR wash-up”;

X41.3 forecast pass-through costs and recoverable costs will be added to the forecast MAR to arrive at the forecast revenue that Transpower can recover from its customers; and

X41.4 the MAR wash-up will correct for any over- or under-recovery from customers owing to, for example, the timing of capex commissioning differing from the forecast timing.

X42 We are proposing enhancements to the RCP2 IPP to better promote the purpose of Part 4. Key changes we are proposing from RCP2 to RCP3 are:

X42.1 updated incentive mechanisms will apply to the base capex and quality standards, in accordance with the Act and as provided for by the Capex IM;

X42.2 a smoothed price path will apply for RCP3, which we consider would help limit volatility in Transpower’s revenues; and

²¹ Under s 54V(5) of the Act, the Electricity Authority may request us to reconsider the price-quality path to take account of a decision made by the Authority in respect of any provision of the Code that relates to or affects the pricing methodologies applicable to Transpower (see also s 54V(4)(a)).

X42.3 to simplify the annual revenue-setting and price-setting processes, we will not ordinarily reopen the price path each year as we did in RCP2.²² Our draft decision is that we will include a forecast of the revenue adjustments in the forecast revenues at the start of RCP3. The wash-up of the forecast values into actual adjustments to revenue will be carried forward and will be included in the price path for the next regulatory period.

X43 We will not finalise Transpower's IPP until November 2019, as Transpower's final WACC is needed to calculate maximum revenues. We are required to determine the WACC rate for RCP3 by 30 September 2019, and then we must publish the WACC rate within a month.²³

Compliance and information reporting requirements

X44 To demonstrate compliance with the IPP, under our draft decision Transpower will be required to publish:

X44.1 a director-certified pricing compliance statement with auditor assurance each December when setting its customer charges for each upcoming pricing year; and

X44.2 a director-certified annual compliance statement and an audit opinion within 80 working days of the end of each disclosure year.

X45 Under our draft decisions Transpower would be also required to publish:

X45.1 an expert report within 80 days of the end of the disclosure year in cases where an individual quality standard is not complied with, but a breach of the quality standards requiring enforcement action by us is deemed not to occur due to the quality standard pooling approach. The reporting will give us and interested persons insights across RCP3 on how Transpower is progressing against the quality standards;

²² The price path reconsideration provision (ie, the reopener rules) is contained in the Transpower IM Determination. We are consulting separately with interested persons on amending the price path reopener provision to allow an application for reopening the price path if the EV account balance builds up (in either Transpower's or customers' favour) to a point where the future spreading of that balance is likely to cause a future price shock effect.

²³ For an explanation of the timing requirements for our WACC determinations see: Commerce Commission "Guidelines for WACC determinations under the cost of capital input methodologies – Regulation under Part 4 of the Commerce Act 1986" (30 April 2018), available at: https://comcom.govt.nz/data/assets/pdf_file/0021/91191/Guidelines-for-WACC-determinations-under-the-cost-of-capital-input-methodologies-30-April-2018.PDF.

- X45.2 in cases where the quality standard and collar value of the grid output measure are set at different values, an expert report within 80 days of the end of the disclosure year in cases where the quality standard is complied with but the grid output measure value is outside the collar of the incentive range;
- X45.3 expert reports within 80 days of the end of each disclosure year in cases where the grid output measure value is outside the collar of the incentive range, but a breach does not happen under the quality standard pooling approach, which will give us and interested persons insights across RCP3 on how Transpower is progressing against the quality standards;
- X45.4 information for interruptions over 12 hours, interruptions over one system minute, and momentary interruptions;
- X45.5 information on the quality standards with 'shadow' revenue-linked grid output measures to enable us to evaluate the measures over time for possible implementation as future revenue-linked measures; and
- X45.6 information on the shadow quality standards for the potential future grid output measures and a potential future customer service measure, which will allow us to evaluate these for future implementation as quality standards.

Chapter 1 Introduction

Introduction

- 1.1 Transpower New Zealand Limited (**Transpower**) is the owner and operator of New Zealand's national transmission grid.²⁴ As the system operator, Transpower also manages the real-time operation of the grid.
- 1.2 Under Part 4 of the Commerce Act 1986 (the **Act**), the Commerce Commission is responsible for determining an individual price-quality path (**IPP**) for the electricity lines services provided by Transpower New Zealand Limited (**Transpower**) for the next regulatory control period (**RCP**) from 1 April 2020 to 31 March 2025 (**RCP3**).^{25, 26}
- 1.3 The IPP that we determine for RCP3 will set out the forecast revenue that Transpower may receive for providing electricity lines services over that period, and the level of quality it must provide to consumers.
- 1.4 Under s 53ZC of the Act we may set the price-quality path using any process and in any way we think fit, but must use our input methodologies that apply to Transpower.
- 1.5 Our regulatory framework and evaluation approach for the IPP reset are set out in Attachment B of this draft decision reasons paper.

Purpose of this paper

- 1.6 The purpose of this paper is to:
 - 1.6.1 explain our draft decisions for the Transpower IPP reset for RCP3;
 - 1.6.2 explain how our draft decisions promote the Part 4 purpose; and
 - 1.6.3 seek submissions on our draft decisions, which will inform our final decisions for the IPP reset.

²⁴ 'Transpower' is defined in s 54B of the Act.

²⁵ Our working assumption is that a five-year term for RCP3 is likely to apply. In this paper we consider whether any variation from this should be made.

²⁶ More information about the regulation of Transpower is provided in Attachment A.

Process to date

- 1.7 On 23 November 2018 we received a proposal from Transpower setting out its forecast expenditure and proposed performance measures for RCP3 (**Transpower’s proposal**).^{27, 28} Alongside its proposal, Transpower also submitted a report from Synergies Economic Consulting and GHD Advisory (together, the **Verifier**) setting out an independent opinion on Transpower’s proposal (**Verifier report**).^{29, 30}
- 1.8 We have now assessed Transpower’s proposal and the Verifier report, and we have reached draft decisions for the IPP.
- 1.9 This paper follows on from previous consultations on process and issues. We published a process, framework and approach paper (**Process paper**) on 25 October 2018 and subsequently received and considered submissions and cross-submissions from interested persons.^{31, 32}
- 1.10 The Process paper included chapters on:
- 1.10.1 our IPP reset process (Chapter 2);
 - 1.10.2 the regulatory framework for the IPP reset, including the requirements of the Act, the input methodologies and how we proposed to evaluate Transpower's proposal (Chapter 3);
 - 1.10.3 Transpower’s progress under our regulatory regime (Chapter 4);
 - 1.10.4 our expenditure assessment approach (Chapter 5); and
 - 1.10.5 the link between forecast expenditures and the price path (Chapter 6).
- 1.11 The key elements of those chapters in the Process paper are described in Attachment B.

²⁷ Transpower “Securing our Energy Future 2020-2025” (November 2018).

²⁸ Transpower’s proposal and supporting documents are available on Transpower’s website at: <https://www.transpower.co.nz/keeping-you-connected/industry/rcp3>.

²⁹ Synergies Economic Consulting & GHD Advisory “Independent Verification Report – Transpower’s RCP3 Expenditure Proposal (2020-25)” (12 October 2018).

³⁰ An overview of Transpower’s proposal and the Verifier report is provided in Chapter 3 of our Issues paper. Commerce Commission “Transpower’s individual price-quality path for the next regulatory control period – Issues paper” (7 February 2019), at 34-52.

³¹ Commerce Commission “Our process, framework and approach for setting Transpower’s expenditure allowances, quality standards and individual price-quality path for 2020 to 2025” (25 October 2018).

³² Our regulatory framework and evaluation approach for the IPP reset are set out in Attachment B of our Process paper.

- 1.12 We undertook an initial review of Transpower’s proposal and the associated Verifier report, and we identified a number of issues on which we wanted to hear the views of interested persons.
- 1.13 We also published an issues paper on 7 February 2019 (**Issues paper**) and subsequently received submissions and cross-submissions from interested persons, which we published on our website.^{33, 34}
- 1.14 In the Issues paper we had identified areas where we intended to carry out further work on Transpower’s proposal, and where we had already issued requests for information (**RFIs**) to Transpower to enable us to do that work.³⁵ We considered the submissions and cross-submissions on the Issues paper to inform the subsequent review and decision steps in making our draft decisions.
- 1.15 We have also asked Transpower for additional information in certain areas when conducting our evaluation. A full list of the information we requested from Transpower is on our website.

Independent experts have assisted with our evaluation of Transpower’s proposal

- 1.16 In making our draft decisions we have had regard to, amongst other things, independent experts reports, submissions on our Process paper and our Issues paper.
- 1.17 Synergies Economic Consulting and GHD Advisory are independent experts who have assisted our evaluation under the terms of the tripartite deed between them (as the Verifier), Transpower and the Commerce Commission.³⁶
- 1.18 A detailed description of the role of the Verifier is set out in Chapter 2 and is further discussed in our expenditure evaluations in supporting Attachment G and Attachment I of this paper.
- 1.19 We also engaged Energy Market Consulting associates (**EMCa**) to assist with our evaluation of Transpower’s proposed information and communication technologies (**ICT**) expenditure.³⁷

³³ Commerce Commission “Transpower’s individual price-quality path for the next regulatory period – Issues paper” (7 February 2019).

³⁴ See: <https://comcom.govt.nz/regulated-industries/electricity-lines/electricity-transmission/transpowers-price-quality-path/setting-transpowers-price-quality-path-from-2020>.

³⁵ Above n 33, at Table 4 and Table 5.

³⁶ Available on Transpower’s website at: https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/Verification%20Deed%20%28REDAC TED%29.pdf.

- 1.20 We will shortly publish a report from EMCa that has informed our draft decisions (**EMCa report**).
- 1.21 The expert reports, while they have assisted our evaluation of Transpower’s proposal, have not substituted for our own expertise and judgement.

What this paper does not cover

- 1.22 The following matters are not covered by this paper:
- 1.22.1 Consultation on input methodology (**IM**) amendments needed to give effect to the draft decisions – these are the subject of a separate paper, published alongside this paper (see Attachment C below);³⁸
 - 1.22.2 Future approvals of major capex projects and base capex listed projects;³⁹
 - 1.22.3 The transmission pricing methodology (**TPM**) – this is the responsibility of the Electricity Authority; and
 - 1.22.4 Decisions in respect of expenditure allowances and quality standards for RCP4 or later regulatory periods – these will be made from 2024 onward.

Structure of this paper

- 1.23 This paper explains our draft decisions for the IPP reset. Details of each chapter and attachment are set out in Table 1.1 below.

Table 1.1 Structure of this paper

Section	Title	Description
Chapter 1	Introduction	Sets out the purpose of this paper, what it covers, how it is structured, how you can provide your feedback, and the next steps.
Chapter 2	Context and priorities for RCP3	Discusses the overarching contextual issues which have informed our draft decisions.

³⁷ Through our expert consulting contract with Strata Energy Consultants Limited we engaged Energy Market Consulting associates (EMCa), an expert consultant with expertise in the areas of ICT expenditure and cybersecurity.

³⁸ Commerce Commission “Proposed amendments to input methodologies for Electricity Distribution Services and Transpower New Zealand Limited, in relation to DPP3 and RCP3: Reasons paper” (29 May 2019), available at: <https://comcom.govt.nz/regulated-industries/input-methodologies/projects/amendments-necessary-to-implement-transpowers-2020-individual-price-quality-path-and-future-price-quality-paths>.

³⁹ This is done on a project by project basis in accordance with: for major capex, Part 3 subpart 3, Part 7 subpart 4, Part 9 subparts 2 and 3, and Schedules C, D, G, H and I, of the Capex IM, and for base capex listed projects, Part 2 subpart 2, 3.2.3 Part 7 subpart 5, clause 8.1.1, and Part 9 Subpart 1A, of the Capex IM.

Section	Title	Description
Chapter 3	Key draft decisions for RCP3	Sets out a brief summary of our draft decisions and reasons, and provides a roadmap to further detail in the attachments.
Attachment A	How Transpower is regulated	Gives context for the IPP by providing an overview of the forms of regulation that apply to Transpower.
Attachment B	Regulatory framework and evaluation approach for the IPP reset	Describes the high-level framework and evaluation approach we have applied in reaching our draft decisions for the IPP reset.
Attachment C	How we propose to implement our draft decisions	Explains how we propose to give effect to our draft decisions.
Attachment D	How we propose to implement the outcomes from the IM review and the Capex IM review	Explains how the RCP3 draft decisions differ from RCP2 as a result of IM changes made during our 2015/16 IM review, and our 2017/18 Capex IM review.
Attachment E	Update on the high-level description of the financial model	Explains how the financial model based on the building blocks has changed since the RCP2 2015 model.
Attachment F	Quality standards and grid output measures	Sets out our draft decisions relating to quality standards and grid output measures for the IPP reset, and explains our reasons for those draft decisions.
Attachment G	Base capex	Sets out our draft decisions relating to base capex for the IPP reset, and explains our reasons for those draft decisions.
Attachment H	Cost estimation	Describes the technical processes used by Transpower to estimate input costs for capex and some opex, and our evaluation of those processes for setting the input costs used in our draft decisions.
Attachment I	Opex	Sets out our draft decisions relating to opex for the IPP reset, and explains our reasons for those draft decisions.
Attachment J	Revenue path design	Sets out our draft decisions for setting Transpower's revenue path and various related disclosure requirements and explains our reasons for those draft decisions.
Attachment K	Customer consultation	Sets out our draft decisions relating to customer consultation by Transpower and explains our reasons for those draft decisions.
Attachment L	Asset management	Sets out our draft decisions relating to asset management and explains our reasons for those draft decisions.
Attachment M	Verifier terms of reference	Sets out the terms of reference for the Verifier.

Material accompanying this paper

- 1.24 Alongside this paper we have published our draft IPP determination. This is a draft of the s 52P determination that would give effect to the draft IPP decisions set out in this paper (**draft IPP determination**).
- 1.25 We will also soon publish the EMCa report.

Submissions

- 1.26 You are invited to provide your written views within the timeframes set out below:
- 1.26.1 Submissions are due by **5pm, Thursday 27 June 2019**; and
- 1.26.2 Cross-submissions on matters raised in submissions by other parties are due by **5pm, Thursday 11 July 2019**.
- 1.27 You should address your responses to:
- Dane Gunnell (Manager, Price-quality Regulation)
c/o regulation.branch@comcom.govt.nz
- 1.28 Please include “Transpower IPP 2020 – Draft decisions” in the subject line. We prefer responses to be provided in a file format suitable for word processing, in addition to PDF file format.

Requests for confidentiality

- 1.29 While we discourage requests for non-disclosure of submissions so that all information can be tested in an open and transparent manner, we recognise that there may be cases where parties that make submissions wish to provide information in confidence. We offer the following guidance:
- 1.29.1 If it is necessary to include confidential material in a submission, the information should be clearly marked, with reasons why that information is confidential.
- 1.29.2 Where commercial sensitivity is asserted, submitters must explain why publication of the information would be likely to unreasonably prejudice their commercial position or that of another person who is the subject of the information.
- 1.29.3 Both confidential and public versions of the submission should be provided.

1.29.4 The responsibility for ensuring that confidential information is not included in a public version of a submission rests entirely with the party making the submission.⁴⁰

1.30 We request that you provide multiple versions of your submission if it contains confidential information or if you wish for the published electronic copies to be 'locked'. This is because we intend to publish all submissions on our website. Where relevant, please provide both an 'unlocked' electronic copy of your submission, and a clearly labelled 'public version'.

Next steps

1.31 Following our consideration of submissions and cross-submissions on this paper, the next step is for us to publish our final decision in August 2019. This decision will include:

1.31.1 Transpower's expenditure allowances, quality standards, and compliance obligations;

1.31.2 the design of the revenue path, including potential smoothing of the revenue path; and

1.31.3 a revised draft IPP determination.

1.32 As we set out in our Process paper, the indicative dates for our IPP reset process are provided in Table 1.2 below.⁴¹

⁴⁰ Parties can also request that we make orders under section 100 of the Act in respect of information that should not be made public. Any request for a section 100 order must be made when the relevant information is supplied to us, and must identify the reasons why the relevant information should not be made public. We will provide further information on section 100 orders if requested by parties. A key benefit of such orders is to enable confidential information to be shared with specified parties on a restricted basis for the purpose of making submissions. Any section 100 order will apply for a limited time only as specified in the order. Once an order expires, we will follow our usual process in response to any request for information under the Official Information Act 1982.

⁴¹ Above n 31, at 9.

Table 1.2 Indicative dates for our IPP reset process

Indicative date	Process step
27 June 2019	Submissions due on our draft decisions
11 July 2019	Technical submissions due on our draft IPP determination Cross-submissions due on our draft decisions
29 August 2019	Final decisions on expenditure allowances, quality standards, compliance obligations and the revenue path design published Revised draft IPP determination published for information only, subject only to revenue path updates to come later for the final Transpower RCP3 WACC in October
12 September 2019	Draft information request provided to Transpower to calculate the forecast maximum allowable revenue (forecast MAR) for RCP3
3 October 2019	Information request issued to Transpower to calculate the building blocks forecast MAR for RCP3 and the maximum allowable revenue for each pricing year of RCP3
10 October 2019	Transpower RCP3 WACC published
31 October 2019	Transpower's values for the forecast MAR and for SMAR for RCP3 to be provided by Transpower to the Commission
14 November 2019	Final IPP determination and companion paper published
28 November 2019	Last statutory date to publish IPP determination

Chapter 2 Context and priorities for RCP3 and beyond

Purpose of this chapter

- 2.1 The purpose of this chapter is to discuss the context for our draft decision, issues we considered, and the priorities which have informed our draft decisions.
- 2.2 In November 2014 we set Transpower's RCP2 IPP. In our reasons paper for the quality and expenditure decisions for RCP2 we described our expectations of how Transpower's IPP would evolve over time. This chapter sets out factors guiding the further evolution of the IPP for RCP3 and the likely direction for RCP4 and beyond.
- 2.3 The chapter covers:
 - 2.3.1 The context for our draft IPP decision;
 - 2.3.2 Quality standards and grid output measures, including:
 - 2.3.2.1 the legal framework on quality;
 - 2.3.2.2 the broad economic quality framework; and
 - 2.3.2.3 our evaluation of the quality standards and Transpower's proposed grid output measures;
 - 2.3.3 Forecast IPP expenditure, including:
 - 2.3.3.1 our tools used in assessing Transpower's forecast expenditures;
 - 2.3.3.2 the role of the Verifier in considering the proposed expenditures;
 - 2.3.3.3 evaluation of the proposed base capex allowance; and
 - 2.3.3.4 evaluation of the proposed opex allowance; and
 - 2.3.4 Introductions to our draft decisions on the key focus areas we identified in our Issues paper:
 - 2.3.4.1 Customer engagement;
 - 2.3.4.2 The revenue path;
 - 2.3.4.3 Asset management; and
 - 2.3.4.4 Cost estimation.
- 2.4 This chapter also signposts where you will find more detailed discussion on these topics in the attachments to this paper.

Context for our draft IPP decisions

- 2.5 We are in the process of setting Transpower’s quality standards, grid output measures, and expenditure allowances, as part of determining Transpower’s IPP for the next RCP, to apply from 1 April 2020 to 31 March 2025 (**RCP3**).
- 2.6 At a high level, our process to date in setting the RCP3 IPP has been:
- 2.6.1 In its proposal, Transpower has proposed grid output measures;
 - 2.6.2 In its proposal, Transpower has proposed expenditure allowances;
 - 2.6.3 We have evaluated Transpower’s proposal;
 - 2.6.4 We have made draft decisions on the RCP3 quality standards and grid output measures;⁴²
 - 2.6.5 We have made draft decisions on base capex and opex expenditure allowances; and
 - 2.6.6 We have made draft decisions on how these decisions will be reflected in Transpower’s RCP3 IPP.
- 2.7 On 23 November 2018 we received Transpower’s proposal and the Verifier report.
- 2.8 The appointment of a Verifier to provide its opinion on Transpower’s proposal was a trial and it is one that we have found useful and effective. We intend considering whether to make this a permanent feature of IPP resets when we next review the Transpower Capital Expenditure Methodology (**Capex IM**).⁴³
- 2.9 In assessing Transpower’s proposal, we have been guided by whether the proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier of electricity transmission services (**expenditure outcome**). This concept is consistent with the purpose of Part 4 of the Act (**Part 4**), which is also a required consideration under the capex evaluation criteria in the Capex IM.⁴⁴

⁴² In Attachment F we explain in detail what quality standards are under the Act, and how these relate to the quality incentives in the grid output measures. Transpower was not required to propose quality standards in its proposal.

⁴³ *Transpower Capital Expenditure Input Methodology Determination 2012* [2012] NZCC 2, as amended and consolidated as at 1 June 2018.

⁴⁴ Clause 6.1.1(2)(b) of the Capex IM.

- 2.10 In applying this concept, we consider that a ‘prudent supplier’ is a supplier whose planning and performance standards reflect Good Electricity Industry Practice (**GEIP**). A useful definition of GEIP, in relation to electricity transmission services, is found in the Electricity Industry Participation Code 2010 (**Code**).^{45, 46}
- 2.11 In its proposal, Transpower noted that it expects the near-term forecast for electricity demand and investments required for asset replacement and renewal in RCP3 to be relatively stable, but it sees significant uplifts in demand and investment in RCP4 and beyond.
- 2.12 In response to the challenges associated with demand and investment forecasts beyond RCP3, Transpower noted areas where it intends to focus its efforts in RCP3.
- 2.13 We also recognise other matters that are relevant context for our draft decisions. For example:
- 2.13.1 pricing and other issues currently under consideration in the Electricity Price Review that could potentially affect Transpower’s future investments;⁴⁷
 - 2.13.2 the general push for decarbonisation in the New Zealand economy and the impacts that might have on how and when Transpower invests in the grid;
 - 2.13.3 the desire by interested parties for greater participation with Transpower in the setting of its investment priorities; and
 - 2.13.4 Transpower’s response to emerging workforce constraints and what that means for the need for increases in Transpower’s expenditure efficiency.

⁴⁵ ‘Good electricity industry practice’ is defined in Part 1 of the Code as: **good electricity industry practice** in relation to transmission, means the exercise of that degree of skill, diligence, prudence, foresight and economic management, as determined by reference to good international practice, which would reasonably be expected from a skilled and experienced **asset** owner engaged in the management of a transmission network under conditions comparable to those applicable to the **grid** consistent with applicable law, safety and environmental protection. The determination is to take into account factors such as the relative size, duty, age and technological status of the relevant transmission network and the applicable law [bold terms in original].

⁴⁶ The Code is available at: <https://www.ea.govt.nz/code-and-compliance/the-code/>.

⁴⁷ Ministry of Business, Innovation & Employment (MBIE), *Electricity Price Review 2018-2019*, <https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-consultations-and-reviews/electricity-price/>.

- 2.14 Although the main focus of this paper is necessarily on the issues we needed to address to make our draft decisions for the setting of the RCP3 price-quality path,⁴⁸ we have considered some implications for RCP3 of the longer-term challenges. For example, we also discuss in this paper:
- 2.14.1 changing the design of the price path to make transmission pricing less volatile and more predictable from year to year over RCP3 for Transpower's customers and for the ultimate consumers of electricity lines services;
 - 2.14.2 Transpower's approach to customer consultation in RCP3, including how this can be developed further during RCP3 to provide greater opportunities for Transpower's customers to participate in how Transpower plans to spend the expenditure allowances that we will determine for RCP3, and how risk considerations could support consultation on the price/quality trade-off;
 - 2.14.3 providing opportunities for Transpower's customers to participate earlier in RCP3 on the settings that Transpower will propose in its RCP4 proposal;⁴⁹
 - 2.14.4 the implications of the expected ramp up in asset replacement and renewal expenditure in RCP4 and beyond for Transpower's asset management capability; and
 - 2.14.5 how we can improve our understanding of the evolution of the scope of Transpower's projects through their development phases to gain greater confidence in Transpower's estimation of project costs in future capex proposals submitted to us for approval.
- 2.15 While these additional matters do not require large allowances for RCP3 expenditure, we consider completing these matters on a timely basis in RCP3 is essential to putting Transpower in a good position for the RCP4 IPP reset, and we have made appropriate enquiries of Transpower to ensure these activities have adequate allowances for expenditure.
- 2.16 In the rest of this chapter we deal with our approach and how it is applied in setting our draft decisions. Each of the following areas are also then dealt with in detail in the attachments to this paper:
- 2.16.1 Quality standards and grid output measures (Attachment F);

⁴⁸ The quality standards and the grid output measures, the capex allowances, and the opex allowance.

⁴⁹ Transpower's RCP4 proposal will be due to us from Transpower by November 2024.

- 2.16.2 Forecast IPP expenditure:
 - 2.16.2.1 Our tools used in assessing Transpower’s forecast expenditures;
 - 2.16.2.2 The role of the Verifier;
 - 2.16.2.3 The draft decision on the base capex allowance (Attachment G);
 - 2.16.2.4 The draft decision on the opex allowance (Attachment I);
- 2.16.3 Our approach to draft decisions for the following focus areas:
 - 2.16.3.1 Customer engagement (Attachment K);
 - 2.16.3.2 The revenue path (Attachment J);
 - 2.16.3.3 Asset management (Attachment L); and
 - 2.16.3.4 Cost estimation (Attachment H).

Quality standards and grid output measures

Legal framework

- 2.17 The requirement for us to set quality standards is set out in s 53M(1)(b) of the Act. Quality standards are a compliance requirement of Transpower’s price-quality path.
- 2.18 In addition, s 53M(2) of the Act provides us with the power to set incentives for Transpower to maintain or improve its quality of supply.
- 2.19 For any revenue-linked output measure, the associated quality standard may be set at the level of the target, collar/cap, or at any other level where we consider an appropriate incentive would be provided by enforcement action under the Act.⁵⁰
- 2.20 The Capex IM requires Transpower to propose, and for us to set, certain types of quality incentive measures, known as grid output measures, while providing Transpower with the opportunity to also propose other grid output measures. We may approve or set different grid output measures from those that Transpower proposes.

⁵⁰ Section 87 of the Act provides that we may apply to the court for a person to be ordered to pay a pecuniary penalty for contraventions of any price-quality requirements.

- 2.21 We determine how the quality standards we set for Transpower are prescribed, but these standards must be based on, and be consistent with, any quality standards for Transpower as set by the Electricity Authority under the Grid Reliability Standards (GRS) in the Code.
- 2.22 Transpower is not required to propose the quality standards to be associated with its grid output measures in its proposal. For the service performance measures, Transpower will be rewarded for outperforming the performance targets via an increase in its maximum revenues, while being penalised for underperforming via a decrease in its maximum revenues under the incentive scheme.⁵¹ If a quality standard is breached, statutory penalties under s 87 of the Act as well as the financial penalties described above could apply for that underperformance.
- 2.23 In setting the grid output measures, we are primarily seeking to provide Transpower with incentives to provide services at a quality that reflects consumer demands, in line with the Part 4 purpose.
- 2.24 The Capex IM provides for two types of grid output measures: revenue-linked, and non-revenue linked. Under any revenue-linked grid output measures, Transpower will be financially rewarded for outperforming performance targets and penalised for underperforming performance targets.
- 2.25 Non-revenue linked measures may be used to better understand Transpower's performance.
- 2.26 Therefore, it would be possible for Transpower to be exposed to both a financial penalty under the grid output measure for its underperformance, and a statutory penalty under the Act where the quality standard is contravened.
- 2.27 The extent to which both financial penalties and statutory penalties can potentially apply depend on the relationship between the value used to set the quality standard and the values set for the target and the collar under the grid output measure. Transpower's quality standards for RCP2 were set at the level of the target level, but for RCP3 we are proposing to set quality standards at different levels than the target.
- 2.28 We may set a quality standard to apply only when thresholds across multiple grid output measures are not met (which we refer to as a 'pooled' approach), with some or all of those measures having an associated incentive scheme. The pooling may be across different measures, sub-categories of measures (for example, across points of service), or across time (for example, if the limit is not met for two out of three years).

⁵¹ These adjustments will be made via the grid output adjustment in Schedule B2 of the Capex IM.

- 2.29 The value for a quality standard may be set outside of the range allowed for grid output measures. This approach could lead to what we refer to as a 'deadband' range for a measure if the quality standard is set at a less stringent level than the collar of the incentive range, which is where no financial incentive would apply.
- 2.30 In applying this framework, there are three main types of incentive measures that we can set for Transpower's RCP3 quality measures:
- 2.30.1 Quality standards that operate with a revenue-linked incentive scheme (can include a pooling approach across measures and/or across years). This may also have additional reporting requirements under information disclosure or under the IPP compliance reporting requirements.
 - 2.30.2 Quality standards only (can include a pooling approach across measures and/or across years). This may also have additional reporting requirements under information disclosure or under the IPP compliance reporting requirements, which might include a pilot non-revenue linked incentive scheme.
 - 2.30.3 Reporting-only measures which are information disclosure requirements with no link to revenue-linked incentives or applicable quality standards.

Broad economic quality framework

- 2.31 One potential way for Transpower to cut costs is to cut quality of service (for example, by reducing maintenance costs, which may lead to more frequent power outages). Hence, we set a price-quality path which includes quality standards and may also include grid output measure incentives.
- 2.32 The concept of financial capital maintenance (**FCM**) implicitly underpins our building blocks approach to implementing our regulation. FCM allows a regulated supplier such as Transpower the opportunity to earn normal returns over the lifetime of an investment and provides it with a chance to maintain the financial capital it has invested.
- 2.33 Our form of regulation for Transpower, revenue-cap regulation, involves setting a revenue path which Transpower can outperform and thereby earn additional profits. This is an important way to incentivise efficiencies which are later passed back to customers at the next regulatory reset.

- 2.34 The quality standards and grid output measures that we set provide incentives for the quality of service that Transpower will provide during RCP3. They are intended to balance incentives for Transpower to reduce expenditure while providing services at the quality consumers demand.⁵²
- 2.35 Under this form of regulation, the FCM concept is applied on an ex-ante basis. Therefore, regulated suppliers are expected to earn a normal return at the beginning of each regulatory period, and to then have the opportunity to make higher profits through cost savings and other efficiency or quality improvements, as well as through innovations, where those savings, improvements and innovations benefit consumers in the long term.
- 2.36 Ex-ante, one would not expect suppliers acting consistently with GEIP to earn less than a normal return due to quality incentive scheme penalties (or quality standard contraventions penalties or compensation) alone. Ex-post however, suppliers may do so due to performance or conduct not consistent with GEIP, as reflected in those standards and incentive schemes. Also, outcomes can be affected by random events.
- 2.37 Ideally, quality incentive schemes should be designed to minimise the risk of windfall gains or losses to Transpower due to circumstances outside its control, or with an ex-ante expectation of a net penalty even where Transpower is acting consistent with GEIP.

Evaluation of the quality standards and the proposed grid output measures

- 2.38 Grid output measures are proposed every five years by Transpower and are set by us as part of the IPP reset. In addition, we set binding quality standards. Transpower has proposed that we simplify and rationalise the grid output measures for RCP3 compared to RCP2. It states that this reflects its consultation with customers and stakeholders.
- 2.39 Our intention is to build on RCP2 to incentivise behaviours around risk assessment and quality to ensure the best outcomes for consumers. In our draft decisions for RCP3 we are proposing that pooling of measures is adopted in some cases, and that the quality standards are set in other cases beyond the incentive regime. We have proposed new reporting requirements and mechanisms through the RCP3 period.

⁵² Refer to s 52A(1)(b) of the Act: “(b) have incentives to improve efficiency and provide services at a quality that reflects consumer demands”.

- 2.40 Based on our legal framework, there are a range of quality options that we can implement for different dimensions of Transpower's quality performance. Which of the available options we consider most suitably matches up with the characteristics of a specific measure and how this resulted in our draft decisions on quality are described in detail in Attachment F.
- 2.41 We re-evaluate Transpower's proposed grid output measures at each reset. This is a continuous process over time, where we aim to improve the suite of quality measures, resulting in incentives on Transpower to deliver further benefits to customers.
- 2.42 The regime has matured significantly over the first two regulatory control periods and we look to continue improving it for RCP3.
- 2.43 Transpower's proposed RCP3 grid output measures include both service performance measures and asset health measures. Service performance measures are directly related to the performance of grid assets as they affect asset availability, customer supply reliability, and the electricity market, while asset health measures are more subjective assessments of asset condition.
- 2.44 The service performance measures include measures of grid performance (including the number and duration of outages across different points of service (**POS**) of the grid), and asset performance (the availability of key systems in the grid).
- 2.45 Transpower has refined and rationalised its service performance measures after consultation with industry. However, it was not required to consult on the incentive arrangements or quality standards that accompany these.
- 2.46 In setting the grid output measures, we are primarily seeking to provide Transpower with incentives to provide services at a quality that reflects consumer demands, in line with the Part 4 purpose.⁵³
- 2.47 The Capex IM provides for two types of grid output measures: revenue-linked, and non-revenue linked. Non-revenue-linked measures may be used to better understand Transpower's performance by providing information about how a possible measure under consideration for future revenue linking would have performed during the RCP. Under any revenue-linked grid output measures, Transpower will be financially rewarded for outperforming performance targets and penalised for underperforming performance targets.

⁵³ We must also apply the criteria in Schedule A clause A4-A6 of the Capex IM which includes the extent to which each measure is a recognised measure of risk in the supply and performance of electricity transmission services, and the relationship between the grid output measure and expenditure by Transpower.

- 2.48 For the revenue-linked grid output measures, we have made draft decisions on:⁵⁴
- 2.48.1 quality standards, that are part the price-quality requirements for purposes of s 87 of the Act;
 - 2.48.2 grid output targets;
 - 2.48.3 caps – to limit the amount of positive revenue adjustment;
 - 2.48.4 collars – to limit the amount of negative revenue adjustment;⁵⁵ and
 - 2.48.5 grid output incentive rates – the amount of money at risk for each unit of output between the cap and the collar.
- 2.49 The quality standards are designed as network performance limits for the grid elements in Transpower’s proposed measures. These grid elements are designed at N or N-1 supply security in line with Schedule 12.2 of the GRS in the Code.
- 2.50 For non-revenue linked measures we may also link the quality standard to a non-financial incentive mechanism, such as special purpose reporting requirements.⁵⁶
- 2.51 Any non-revenue-linked measures that are not linked to quality standards are simply an information disclosure requirement.

Interaction with other incentives

- 2.52 In Attachment F we describe the context for the grid output measures against the range of drivers of behaviour that may impact Transpower’s expenditure and quality decision-making processes and how these may interact with the quality scheme.

Forecast IPP expenditure

- 2.53 We have made draft decisions on the expenditure allowances for base capex and opex for RCP3. In setting these, we have applied proportionate scrutiny to Transpower’s RCP3 base capex and opex proposals and used a range of tools, which have provided guidance to us in exercising judgement when assessing Transpower’s forecast expenditures.
- 2.54 In the following sections, we outline:
- 2.54.1 the tools we used in assessing forecast expenditures;

⁵⁴ Clause 2.2.2(1)(d) of the Capex IM.

⁵⁵ This could also be a trigger point that, if outside the cap or collar, may require additional reporting.

⁵⁶ For example, s 53M(2)(d).

- 2.54.2 how we used the outcomes of Transpower’s verification process in our assessment of Transpower’s forecast expenditures; and
 - 2.54.3 the process of setting the draft expenditure allowances for RCP3.
- 2.55 The process of setting expenditure allowances for Transpower in RCP3 comprised four major stages:
- 2.55.1 The ‘proposal stage’, covering Transpower’s process of preparing and submitting forecast expenditure proposals as part of its RCP3 application;
 - 2.55.2 The ‘review stage’, covering both the Verifier’s and our review of Transpower forecast expenditures. This stage included our process of forming a view on the appropriateness of the Verifier’s conclusions as well as our own targeted reviews of specific forecast expenditure proposals, particularly where:
 - 2.55.2.1 we were not wholly satisfied with the Verifier’s conclusions;
 - 2.55.2.2 the Verifier considered that an expenditure forecast did not meet the expenditure outcome; or
 - 2.55.2.3 a forecast was not subject to verification scrutiny;
 - 2.55.3 The ‘determine stage’, at which we determine appropriate expenditure forecasts for RCP3 based on the review stage. These forecasts could either be consistent with, or variations of, Transpower’s expenditure forecasts, including instances where we may find a nil forecast is appropriate; and
 - 2.55.4 The ‘set stage’, at which we aggregated the expenditure forecasts determined at the previous stage into draft expenditure allowances.

Our tools used in assessing Transpower’s forecast expenditures

- 2.56 In defining the scope, covering both the breadth and depth of our reviews, we applied proportionate scrutiny to Transpower’s forecast RCP3 expenditures.
- 2.57 In broad terms, ‘proportionate scrutiny’ means that we applied the level of scrutiny that is commensurate with potential price and quality impacts of forecast expenditures on Transpower’s customers and where we considered the benefits of such scrutiny to customers outweighed the associated costs over time.
- 2.58 Where appropriate, we used a process of incrementally higher levels of scrutiny if the lower levels of scrutiny proved insufficient. We consider that proportionate scrutiny should guide our evaluation of Transpower’s expenditure proposals as well as the setting of IPPs more generally.

- 2.59 In exercising proportionate scrutiny, we were supported by the outcome of Transpower's independent verification process. Similar to how we would use the verification process in helping us assess a customised price-quality paths (**CPP**) proposal, we considered the verification process useful in helping us define the scope of our review.
- 2.60 The Verifier report helped define:
- 2.60.1 the **breadth** of our reviews, by highlighting forecast expenditures that were likely to meet the expenditure outcome, but also by pointing us to forecast expenditures the Verifier considered would fail to do so. Our review focus was primarily on the latter. We only performed significant further scrutiny on those forecast expenditures the Verifier considered likely to meet the expenditure outcome, where we were not satisfied with the Verifier's conclusions; and
 - 2.60.2 the **depth** of our reviews, by identifying forecast expenditures that needed to be investigated at greater depth – eg, areas where Transpower did not provide sufficient information to the Verifier for it to assess those against the expenditure outcome; areas where sufficient information was provided, but the Verifier was still unable to come to a conclusion; and/or areas where we were not satisfied with the Verifier's conclusions. Again, our review focus was on those areas, as opposed to areas the Verifier (and we) considered to have been subject to sufficient in-depth scrutiny.
- 2.61 Having established the breadth and depth of our review on the basis of the verification outcome, we overlaid this with our own review of scope before we made a decision on what we intended to cover in our base capex and opex reviews.
- 2.62 We applied proportionate scrutiny to our evaluation of Transpower's forecast expenditures for RCP3. The framework, approach and tools we used for our evaluation are described in detail in Attachments B and C of our Process paper.⁵⁷
- 2.63 It is important to note that scrutinising Transpower's forecast expenditures was not a mechanistic process. The process necessarily involved exercising professional judgement, including, but not limited to, engineering expertise. We applied other questions and considerations in reviewing the forecast expenditures and/or change scope where we considered the principle of proportionate scrutiny indicated it was necessary.

⁵⁷ Above n 31.

2.64 We consider that the tools described in our Process paper provided us with valuable guidance in exercising our judgement. They were designed to provide transparency, to the extent possible, to interested parties about our approach to scrutinising forecast expenditures.

2.65 A high-level overview of what these tools were designed for is:

2.65.1 *Factors we considered in assessing the Verifier's conclusions.* In addition to explaining the purpose of trialling independent verification for Transpower's proposal, the purpose of Attachment B of the Process paper was to summarise the key factors we consider in forming our decisions when assessing the Verifier's conclusions. Understanding the extent of our agreement/disagreement with the Verifier's conclusions was an important step in applying proportionate scrutiny to Transpower's expenditure forecasts, as the Verifier report informed our assessment where we agreed with the Verifier's conclusions.

2.65.2 *A summary of Transpower's forecast expenditure.* The purpose of Attachment C of the Process paper was to summarise the forecast expenditures – quantitatively and qualitatively. It guided us in reviewing the RCP3 base capex and opex proposals and helped define the level of scrutiny of our review. We grouped forecast expenditures by total expenditure, expenditure type, expenditure category, asset/opex category and asset/opex class. For each of these groupings, there were six analysis steps:

2.65.2.1 Analysis step 1 – a quantitative expenditure overview – RCP2 versus RCP3.

2.65.2.2 Analysis step 2 – a qualitative analysis of the verification process, including the extent to which we agreed with the Verifier's conclusions. Any expenditure forecasts the Verifier did not consider met the expenditure outcome, or any recommendation by the Verifier we disagreed with, was subject to higher levels of our scrutiny.

2.65.2.3 Analysis step 3 – a quantitative analysis based on the values in analysis step 1. This allowed us to better understand the financial materiality of a proposed expenditure. For example, we applied more scrutiny to an opex forecast reflecting a material step change as opposed to one that was consistent with actual spend in RCP2.

2.65.2.4 Analysis step 4 – a qualitative analysis looking at the key drivers of expenditure (eg, to meet quality standards, to connect generation capacity). This step helped us to understand whether there is a clearly defined need for the expenditure and what this was. In the absence of such a need (including a lack of clear explanation by Transpower) for an expenditure generally and/or a step change, a proposed expenditure was unlikely to achieve the expenditure outcome. Any shortcomings resulted in us applying higher levels of scrutiny.

2.65.2.5 Analysis step 5 – a qualitative analysis assessing the (immediate or more indirect) relevance of expenditure for the defined key focus areas in our evaluation of Transpower’s proposal. If expenditure related to any of these key focus areas, we applied higher levels of scrutiny.

The role of the Verifier

2.66 In our Process paper we explained that we considered it would be beneficial to use an independent verifier to verify Transpower’s proposal in advance of submitting it to the Commission. We considered that a verification process would:⁵⁸

2.66.1 help improve our decision making by testing, in advance of us receiving the proposal, the policies, planning standards and assumptions that underpin Transpower’s forecast information on proposed capex, opex, and demand;

2.66.2 enable us to better focus our review of Transpower’s proposal on areas where forecast expenditures and/or associated grid output measures were less likely to meet the expenditure outcome, consistent with the proportionate scrutiny principle;

2.66.3 provide useful insights to Transpower in terms of potential operational improvements it could make;

2.66.4 help to mitigate the risk of any potential incentives on Transpower to provide overly generous estimates of forecast expenditure;

2.66.5 result in better scrutiny of Transpower’s investment plans prior to these being submitted to the Commission, which may result in a more appropriate level of forecast expenditure in the proposal; and

⁵⁸ Above n 31, at Attachment B.

- 2.66.6 give us insight into how effective a verification process could be as a possible permanent future feature of the Capex IM.
- 2.67 We consider that the independent verification process has been a useful and effective process for Transpower, the Commission, Transpower's customers, and consumers. We consider verification has:
- 2.67.1 provided many of the benefits we identified in the Process paper;
 - 2.67.2 identified key areas for us to focus on in our review of Transpower's base capex proposal;
 - 2.67.3 identified issues we want Transpower to focus on as it continues to improve its asset management and planning processes during RCP3; and
 - 2.67.4 has justified further consideration as a permanent feature when we next consider IM amendments to the Capex IM after we make our final decisions for RCP3.⁵⁹

Testing the Verifier's findings

- 2.68 In our Process paper we set out factors we would consider in assessing the Verifier's conclusions. These included:
- 2.68.1 the Verifier's general approach to assessing Transpower's proposal, including the depth of the Verifier's investigation and the process the Verifier has undertaken against the Terms of Reference (**General assessment approach**);
 - 2.68.2 the extent to which the Verifier has tested Transpower's proposal's compliance with the relevant IMs (**Proposal compliance with IMs tested**);
 - 2.68.3 the extent to which the Verifier has tested Transpower's proposed expenditure allowances against the expenditure outcomes that reflect the efficient costs of a prudent supplier (**Expenditure outcome tested**);
 - 2.68.4 the extent to which the Verifier's approach to assessing Transpower's proposal is sufficiently explicitly explained and whether its conclusions are comprehensible (**Assessment is sufficiently explained**); and

⁵⁹ The statutory framework and decision-making framework for making IM amendments is set out in the introduction to our paper on draft IM amendments published alongside this paper that includes proposed changes relevant to the RCP3 individual price-quality path.

- 2.68.5 whether there are any relevant areas that point to limitations in the Verifier's expertise and the extent to which they have been filled appropriately (**Limitations in Verifier expertise**).

General assessment approach

- 2.69 The Verifier's general approach to assessing the RCP3 base capex proposal was guided by the Commission's Terms of Reference (**Verifier TOR**)⁶⁰ and evaluating whether Transpower's proposed base capex allowance, proposed opex allowance, proposed grid output measures and key assumptions are consistent with an expenditure outcome which represents the efficient costs of a prudent supplier, having regard to GEIP and the evaluation criteria.
- 2.70 For guidance on whether the forecast expenditure satisfied the definition of GEIP, the Verifier applied the prudence and efficiency tests from the TOR, while having regard to the interpretation of GEIP in both the Australian and New Zealand jurisdictions.⁶¹
- 2.71 For example, the Verifier considered base capex forecasts were:⁶²
- 2.71.1 prudent if they met Transpower's ongoing legal and regulatory obligations or contracts with customers, which includes service quality standards approved by the Commission;
 - 2.71.2 prudent if they were required to meet forecast demand growth, renewal of existing infrastructure in a timely manner, or achieve an increase in the reliability or the quality of supply that is explicitly desired by customers or required by the Electricity Authority;
 - 2.71.3 efficient if they were underpinned by robust cost-estimation and forecasting methodologies, including incorporating actual project costs into the development of RCP3 forecasts while having regard to the efficiency incentives applying under the Part 4 regulatory framework; and
 - 2.71.4 efficient if Transpower's asset management and capex planning processes were likely to reliably provide for the best means of achieving identified need (legal, regulatory or contractual) having regard to available options, including the substitution possibilities between base capex and opex, such as non-network alternatives.

⁶⁰ The Verifier TOR are provided in Attachment M.

⁶¹ The Australian national electricity framework and AER definitions of GEIP are reproduced on page 32 of the Verifier report.

⁶² Above n 29, at 32-33.

- 2.72 Also, the Verifier considered the opex forecasts were:
- 2.72.1 prudent if they met Transpower's ongoing legal and regulatory obligations or its contracts with customers, which includes service quality standards approved by the Commission; and
 - 2.72.2 efficient if they were underpinned by robust cost-estimation and forecasting methodologies, including incorporating reported actual costs into the development of RCP3 forecasts and having regard to the efficiency incentives applying under the Part 4 regulatory framework.
- 2.73 In respect of both base capex and opex, the Verifier considered that the fact that Transpower procures the provision of all its field services from a panel of external service providers was a pertinent consideration in its prudency and efficiency assessment, including assessment of Transpower's ongoing management and coordination of these external resources.

Compliance of the proposed base capex with IMs was tested

- 2.74 The Verifier did not specifically report, on a clause by clause basis, whether the RCP3 base capex proposal was consistent with the Capex IM, specifically:
- 2.74.1 whether the proposal met the requirements of Clause A1 of Schedule A of the Capex IM (the factors that the Commission will have regard to when evaluating a base capex proposal); and
 - 2.74.2 whether the proposal met the requirements of Clause A2 of Schedule A (what the review will include when evaluating each of the Identified Programmes in a base capex proposal).
- 2.75 While the Verifier report contained a comprehensive assessment in each of the Identified Programmes and two non-Identified Programmes, the Verifier's views of compliance with Clauses A1 and A2 of Schedule A were consolidated within its written review material.
- 2.76 We carried out our own review of the Verifier report to test the verification findings against the clause by clause requirements of Clauses A1 and A2 and Schedule A, where this was relevant to the Identified and non-Identified Programmes.⁶³
- 2.77 Following this, we are satisfied that the Verifier has sufficiently reviewed the base capex expenditure proposal in accordance with the requirements of Clauses A1 and A2 of Schedule A and has used evaluation techniques described in Clause A3 of Schedule A.

⁶³ Our general evaluation approach is outlined in our Process paper (above n 31, at Attachment E).

Compliance of the proposed opex was tested as if the IMs had applied

- 2.78 While there are no specific IMs for opex we do not consider that the criteria for assessing opex should be different to those used to assess base capex. Similar to base capex, opex should be directed towards achieving cost-effective and efficient solutions, and the potential cost trade-offs between capex and opex that this implies.
- 2.79 Therefore, in evaluating Transpower's opex proposal we have had regard to the efficient costs of a prudent supplier and have been guided, where it is useful, by the Capex IM criteria and GEIP.
- 2.80 We carried out a review of the Verifier report to test verification findings against the clause by clause requirements of the Capex IM (clauses A1 and A2 of Schedule A), where this was relevant and applicable to the Identified and non-Identified Programmes in the opex forecast.
- 2.81 Following this, we are satisfied that the Verifier has sufficiently reviewed the opex forecast in accordance with the requirements of Clauses A1 and A2 and has used evaluation techniques described in Clause A3 of Schedule A of the Capex IM.

Expenditure outcome tested

- 2.82 In the verification TOR, we defined the expenditure outcome as one which represents the efficient costs of a prudent supplier having regard to:
- 2.82.1 GEIP as reflecting the appropriate planning and performance standards for a prudent supplier;
 - 2.82.2 the evaluation criteria in Attachment A of the Capex IM, for base capex; and
 - 2.82.3 the evaluation criteria in Attachment A of the Capex IM where applicable, for opex.
- 2.83 We consider that, to a large extent and to varying degrees of depth guided by the principles of proportionate scrutiny and materiality, the Verifier has fully tested the base capex and opex proposals against the expenditure outcome.⁶⁴
- 2.84 The Verifier rigorously tested the prudence of expenditure of the Identified and non-Identified programmes and has extensively reviewed Transpower's internal project and programme cost-estimation processes to test efficiency of the base capex proposal as a whole.

⁶⁴ Above n 31, at 35.

- 2.85 The Verifier report enabled us to carry out more focussed investigations, particularly in areas where the Verifier identified that Transpower's asset health modelling is not mature. In these cases, we sought additional information and clarification from Transpower, such as in the high-voltage direct current (**HVDC**) and Reactive Assets portfolios, about how expenditure forecasts have been supported with modelling.
- 2.86 The Verifier also provided very detailed and in-depth analysis of how Transpower is progressing its asset management, with particular focus on asset health modelling and asset criticality understanding.
- 2.87 In respect of the opex proposal, the Verifier report enabled us to carry out more focussed investigation of the efficiency of the base-year opex.

Verifier assessment is sufficiently explained

- 2.88 While the Verifier did not explicitly reference the Capex IM base capex evaluation requirements in Clauses A1 and A2 of Schedule A in its report, we consider the Verifier did follow the requirements of the TOR and, for each Identified and non-Identified Programme, provided in-depth analysis and opinions consistent with the TOR paragraphs 4.1 to 4.9, relevant to base capex.
- 2.89 The Verifier provided an opinion on whether Transpower's proposed opex allowance, and key assumptions were consistent with the expenditure outcome described in paragraph 3.2 of the TOR;
- 2.90 Specifically, the Verifier:
- 2.90.1 provided an opinion on whether Transpower's proposed base capex and opex allowances and key assumptions were consistent with the expenditure outcome described in paragraph 3.2 of the TOR;
 - 2.90.2 provided an opinion on the extent to which Transpower's relevant policies and governance processes (including Transpower's approach to, and use of, asset health modelling) were consistent with good asset management practice and were directed towards the expenditure outcome described in paragraph 3.2 of the TOR;
 - 2.90.3 provided an opinion on the extent to which Transpower's key policies and governance processes on which the proposal or its implementation depended had been made effective;
 - 2.90.4 provided a list of the key issues and areas that it considered the Commission should focus on when the Commission evaluates Transpower's proposal;
and

- 2.90.5 provided an opinion on whether Transpower provided the Verifier with the type and depth of information it needed to provide its Verifier report.

Limitations in Verifier expertise

- 2.91 The Verifier did not identify that it was limited or unable to adequately comment on, analyse or review any of the material related to each identified or non-Identified Programme in the base capex proposal.
- 2.92 With one exception, the Verifier did not identify that it was limited or unable to adequately comment on, analyse or review any of the material related to each identified or non-Identified Programme in the opex proposal.
- 2.93 The exception related to the step change in insurance costs. Although the Verifier commented on the prudence of the insurance costs, it considered that expert actuarial advice was necessary to assess the efficiency of the opex.
- 2.94 The Verifier's treatment of the ICT capex programme demonstrated that verification had improved Transpower's ICT business case processes, especially for the reported benefits-driven ICT projects.
- 2.95 However, after evaluating the work done by the Verifier on ICT capex and ICT opex, we concluded that further investigation was necessary before we could make draft decisions on these expenditure areas. The main reasons for this are:
- 2.95.1 ICT capex has a short payback period (typically 3 to 5 years) and therefore the assumptions and forecasts have a more direct impact on the price path than grid assets, similar to that of opex;
- 2.95.2 ICT capex and opex appear to be highly fungible;
- 2.95.3 ICT expenditure is specialised and while this was generally within the Verifier's grid business expertise, we sought further advice into key aspects that were not in the Verifier's skill set; and
- 2.95.4 we were not fully confident about the adequacy of Transpower's proposed expenditure on cybersecurity in RCP3, which is a key infrastructure risk.
- 2.96 We engaged EMCa to test the ICT capex and opex programmes as a whole. This is not a criticism of the Verifier or the report or its conclusions on the ICT base capex and opex programmes. Rather, we sought advice about how the Transpower ICT capex and opex expenditure in total (ie, as a programme of totex) compares with other transmission utilities, whether benefits-driven projects are realistic, and whether they do provide benefit to Transpower that ultimately is shared with customers.

Verifier recommendations on other further work we should carry out

- 2.97 The Verifier identified particular areas of interest that it considered we should focus our attentions on. We also wanted to explore some aspects of Transpower’s expenditure proposal related to risk and how this was informing business cases that underpinned investment decision making.
- 2.98 For some, but not all, Identified and non-Identified Programmes, we carried out additional analysis beyond reviewing the Verifier report. For some expenditure programmes we have:
- 2.98.1 asked questions in our Issues paper seeking submitter views on aspects of Transpower’s proposal;
 - 2.98.2 sought further supporting information from Transpower using RFIs; and
 - 2.98.3 carried out analysis of the RFI information to decide next steps.

Evaluation of the proposed base capex allowance

- 2.99 In assessing the proposed base capex expenditure in Transpower’s proposal, we were guided by whether the proposal was consistent with an expenditure outcome which represents the efficient costs of a prudent supplier.⁶⁵
- 2.100 We consider this concept to be consistent with the purpose of Part 4 of the Act, which is a required consideration under the capex evaluation criteria.⁶⁶
- 2.101 In applying this concept, we consider that a ‘prudent supplier’ is a supplier whose planning and performance standards reflect GEIP.
- 2.102 In evaluating the proposed base capex expenditure in Transpower’s proposal, we must apply the evaluation criteria in the Capex IM (the capex evaluation criteria), being:
- 2.102.1 the general evaluation criteria set out in clause 6.1.1(2) of the Capex IM (general capex evaluation criteria); and
 - 2.102.2 the specific base capex evaluation criteria referred to in clause 6.1.1(3) of the Capex IM and specified in Schedule A of the Capex IM (base capex evaluation criteria).

⁶⁵ Commerce Commission “Transpower capex input methodology review – Decision and reasons” (29 March 2018), at [A15].

⁶⁶ Clause 6.1.1(2)(b) of the Capex IM and Chapter 3 of our Process paper.

- 2.103 The general capex evaluation criteria are:
- 2.103.1 whether what is proposed is consistent with the Transpower Input Methodologies (**Transpower IM Determination**)⁶⁷ and the Capex IM;
 - 2.103.2 the extent to which what is proposed will promote the purpose of Part 4 of the Act; and
 - 2.103.3 whether the data, analysis, and assumptions underpinning what is proposed are fit for the purpose of the Commission exercising its powers under Part 4 of the Act, which includes consideration of the accuracy and reliability of data and the reasonableness of assumptions and other matters of judgement.
- 2.104 The base capex evaluation criteria are specified in Schedule A of the Capex IM. They include:
- 2.104.1 general factors we must have regard to when evaluating Transpower's proposal, such as reasonableness of key assumptions, overall deliverability of the proposed base capex during the regulatory period, and the extent to which grid output targets were met in the current and previous regulatory periods;
 - 2.104.2 a non-exhaustive list of criteria we may use when evaluating each identified programme of work set out in the base capex proposal, such as reviewing Transpower's process used to determine each identified programme's reasonableness and cost effectiveness; and
 - 2.104.3 a list of evaluation techniques we may employ, such as process benchmarking, and process or functional modelling.
- 2.105 The base capex evaluation criteria are not exhaustive, and the weighting of different criteria is at our discretion. Also, while Transpower is required to submit a base capex proposal, the final decisions on Transpower's base capex allowances ultimately rest with the Commission. We are not required to agree with Transpower about any aspect of the proposed expenditure allowances.
- 2.106 Our evaluation and draft decision on the forecast base capex are described in detail in Attachment G.

⁶⁷ *Transpower Input Methodologies Determination 2010* [2012] NZCC 17, as amended and consolidated as at 28 February 2017.

Evaluation of the proposed opex allowance

2.107 In developing its proposed RCP3 opex forecasts, Transpower used a base-step-trend forecasting methodology, which extrapolates from the expenditure in a base year, using historic trends. In assessing the efficiency of its base level opex, Transpower undertook an historical trend analysis. It considered a proposed base level opex efficient if it was in line with the average expenditure of some of the preceding years.

2.108 Implicit in this assumption is that historical expenditures (ie, 'revealed costs') should be reflective of efficient costs if there is an effective incentive mechanism in place that incentivises a supplier of regulated services to actively pursue efficiency gains. A range of such incentive mechanisms apply to Transpower, with our incremental rolling incentive scheme (**IRIS**) applying to Transpower's opex.

2.109 Transpower has developed base-step-trend opex forecasts for each of its expenditure categories, excluding insurance and preventive maintenance. It described this in Transpower's proposal as follows:

For most of our opex forecasts we have adopted a base-step-trend framework. Base-step-trend forecasting is generally appropriate for expenditure that is recurring and assumes that historical 'revealed' expenditure provides a suitable starting point for a forecast requirement. The base-step trend approach involves the following main components.

Base year – identifying an efficient base year, typically the most recent year for which actual opex data is available. This includes assessing the extent to which the base year is relatively efficient.

Base amount – following an assessment of the base year, the base amount is identified by adjusting the base year expenditure for any atypical cost items.

Step changes – required to meet the needs of the network or to allow for external requirements, and which are not already captured within the scope of the base amount.

Trends – these reflect expected changes in cost due to output growth. It can also include adjustments for ongoing productivity and/or cost efficiency.

2.110 Base-step-trend forecasting is discussed in more detail in Attachment I of this paper.

2.111 Transpower used 2017/18 as the base year as follows:

2.111.1 Forecasts were based on actual costs incurred in 2017/18, which are the most recently audited costs and are considered to embed efficiency gains made since the Commission's RCP2 final decision;

2.111.2 Non-recurring costs for efficiency initiatives have been removed from the base-year business support costs, as these initiatives are self-funding via the incentive arrangements; and

- 2.111.3 Prospective efficiency gains have been excluded from the forecast to incentivise Transpower identifying and pursuing gains at any time through the regulatory cycle.
- 2.112 Transpower's insurance opex forecast was developed based on actuarial and broker forecasts of premiums over RCP3.
- 2.113 For preventive maintenance, Transpower generated standard jobs for the routine maintenance activities and used work volumes generated by its Maximo operational asset register and maintenance management tool to calculate an aggregated [quantity] x [standard job cost] forecast.
- 2.114 There is no IM that sets out rules about how we should determine or evaluate forecast opex in an IPP. However, we consider the criteria to be applied should not be materially different to the criteria that apply to base capex, particularly given the need to direct capex expenditure towards achieving cost-effective and efficient solutions, and the potential cost trade-offs between capex and opex that this implies.
- 2.115 Therefore, consistent with our approach to assessing base capex, in assessing opex we were guided by:
- 2.115.1 the extent to which the opex that Transpower proposed will promote the purpose of Part 4 of the Act; and
- 2.115.2 where they can be usefully applied to opex, the base capex evaluation criteria.
- 2.116 In considering the extent to which Transpower's opex proposal will promote the Part 4 purpose, we have been guided by whether Transpower's proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier (ie, where a 'prudent supplier' is a hypothetical transmission business facing the same circumstances as Transpower whose planning and performance standards reflect GEIP).
- 2.117 Our evaluation and draft decisions on the forecast opex are described in detail in Attachment I.

Our approach to draft decisions for focus areas

- 2.118 From our initial review of Transpower's proposal and the Verifier report, we identified in our Issues paper issues on which we sought the views of interested persons. We also identified areas to carry out further work on Transpower's proposal. We refer to the following as our other focus areas:
- 2.118.1 The revenue path;

2.118.2 Customer engagement;

2.118.3 Asset management; and

2.118.4 Cost estimation.

The revenue path

- 2.119 The unsmoothed building blocks approach used in setting Transpower's forecast maximum allowable revenue (**forecast MAR**) for RCP1 and RCP2 can produce volatility from year to year, and when transitioning between RCPs. This volatility is reflected in the prices Transpower charges its customers.
- 2.120 Volatility in annual prices can potentially lead to increased difficulty of budgeting for transmission lines charges. Transpower's customers have previously supported smoothing large changes in revenue.
- 2.121 In RCP2, forecast pass-through costs and forecast recoverable costs do not form part of the building blocks used to set the forecast MAR. Pass-through costs or recoverable costs can add further volatility to Transpower's total annual revenue.
- 2.122 In RCP3 Transpower may incur further approved capex that is not included within the IPP, through the major capex projects and listed projects mechanisms. When these projects are commissioned, Transpower should earn a higher revenue due to a return on capital, and depreciation, from these projects.
- 2.123 To help us ensure compliance with the price path, and to enable scrutiny by interested persons, there should be access to accurate published information about Transpower's price path performance and Economic Value (**EV**) account (and other) calculations.
- 2.124 Transpower proposed nominal total forecast revenue of \$4,419 million for RCP3, which in nominal terms represents a 6.6% reduction from its total revenue in RCP2. This reduction is largely driven by an assumption of a lower WACC rate. This puts downward pressure on Transpower's total forecast capital charge, and offsets the revenue impact of proposed higher base capex and opex allowances on Transpower's total forecast revenue in RCP3.
- 2.125 Transpower has proposed that its RCP3 revenue based on annual building blocks should be smoothed over the five years of RCP3, exclusive of the revenue effects of listed projects and major capex projects. We understand that Transpower's stakeholders have expressed mixed views when Transpower consulted on revenue path smoothing.

- 2.126 We consider Transpower's proposed approach to intra-period smoothing between the years in RCP3 is sensible, as it contributes to pricing predictability. We note, however, that Transpower did not propose any form of inter-period smoothing between regulatory periods, and this is a more complex issue. Total forecast revenues for both Transpower's high-voltage alternating current (**HVAC**) and HVDC networks have downwards step changes of varying magnitudes in between RCP2 and RCP3 as well as a step up between RCP3 and an indicative revenue path for RCP4 for each network, based on current forecasts.
- 2.127 The design of Transpower's revenue path will determine the level of volatility of Transpower's yearly transmission revenues, which will in turn affect prices paid by Transpower's customers, and ultimately, end users of electricity. In our Process paper, we signalled that we considered pricing predictability could offer a benefit to Transpower's customers.
- 2.128 Smoothing the total forecast revenues could be beneficial, as it reduces volatility in Transpower's year-on-year total forecast revenues, and therefore would promote pricing predictability for Transpower's customers and, to a proportionately lesser extent, household consumers.
- 2.129 We did not smooth the total forecast revenues when we initially set the IPP for RCP2. We concluded that smoothing was not justified because any wash-up values and pass-through costs and recoverable costs up to then had not been material to the yearly revenue totals, and pricing predictability had not been an issue for Transpower's customers or electricity consumers.
- 2.130 However, such updates to revenues have to date become more substantial during RCP2, and we are of the view that the associated potential benefits of smoothing may now outweigh any additional costs and complexity (which we consider to be low). Also, smoothing the total forecast revenues would align the approach to setting revenues across the sector.
- 2.131 Revenue smoothing is not intended to change the economic value to Transpower of its total revenue. It is more about the timing of recovery of the allowable revenues from customers. To this extent revenue path design is a matter of timing, with the main consideration being minimising price shocks to Transpower's customers.
- 2.132 We see merit in Transpower's proposal to move to an approach where wash-up amounts and annual incentive amounts are accumulated for RCP3 in the EV account, but with its balance only applied to Transpower's total forecast revenues when we reset the IPP for RCP4 in 2024. Such an approach could reduce IPP compliance costs and further contribute to pricing predictability during RCP3.

2.133 The EV account is used to account for under/over-recovered revenues until the next available pricing year, with balances carried forward being adjusted at the WACC rate. These balances include annual revenue-path wash-up calculations and incentive calculations that have not yet been recovered from or returned to Transpower in revenue calculations.

2.134 The accumulation of EV account entries during RCP3 may result in a build-up of the EV account balance (in favour of either Transpower or its customers) to levels that could be more likely to result in price shocks when we set Transpower's total forecast revenues for RCP4. We have considered how this could be addressed by:

2.134.1 Transpower annually disclosing information that would give its customers advance warning of the revenue impact of accumulated EV account entries and of the resulting revenue that is likely to be applied under the transmission pricing methodology (**TPM**); and

2.134.2 introducing a mechanism to reopen the price path and recover some of the EV account balance in RCP3, if recovery of the forecast value of that balance at the end of RCP3 solely over RCP4 would be likely to cause a price shock to Transpower's customers in RCP4.⁶⁸

2.135 Our draft decisions on the revenue path design are discussed in more detail in Attachment J.

Customer engagement

2.136 In our Process paper we identified Transpower's approach to customer consultation as one of the focus areas for our review of Transpower's proposal. We indicated that while our scope for actively shaping Transpower's customer engagement for each reset is limited (as the Transpower IM Determination does not specify customer engagement requirements in the way the IMs for CPPs do for CPP applicants), we expected to see the following in Transpower's proposal:

2.136.1 clear evidence of how Transpower has considered customer preferences in shaping its expenditure forecasts and proposed quality measures and targets (revenue linked where applicable) for RCP3; and

⁶⁸ The mechanism to reopen the RCP3 price path would require a combination of drafting in the IPP determination and an amendment to the price path reconsideration provisions of the Transpower IM Determination. We announced on 16 May 2019 our intention to consider the amendment of the input methodologies to provide for this mechanism.

- 2.136.2 for Transpower to develop a customer engagement model where customer preferences drive the grid output targets, where appropriate, and where those targets define the expenditure proposal. This included providing for transparent engagement on the trade-off Transpower's customers have to make in weighing-up the amount of risk they are prepared to accept in exchange for the price they have to pay for transmission services (Transpower's revenues).
- 2.137 The Verifier of Transpower's proposal considered Transpower's consultation should have been more outcome-focussed, and that Transpower's testing of the price-quality balance was less effective than it could have been.
- 2.138 In our Issues paper, we noted that effective customer engagement will become even more important in preparing for RCP4 and beyond, as the anticipated increase in expenditures in those periods flow through to Transpower's customers in transmission prices, and ultimately to end-use consumers.
- 2.139 We set out in our Issues paper our views on:
- 2.139.1 expectations on Transpower to consult with stakeholders during RCP3, including how Transpower will consider transmission alternatives in its customer engagement and project prioritisation; and
 - 2.139.2 the effectiveness of Transpower's consultation with customers in preparing its proposal, and our expectations for how this should improve for RCP4.
- 2.140 Submitters on our Issues paper raised a number of concerns with the quality of Transpower's engagement during the current regulatory period (RCP2). They raised concerns about Transpower's consultation in preparing its proposal, including that it had been ad hoc, too late in the proposal process, and did not adequately test price-quality trade-offs.
- 2.141 The submitters supported initiatives to encourage Transpower to improve its engagement during RCP3.
- 2.142 Transpower considered its RCP3 pre-proposal engagement process went well, although it did acknowledge it intended to make improvements for RCP4. It has explained the steps it had already taken to improve its engagement with customers, and it has outlined its plans for further improving its engagement processes.

- 2.143 We are making our draft decision to encourage Transpower to become more open and transparent in its customer engagement during RCP3, so that Transpower's customers will:
- 2.143.1 feel they have an opportunity to engage with Transpower to influence more of its investment decisions throughout the regulatory period; and
 - 2.143.2 become more confident that Transpower is efficiently investing and operating in a way that reflects customer preferences.
- 2.144 Our draft decisions set out:
- 2.144.1 our expectation that Transpower would engage with stakeholders in developing its engagement plan for RCP3; and
 - 2.144.2 the possibility that we may seek updates during RCP3 to the engagement plan, if we consider the initial plan is not of sufficient quality.
- 2.145 Our evaluation and draft decisions on customer consultation are described in detail in Attachment K.

Asset management

- 2.146 In our Process paper we stated that we considered that a well-functioning, prudent and efficient transmission asset owner should understand the health and criticality of its assets and that this understanding should be used to inform a risk-based investment decision-making framework; ie, a framework that can inform likely asset outage impacts, and eventually lead to a better understanding of price/quality trade-offs that will directly inform its decision making on expenditure.
- 2.147 The two key inputs to an asset management approach that informs a risk-based investment decision-making framework are asset health and asset criticality.
- 2.148 Asset health reflects the likelihood of an asset failing due to its assessed condition, while asset criticality reflects the consequence of the asset failing, ie, how the asset affects network reliability and consumer supply.
- 2.149 Asset criticality modelling is about understanding the supply security consequences and outage implications of an asset within the context of the wider network.
- 2.150 We consider that improving asset health and criticality modelling should be one of the top priorities for Transpower over RCP3, especially given that it is signalling a significant expenditure uplift in RCP4 and RCP5.
- 2.151 We also consider that rather than modelling individual asset classes in isolation, Transpower's asset health and criticality modelling should be integrated to ensure Transpower understands the level of risk that the grid carries as a whole.

Asset health

- 2.152 While it may be impractical to derive detailed asset health models and perform asset condition assessments for all asset types, we expect that where asset health models are practical and useful, they should be developed and implemented.
- 2.153 The decision to derive asset health models and their level of complexity will be based on many considerations. However, for all primary assets, we would expect that sufficient asset health modelling is being carried out by Transpower and that adequate condition assessment processes exist to inform this modelling.
- 2.154 Conversely, we recognise that asset health models may not be appropriate for some secondary asset classes, and that simpler models may be more practical, with some replacement strategies necessarily being based on volumetric, age-based or technical obsolescence factors.
- 2.155 Despite these practicalities of deriving asset health models, how complex they are, and what processes exist for condition assessments to inform them, asset health modelling has benefits. Asset health models inform expenditure decision making and not just decisions to replace an asset. These models also assist in determining if it is economic to refurbish an asset, how long refurbishment is likely to provide a benefit, and the timing of expenditure intervention.

Asset criticality

- 2.156 We consider that asset criticality understanding is also a key input to effective asset management because:
- 2.156.1 it can provide timely, risk-based signals for refurbishment/replacement investment decisions that reliability outcomes may not provide;
 - 2.156.2 it allows asset refurbishment and replacement strategies to be compared across the asset fleet, and prioritisation decisions can be made if a common criticality measure is employed (eg, a monetised approach to risk);
 - 2.156.3 it can provide connected parties and stakeholders with an informed estimate of the likely outage risk that they face, linked to the price they are required to pay; and
 - 2.156.4 it can provide Transpower with the ability to use network risk estimates to set performance measures and targets based on their investment strategy, rather than using historical performance as a predictor of future performance.

The Verifier's comments

- 2.157 The Verifier reviewed Transpower's asset management practices that supported Transpower's proposal, analysed Transpower's asset data processes, and its asset health and asset criticality modelling.
- 2.158 It concluded that Transpower had made progress in developing asset health models to its target level of maturity in many key asset classes, and that its criticality framework appeared to be comprehensive. However, the Verifier:
- 2.158.1 lacked confidence in the level of data Transpower had in several asset classes;
 - 2.158.2 identified that there are several opportunities for improving Transpower's asset health and criticality modelling. While maturity of asset health modelling of some asset classes was well understood, such as for substation outdoor primary assets, other asset types require further development in this area, such as transmission line conductors, HVDC, reactive support plant and some secondary systems (eg, protection relays and substation site Direct Current (DC) control and protection supply systems);
 - 2.158.3 noted that there are considerable benefits in improving the life expectancy of some secondary assets and hence there are benefits from improved data and asset health modelling for these assets; and
 - 2.158.4 recommended that Transpower's asset health models can and should be refined for HVDC assets and the majority of individual reactive plant assets, using a facility approach rather than a fleet-based approach.
- 2.159 The Verifier made recommendations for asset health and criticality modelling improvements.
- 2.160 The Verifier report indicates that Transpower's use and understanding of asset health and criticality modelling across the asset fleet is progressing, but that there are some inconsistencies.
- 2.161 In some asset classes, notably the 'AC Substations – Power Transformers' asset class, Transpower uses and benefits from an in-depth level of asset health and criticality modelling. We consider that this is the level of asset management understanding that Transpower should aim for in all of its primary assets and certain of its secondary asset classes.
- 2.162 However, in some primary asset classes there are no asset health models (for example the HVDC and reactive support assets) and asset health modelling of key secondary assets is generally limited.

Submitters' views

- 2.163 Submitters to our Process paper supported greater use by Transpower of asset health and criticality frameworks to underpin investment decisions. One submitted that the timeframe for improving asset health and criticality modelling was not ambitious enough and that Transpower must achieve this by the end of RCP3. We agree.
- 2.164 In our Issues paper we sought views about submitter experience with asset health and criticality. We also indicated that we see the future application of asset health and criticality frameworks being combined to develop a network risk model. This type of model could enable the communication of network outage risk, for a variety of network investment strategies, to stakeholders and connected parties.
- 2.165 We tested ideas about how we might incentivise Transpower to prioritise development of a network risk model (which includes as inputs, asset health and criticality), and proposed several options to do this, including:
- 2.165.1 financial (dis)incentives using a regulatory compliance mechanism during RCP3 (2020-2025);
 - 2.165.2 independent review and reporting, for example, at the mid-point of RCP3 (which is our preferred option); and
 - 2.165.3 annual Transpower self-disclosure on progress using a regulatory compliance mechanism during RCP3.
- 2.166 Submitters on our Issues paper stated that it was important to improve asset health and asset criticality frameworks as soon as possible and that they should be mature at the end of RCP3.
- 2.167 Two submitters supported the proposed reporting and the idea of mid-RCP3 period expert review.
- 2.168 However, while Major Electricity Users' Group (**MEUG**) was supportive of our reporting measures, it also criticised these as being too weak, stating that:⁶⁹

The proposed preferred option by the Commission to require an independent verification part way through RCP3 to report progress in this area seems to us to be a continuation of the weak incentives to date leading to delays in RCP1 and RCP2 from making real progress.

⁶⁹ MEUG "Transpower's IPP for the next RCP - Issues paper" (28 February 2019), at [4.b)].

2.169 It has stated:⁷⁰

MEUG does not consider Transpower tested with customers the price-quality trade-off that we would expect from any business including capital intensive enterprises, in a workably competitive market.

2.170 Transpower made a number of statements about how it is progressing its risk modelling and ability to make the investment/quality outcome linkages stating that:⁷¹

Linking performance measures to planning is complex and we are on a maturity journey. In line with other transmission businesses, we have developed an incremental approach we believe is appropriate for Transpower's business. As we work through the complexities and our maturity evolves, the link between planned investment and likely performance outcomes is expected to become stronger and more transparent.

2.171 We consider that there are a number of benefits of having a functional network risk model, which will also allow Transpower to discuss the investment/risk trade-offs with stakeholders and connected parties. The submissions have indicated that this understanding is desirable.

2.172 In response Transpower noted that it has not identified any other transmission businesses pursuing an asset risk modelling approach in the way we are advocating.

2.173 However, the Verifier demonstrated in its report that one utility in Australia uses asset risk modelling, namely TransGrid, with its Investment Risk Tool. While this still appears to be developmental, it is an example of a transmission utility progressing towards using risk analysis to inform investment decision making and define investment/quality outcomes.

2.174 The Verifier also summarised the UK's Ofgem Common Network Asset Indices Methodology (**CNAIM**) approach for asset health, asset criticality and monetised risk for distribution network operators (**DNOs**) in the electricity distribution network sector. This framework links investment to potential quality outcomes.

2.175 We do not think that expecting Transpower to fully develop its asset health modelling and asset criticality frameworks, and to ultimately link these together to understand the risk profile of its network and assets is a bold step or an unreasonable one.

⁷⁰ Above n 69, at [9].

⁷¹ Transpower "Transpower's individual price-quality path for the next regulatory control period: issues paper" (28 February 2019), at 17.

- 2.176 The modelling may be complex but the international practice examples demonstrate that many utilities are starting to think like this and submitters are expecting Transpower to be able to discuss with them, in a more granular way, an understanding of investment/quality trade-offs. This is essentially what a risk model can do.
- 2.177 Our evaluation and draft decisions on asset management are described in detail in Attachment L.

Cost estimation

- 2.178 The main reason for addressing this issue is that we require more relevant information to improve our level of confidence on major capex and listed project allowances we may be called on to approve during RCP3 and for future regulatory periods.
- 2.179 The Capex IM requires us to assess cost estimates and set appropriate levels of allowances for base capex, listed projects and major capex projects.
- 2.180 In response to the Commission's suggested initiatives in RCP2, the system cost database, Transpower Enterprise Estimation System (**TEES**), has been further developed, and is now regularly updated with actual cost data. The Verifier has confirmed that the TEES system is consistent with GEIP for estimating systems used by utilities for developing capital expenditure and major project estimates.
- 2.181 Most non-volumetric projects have two components to their costs – standard scope applicable to all similar projects and project specific scope of work.⁷² The project specific scope and therefore costs require investigations and site visits to quantify. When assessing such cost estimates, we largely depend on the project specific scopes defined by Transpower and its consultants. The information we are requesting would provide us with a basis to assess such costs.
- 2.182 For example, the forecast end costs (**FEC**) and the approved amount for three recent reconductoring projects are below. As can be seen, two of them have significant variations between the approved cost and the FEC:
- 2.182.1 Bunnythorpe Haywards – FEC \$74.8m (approved Major Capex Project \$160m);
- 2.182.2 Central Park – Wilton B line – FEC \$7.9m (approved Listed Project \$11.6m);
and

⁷² Project specific scope includes site constraints of doing the work, access to the transmission lines, the number of major road or rail crossings.

- 2.182.3 Oteranga Bay – Haywards – FEC \$23.6m (approved Listed Project \$23.5m).
- 2.183 Project costs are estimated at many phases of a project’s development life cycle. For any project, the initial cost estimates are the least accurate and cost estimates become more accurate as the scope of a project is better defined.
- 2.184 The forecasts in the RCP proposal are often based on the scope of works defined at the pre-feasibility or preliminary study phase of a project.⁷³ Cost estimates derived at this phase have estimating accuracies of between 20% and 30%. Such inaccuracies can result in windfall gains or losses for non-volumetric projects.
- 2.185 We need to build confidence that the capex allowances we set are reasonable estimates of cost of the proposed projects and programmes:
- 2.185.1 For volumetric programmes the estimating errors are expected to balance out, but there can be economies of scale and economies of scope that may not be accounted for in a proposal;⁷⁴ and
- 2.185.2 For individual projects, which are expected to increase from RCP4 onwards, the chances of cost estimating inaccuracies could be high and these would result in windfall gains or losses for Transpower via the capex incentive mechanism.
- 2.186 To address these concerns, our preference is to require Transpower to report annually by 80 working days after the end of each disclosure year (ie, at the same time as an IPP compliance disclosure) to the Commission on the variances between cost estimates in the proposal, those in the delivery business case and actual costs.
- 2.187 This topic and our draft decisions are discussed in more detail in Attachment H.

⁷³ The estimates for major capex proposals submitted for our approval are also done at the Pre-feasibility or Preliminary study phase. The estimates for Listed projected are at the ‘detailed study’ phase at the time of our approval.

⁷⁴ Volumetric programmes are programmes where large quantities of the same assets are replaced, for example circuit breaker replacements.

Chapter 3 Key draft decisions for RCP3

Purpose of this chapter

- 3.1 The purpose of this chapter is to provide an overview of our draft decisions for the IPP reset.

Key draft decisions relating to the price-quality path

- 3.2 Table 3.1 below provides a summary of our draft decisions relating to the price-quality path, how these compare to the requirements that applied in RCP2, and our reasons for those draft decisions, and where further details can be found in this paper.

Table 3.1 Summary of draft decisions relating to the price-quality path

Draft decision for RCP3	Change from RCP2	Reasons
Regulatory period		
5-year RCP.	No change.	The Act requires us to set a 5-year period, unless a shorter period would better meet the purposes of Part 4 of the Act. We have not identified that a shorter period would better meet the purposes of Part 4 – we have identified potential additional costs for the ultimate consumers of Transpower’s services that would outweigh potential benefits. See Attachment J.
WACC used for draft decision		
5.13% WACC (pending final WACC rate to be set in October 2019)	N/A	We have assumed a WACC of 5.13% will apply to RCP3. This is the WACC electricity distribution businesses (EDBs) use for information disclosure purposes for disclosure year 2020. The WACC for EDBs and Transpower was similar during RCP2. The WACC is not set as part of the draft decision, but will be determined separately, in October. However, using a WACC estimate helps provide additional illustrative information about the implications of our draft IPP determination.
Quality standards and grid output measures		
Set quality standards and grid output measures for the GP1 and GP2 grid performance measures	Modified feature.	Change from the RCP2 measures, to measure interruption duration and outage across POS categories rather than customer category. Supported by Transpower’s consultation. The Verifier concluded the consultation on these measures was effective and the measures address areas likely to be of consumer concern. The refined measures are based on level of security, levels of demand and evaluation of economic consequence. See Attachment F.
Set quality standards and grid output measures for the AP1 and AP2 asset performance measures	Modified feature.	This is a continuation of the availability of HVDC and availability of HVAC measures, with updated targets, caps and collars. HVAC assets for AP2 measures have changed from RCP2. This was supported by Transpower’s consultation. See Attachment F.

Draft decision for RCP3	Change from RCP2	Reasons
<p>Adopt a "pooling" approach to setting quality standards for grid performance measures GP1 and GP2</p>	<p>New feature.</p>	<p>Pooling measures will help effectively increase the sample size and reduce the risk of breach due to setting standards based on POS with small numbers of data points.</p> <p>Pooling across time will help filter out single-year performance issues while highlighting potential deterioration in performance over multiple years.</p> <p>See Attachment F.</p>
<p>Adopt a "deadband zone" approach to setting quality standards for asset performance measures AP1 and AP2.</p>	<p>New feature.</p>	<p>The deadband provides a wider range for the standard, as AP measures are not being pooled. This will better reflect Transpower's historical performance.</p> <p>See Attachment F.</p>
<p>Set the GP-M grid performance measure, the number of unplanned interruptions of less than one minute's duration, as a non-revenue linked reporting measure.</p>	<p>Modified feature.</p>	<p>This measure is a development of the RCP2 measure PMD6 (energy not supplied for each POS for each unplanned interruption).</p> <p>Although Transpower did not propose to maintain it during RCP3, stakeholders supported its inclusion during Transpower's consultation, and we have kept it as a reporting requirement.</p> <p>See Attachment F.</p>
<p>Set a GP-M quality standard, the number of unplanned interruptions of less than one minute's duration.</p>	<p>New feature.</p>	<p>We propose to set this quality standard given submitter support in Transpower's consultation process.</p>
<p>Set asset health measures as quality standards and remove Transpower's proposed revenue-linkage.</p> <p>Asset health measure quality standards set between the percentage of assets with AHI>8 following proposed investment and percentage of assets with AHI>8 without intervention.</p>	<p>New feature.</p>	<p>An understanding of asset health is a cornerstone of effective asset management, and will help produce greater confidence around Transpower's expenditure forecasts for RCP4.</p> <p>Setting quality standards will incentivise Transpower to maintain minimum asset health levels and will also act as an intermediate step towards functional risk modelling.</p> <p>See Attachment F.</p>

Draft decision for RCP3	Change from RCP2	Reasons	
<p>Set revenue at risk across all grid output measures at +/- 1.46% of RCP3 revenue (including service performance measures).</p>	<p>Modified feature.</p>	<p>Total revenue at risk is a decrease (in percentage terms) compared to RCP2. Revenue at risk for the service performance measures (GP and AP) remains constant at 1.46%, with the decrease attributable to the fact that asset health is no longer revenue linked.</p> <p>The amount of revenue at risk balances the incentive effect against the extent to which customers are willing to pay for increased quality.</p> <p>See Attachment F.</p>	
<p>Capex</p>			
<p>Approve total base capex of \$1152.5m, comprised of:</p>	<p>Increase of \$8.9m over RCP2 spend (and forecast spend) of \$1,143.6m (\$2017/18), comprised of:</p>	<p>Decrease of \$50m from Transpower's proposal of \$1202.4m</p>	<p>Assessment of the consistency of Transpower's proposed base capex with:</p> <ul style="list-style-type: none"> - The general evaluation criteria set out in clause 6.1.1(2) of the Capex IM; and - The specific base capex evaluation criteria referred to in clause 6.1.1(3) of the Capex IM and specified in Schedule A of the Capex IM.
<ul style="list-style-type: none"> • Renewal capex – AC Substations of \$180.4m. 	<p>Decrease of \$121.3m from RCP2 expenditure of \$301.7m.</p>	<p>No change from Transpower's proposal.</p>	<p>In assessing the base capex, we were guided by whether it was consistent with an expenditure outcome that represents the efficient costs of a prudent supplier.</p>
<ul style="list-style-type: none"> • Renewal capex – ACS Buildings and Grounds of \$39.5m 	<p>Increase of \$8.1m from RCP2 expenditure of \$31.4m.</p>	<p>No change from Transpower's proposal.</p>	<p>To support our analysis, we used a Verifier to review Transpower's proposal prior to its submission to us. The Verifier reviewed approximately 90% of Transpower's proposed capex.</p>
<ul style="list-style-type: none"> • Renewal capex – Transmission Lines of \$452.7m 	<p>Increase of \$101.4m from RCP2 expenditure of \$351.3m.</p>	<p>No change from Transpower's proposal.</p>	<p>We assessed the Verification against the requirements of Clauses A1 and A2 of Schedule A of the Capex IM, and where gaps were identified, or further issues raised after the verification, sought additional information and performed additional analysis.</p>
<ul style="list-style-type: none"> • Renewal capex – HVDC and Reactive Assets of \$104.1m 	<p>Increase of \$67.3m from RCP2 expenditure of \$36.8m.</p>	<p>No change from Transpower's proposal.</p>	<p>We sought additional expert advice in reviewing the ICT capex programme, which resulted in a draft decision to reduce the approved amount by \$32.6m.</p>
<ul style="list-style-type: none"> • Renewal capex – Secondary Assets of \$200.2m 	<p>Increase of \$75.2m from RCP2 expenditure of \$125m.</p>	<p>No change from Transpower's proposal.</p>	

Draft decision for RCP3	Change from RCP2	Reasons	
<ul style="list-style-type: none"> • Enhancement and Development of \$59m 	Decrease of \$38.5m from RCP2 expenditure of \$97.5m.	Reduction of \$17.4m from Transpower's proposed amount of \$76.4m.	<p>We considered the uncertainty surrounding the E&D capex programme and have made a draft decision to approve Transpower's low-expenditure scenario amount.</p> <p>We recognise the original intention to reduce uncertainty was that the base capex adjustment mechanism (BCAM) would be used. However, we consider that the BCAM, as it currently stands, likely needs amending to appropriately balance the risks to consumers and Transpower.</p> <p>See Attachment G for discussion of base capex.</p>
<ul style="list-style-type: none"> • ICT Capex of \$113.6m 	Decrease of \$56m from RCP2 expenditure of \$169.5m.	Reduction of \$32.6m from Transpower's proposed amount of \$146.1m.	
<ul style="list-style-type: none"> • Business Support Capex of \$17.1m 	Decrease of \$13.3m from RCP2 expenditure of \$30.4m	No change from Transpower's proposal.	
<ul style="list-style-type: none"> • Adjustment for PQ and grid-related ICT benefits of -\$14.0m 	New feature.	No change from Transpower's proposal.	
Opex			
<p>Approve total RCP3 opex allowance of \$1,303.6m (\$2017/18), allocated against specific expenditure categories as below.</p>	Decrease of \$2.0m from Transpower's RCP2 forecast expenditure of \$1305.6m (2017/18 constant).	Reduction of \$39.3m from Transpower's proposed amount of \$1,342.9m.	<p>Assessment of the consistency of Transpower's proposed opex with:</p> <ul style="list-style-type: none"> - The general evaluation criteria set out in clause 6.1.1(2) of the Capex IM; and - The specific base capex evaluation criteria referred to in clause 6.1.1(3) of the Capex IM and specified in Schedule A of the Capex IM.
<ul style="list-style-type: none"> • Approve maintenance expenditure of \$538.9m. 	Increase of \$36.9m from Transpower's RCP2 maintenance opex forecast of \$502.0m.	Reduction of \$13.2m from Transpower's proposed amount of \$552.1m.	<p>In assessing the opex, we were guided by whether it was consistent with an expenditure outcome that represents the efficient costs of a prudent supplier.</p> <p>To support our analysis, we used a Verifier to review Transpower's proposal prior to its submission to us. The Verifier reviewed all of Transpower's</p>

Draft decision for RCP3	Change from RCP2	Reasons	
<ul style="list-style-type: none"> • Accept Transpower's proposed deliverability adjustment of -\$29.1m 	N/A	No change from Transpower's proposal.	proposed opex.
<ul style="list-style-type: none"> • Approve AM&O expenditure of \$309.2m. 	Increase of \$6.5m from Transpower's RCP2 forecast expenditure of \$302.6m.	Reduction of \$0.4m from Transpower's proposed amount of \$309.5m.	We assessed the Verification against the requirements of Clauses A1 and A2 of Schedule A of the Capex IM, and where gaps were identified, or further issues raised after the verification, sought additional information and performed additional analysis.
<ul style="list-style-type: none"> • Approve Business Support opex of \$220.6m 	Decrease of \$16.7m from Transpower's RCP2 forecast expenditure of \$237.3m.	Reduction of \$5.9m from Transpower's proposed amount of \$226.5m.	See Attachment I for discussion of opex.
<ul style="list-style-type: none"> • Approve ICT opex of \$195.9m 	Increase of \$4.3m from RCP2 expenditure of \$191.6m.	No change from Transpower's proposal.	
<ul style="list-style-type: none"> • Approve Insurance opex of \$68.1m 	Decrease of \$3.9m from RCP2 expenditure of \$72.1m.	Reduction of \$19.8m from Transpower's proposed amount of \$88.0m.	
<ul style="list-style-type: none"> • No allowance at this stage for costs of implementing new TPM 	N/A	<p>The cost and timing of moving to a new TPM is unknown. Costs incurred may be opex, capex or a mixture of both.</p> <p>We expect the Electricity Authority to make a s 54V request that we reconsider our IPP determination, at the time of any new TPM, which would enable us to adjust the price path to take into account any additional cost.</p>	

Draft decision for RCP3	Change from RCP2	Reasons
Revenue path design		
Annual revenues smoothed.	New feature.	Reduced volatility in revenue, will help produce pricing predictability for Transpower's customers, and indirectly, for consumers. See Attachment J.
Forecasts of pass-through and recoverable costs included within the smoothed revenue path.	New feature.	Forecasting these amounts enables them to be included within the smoothed price path. See Attachment J.
EV account balance forecast as at 30 June 2020, and recovery of the forecast amount included within the revenue path.	New feature.	Forecast and wash-up will enable the existing balance, at the end of RCP2, to be spread across RCP3 rather than carried forward to RCP4. See Attachment J.
Variance between these forecast amounts and the actual amounts annually washed up, with the difference included in the EV account.	Modified feature.	As the amounts are now forecast, only the variance between the forecast and actual amounts needs to be washed up. See Attachment J.
Recovery of amounts in the EV account deferred until RCP4.	New feature.	Deferring recovery of the EV account balance and recovering the RCP3 net balance over RCP4 will reduce the volatility in annual revenue by over- and under- forecasts. See Attachment J.
Mechanism to reopen the price path and recover some of the EV account balance in RCP3, if recovery of the balance over only RCP4 would be likely to cause a price shock to Transpower's customers.	New feature.	While our approach to accumulating wash-up amounts and incentives is not expected to lead to the EV account balance becoming overly large (either in favour of customers or Transpower), the mechanism will provide an additional layer of assurance. See Attachment J.

Draft decision for RCP3	Change from RCP2	Reasons
Pass-through and recoverable costs		
Fire and Emergency New Zealand levy treated as a recoverable cost.	New feature.	Uncertainty over the final form of the Fire Emergency New Zealand (FENZ) funding model means that this cost is uncertain, as well as being largely outside Transpower's control. See Attachment J.
Energy Complaints Scheme levy treated as a pass-through cost.	New feature.	This cost is outside Transpower's control, and treatment as a pass-through cost is consistent with the equivalent regulatory treatment of EDBs. See Attachment J.

Summary of key draft decisions relating to reporting requirements

3.3 Table 3.2 sets out our draft decisions relating to reporting requirements.

Table 3.2 RCP3 reporting requirements

Information provision requirement	Change from RCP2	Reason
Annual compliance reporting		
<p>Transpower to provide a (director-certified) statement of compliance with the price path when setting its prices through the TPM.</p> <p>Certified by Directors.</p> <p>Provided each November, within 5 days of announcement of the HVAC and HVDC amounts.</p>	<p>Existing feature.</p> <p>Additional requirement for independent assurance.</p>	<p>Disclosure of the information helps provide interested persons with assurance that Transpower is complying with its price path, and to have confidence in their assessments of whether the IPP is promoting the purpose of Part 4.</p>
<p>Annual compliance statement (ex-post) – statement of compliance with price path, quality standards, incentive calculations, and wash-up calculations.</p> <p>Reporting date 80 working days from end of period. (Changed from the end of the 3rd week of October).</p>	<p>Existing requirement.</p> <p>Change to timing of providing information.</p>	<p>Provides assurance to interested persons, including the Commission, that the disclosed information has been prepared in line with the IPP determination and input methodologies, and to have confidence in their assessments of whether the individual price-quality path is promoting the purpose of Part 4.</p>
<p>Statement of reasons for any non-compliance with the price path.</p>	<p>Existing feature.</p>	<p>Disclosure of the information helps provide interested persons with assurance that Transpower is complying with its price path, and to have confidence in their assessments of whether the IPP is promoting the purpose of Part 4.</p> <p>Information on non-compliance will help us assess the extent to which any enforcement action is warranted.</p>
<p>Statement of reasons for any non-compliance with any quality standard or, in cases where the quality standard is set at a value other than the collar and performance remains compliant with the quality standard, reasons for being outside the cap or collar of the incentive range.</p>	<p>Existing feature.</p>	<p>Disclosure of the information helps provide interested persons with assurance that Transpower is complying with its price path, and to have confidence in their assessments of whether the IPP is promoting the purpose of Part 4.</p> <p>Information on non-compliance will help us assess the extent to which any enforcement action is warranted.</p>

Performance and Breach reporting		
<p>Report breach of service performance measures (GP1 and GP2) at the same time as Annual Compliance Statement.</p> <p>Transpower to provide expert report within 80 working days from end of period of non-compliance with quality standard.</p>	Compliance	<p>Information on non-compliance with quality standards will be used to assess the extent to which enforcement action is warranted.</p> <p>Draft IPP determination provides detail of breach reporting requirements.</p>
<p>Report breach of availability measures (AP1 and AP2) at the same time as Annual Compliance Statement.</p> <p>Transpower to provide expert report within 80 working days from end of period of non-compliance with quality standard.</p>	Compliance	<p>Information on non-compliance with quality standards will be used to assess the extent to which enforcement action is warranted.</p> <p>Draft IPP determination provides detail of breach reporting requirements.</p>
<p>Report breach of service performance measure (GP-M) at the same time as Annual Compliance Statement.</p>	Compliance	<p>Information on non-compliance with quality standards will be used to assess the extent to which enforcement action is warranted.</p> <p>Draft IPP determination provides detail of breach reporting requirements.</p>
<p>Reporting related to service performance measures (GP1 and GP2).</p> <p>Reporting requirement when annual service performance quality standard is not met.⁷⁵</p> <p>Transpower to provide reporting at the same time as Annual Compliance Statement.</p>	Reporting	<p>Information will be used to understand reasons why the quality standard has not been met.</p>
<p>Reporting related to availability measures (AP1 and AP2).</p> <p>Reporting requirement when annual availability is in the deadband between the collar and the quality standard.</p> <p>Transpower to provide reporting at the same time as Annual Compliance Statement.</p>	Reporting	<p>Information will be used to understand reasons for performing below the collar.</p> <p>Reporting also to assess the reasonableness of the collar and quality standard settings.</p>

⁷⁵ For service performance GP1 and GP2, the quality standards and collars are the same.

<p>Reporting related to service performance measures (GP1 and GP2).</p> <p>Comprehensive reporting requirement for interruptions over 12 hours and interruptions causing a loss of supply of more than one system minute.</p> <p>Transpower to publicly report within 42 working days following each interruption.</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Reporting	Reporting will include cause(s) of the interruption, interruption date and time, duration of the interruption, impact on Transpower's customers, GXPs affected, actions that Transpower has taken to restore supply, and lessons learnt for the future.
<p>Reporting related to service performance measure (GP-M).</p> <p>Simple reporting to disclose momentary interruptions that affect customer supply.</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Reporting	Reporting will include cause(s) of the interruption, interruption date and time, duration of the interruption, impact on Transpower's customers, GXPs affected, and any reasons for not meeting the quality standard.
<p>Report on availability – return to service time (AP3) and communication of delays to planned outage return times (AP4).</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Reporting	<p>AP3 to measure and report daily outages of the 71 HVAC circuits from AP2 returned to service 2 or more hours after original return to service time estimate.</p> <p>AP4 to measure and report on the percentage of time 1.5 or more hours' notice given to market if assets returned to service late (based on original planned return to service time).</p> <p>We consider these measures would add value for stakeholders. Introducing these as a non-revenue-linked trial would help inform decisions around revenue-linkage in RCP4.</p> <p>See Attachment F.</p>
<p>Reporting related to asset availability measure (AP5).</p> <p>Simple reporting to disclose the extent to which Transpower places customers on N security.</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Reporting	Reporting will include information of the supply points affected by being placed on N security, how long these supply points are placed on N security and what steps Transpower has taken to inform affected customers.

<p>Report to disclose post-interruption event survey results of affected customers to assess timeliness of Transpower information provision following event (CS1).</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Reporting	Information considered of value to stakeholders. Propose that this is a trial measure that we may set as a quality standard in future.
Wash-ups and other technical price path reporting		
<p>Publishing the forecast MAR used for the pricing year, the HVAC revenue and the HVDC revenue.</p>	Existing feature	
<p>Publishing summary of pass-through costs and recoverable costs.</p>	Existing feature	
<p>Publishing explanations for any voluntary revenue reductions made by Transpower when setting its prices or carrying out its wash-up calculations.</p>	Existing feature	
<p>Publication of the rolled forward EV account balance.</p>	New feature	These requirements will increase transparency and help assist interested persons to form a view of Transpower’s performance against its price-quality path.
<p>Publication of approved base capex commissioned/spend.</p>	New feature	
<p>Publishing wash-up calculation resulting in EV account entry.</p>	Existing feature	
<p>Publishing EV account summary.</p>	Existing feature	
<p>Updated forecast summary of the EV account that demonstrates the forecast balance at the start of the next RCP.</p>	Modified feature	This will help inform interested persons about the potential impact on prices in RCP4.
<p>EV adjustment calculations (where a potential price shock triggers reopening).</p>	Modified feature	This will increase transparency and help assist interested persons to form a view of Transpower’s performance against its price-quality path.
<p>Publication of the forecast closing balance in the EV account for the final disclosure year of RCP2 (estimated balance at 30 June 2020 to be washed up when actual balance is calculated).</p>	New feature	This will increase transparency and help assist interested persons to form a view of Transpower’s performance against its price-quality path.

Transpower to annually publish and explain IRIS incentive amounts that Transpower will recover or bear based on its performance in the previous disclosure year.	New feature	This will increase transparency and help assist interested persons to form a view of Transpower's performance against its price-quality path.
Major capex projects and listed projects reopeners		
Transpower to submit director-certified and independently assured new maximum allowable revenue amounts for remaining pricing years of RCP3 within 80 working days of the end of the period of our approval of the capex amount under the reopener.	New requirement.	As the forecast MAR is no longer annually updated, the requirement to provide certified and independently assured updated forecasts can be restricted to when an amount of expenditure is approved for a listed project or major capex project. The resulting update ensures that the revenue impact from these projects is appropriately recognised.
Providing updated summary of approved base capex.	Existing feature.	Updating the base capex, in response to expenditure for a listed project being approved, provides transparency and ensures that incentive arrangements operate correctly.
Asset health developments reporting		
Transpower to produce a roadmap for developing asset and network risk modelling for RCP3 by 1 October 2020.	New feature	These reporting requirements will help incentivise Transpower to continue to improve data quality and maintain asset health.
Transpower to report annually on its progress towards implementing asset health models, risk-based decision-making frameworks,⁷⁶ and asset life-extension models.⁷⁷	Modified feature	Improved understanding of asset health will help ensure that Transpower's RCP4 forecasts can be relied upon. We consider Transpower should continue to develop its asset health models in line with the verification report recommendations and as discussed in Attachment G.
Mid-RCP independent expert assessment of Transpower's progress towards implementing asset health models, risk-based decision-making frameworks, and asset life-extension models.	New feature	We consider Transpower should also continue to develop its risk-based decision making frameworks and discuss this in Attachment L.
Introduce annual reporting on performance of Transpower's proposed asset health measures as though there was revenue at risk as a trial measure.	New feature	We will test how the asset health measures perform over RCP3 as if these were revenue linked with a view to revenue linking asset health in RCP4 (see Attachment F).

⁷⁶ Including a risk-based cost-benefit analysis (CBA) framework for secondary asset protection scheme capex planning, and to support the asset health models for HVDC assets and the life-extension models for substation management system assets.

⁷⁷ For substation management system assets.

<p>Disclosure of how Transpower would have performed in relation to the proposed revenue-linked asset health pilot scheme, had the scheme existed.</p>	<p>New feature</p>	<p>Mid-period review by an independent expert will help us better understand Transpower's progress on asset health developments such as asset health model development, risk-based investment decision-making and asset life-extension modelling (see Attachment F).</p>
<p>Cost estimation</p>		
<p>Transpower to report annually for completed projects on variances between cost estimates in Transpower's various capex proposals and the cost estimates included in the project delivery business cases.</p> <p>Reporting will include an expanded narrative on completed projects that vary +/-30% from their estimated costs.</p> <p>Transpower to provide annual summary report at the same time as Annual Compliance Statement.</p>	<p>New feature</p>	<p>We are seeking this information improve our level of confidence about Transpower's future RCP expenditure forecasts and cost estimates for listed projects and major capex proposals.</p> <p>We propose that this includes significant base capex projects, RCP2 and RCP3 listed project projects, and for all major capex projects.</p> <p>Some of this information will be disclosed to the Commission only, for commercial reasons.</p>
<p>Customer consultation</p>		
<p>Transpower to publish customer engagement plan for RCP3 by 1 October 2020.</p>	<p>New feature.</p>	<p>These requirements will encourage Transpower to become more open and transparent in its customer engagement during RCP3, so that customers are better able to engage with and influence Transpower, and become more confident that Transpower is efficiently investing and operating in a way that reflects customer preferences.</p>
<p>Transpower to report on the extent and effectiveness of its consultation in relation to actual base capex.</p>	<p>New feature.</p>	
<p>Transpower to publish post-project review for significant capex projects.</p>	<p>New feature.</p>	
<p>Transpower to obtain a mid-period independent expert opinion on its proposed engagement process leading up to its RCP4 proposal.</p>	<p>New feature</p>	<p>This will enable Transpower's customers to better understand proposed investment decisions relative to risk, and will promote meaningful opportunities for customers to engage with Transpower. It will also help Transpower to identify customer preferences and demonstrate how those preferences are influencing Transpower's expenditure priorities.</p>

Implementation

- 3.4 A summary of how we propose to implement our draft decisions is provided in Attachment C.

Attachment A How Transpower is regulated

Purpose of this attachment

- A1 The purpose of this attachment is to give context for the IPP by providing an overview of our forms of regulation that apply to Transpower.

Transpower's role

- A2 Transpower is a state-owned enterprise that owns and operates New Zealand's high-voltage electricity transmission system (ie, 'the National Grid'). Transpower transmits electricity from generators to substations at grid exit points (**GXPs**) where it is supplied to local EDBs or large industrial customers.
- A3 In addition to transmitting electricity throughout the National Grid, Transpower also manages the real-time coordination of the power system as the system operator. Transpower provides system operator services under its system operator service provider agreement (**SOSPA**) with the Electricity Authority,⁷⁸ and according to the requirements of the Code.

How Transpower is regulated

- A4 Both we, and the Electricity Authority, have a role in regulating the electricity lines services provided by Transpower.⁷⁹

How we regulate Transpower

- A5 We regulate Transpower under Part 4 of the Act. Part 4 "provides for the regulation of the price and quality of goods or services in markets where there is little or no competition and little or no likelihood of a substantial increase in competition."⁸⁰

⁷⁸ System operator service provider agreement between the Electricity Authority and Transpower New Zealand Limited, February 2016, available at: <https://www.ea.govt.nz/operations/market-operation-service-providers/system-operator/what-the-system-operator-does/>.

⁷⁹ See our fact sheet about our role in the electricity sector: Commerce Commission "Electricity and the Commerce Commission's role" (August 2018), available at: https://comcom.govt.nz/_data/assets/pdf_file/0029/89804/Electricity-and-the-Commerce-Commissions-role-Fact-sheet-August-2018.pdf.

⁸⁰ Section 52 of the Act.

A6 The purpose of Part 4 is:⁸¹

... to promote the long-term benefit of consumers in markets referred to in section 52 by promoting outcomes that are consistent with outcomes produced in competitive markets such that suppliers of regulated goods or services—

(a) have incentives to innovate and to invest, including in replacement, upgraded, and new assets; and

(b) have incentives to improve efficiency and provide services at a quality that reflects consumer demands; and

(c) share with consumers the benefits of efficiency gains in the supply of the regulated goods or services, including through lower prices; and

(d) are limited in their ability to extract excessive profits.

A7 Section 54Q of the Act is also relevant to the Capex IM. Section 54Q requires us to promote incentives, and avoid imposing disincentives, for suppliers of electricity lines services to invest in energy efficiency and demand-side management, and to reduce energy losses. Demand-side management and reduction of energy losses are of particular relevance to the Capex IM. The Capex IM provides for such matters to be taken into account in the assessment of Transpower's capital expenditure proposals. For example:⁸²

A7.1 loss reductions are included as a market benefit under our quantitative investment test for major capex.⁸³ This is intended to promote investment options that result in lower transmission losses over those that do not (other factors being equal);

A7.2 we require close attention be given to the process for identification and consideration of transmission alternatives.⁸⁴ This is intended to result in greater consideration being given to investment options that improve network utilisation: for example, load shifting or peak shaving, demand-inter-trip schemes, and operation of local generation.

⁸¹ Section 52A of the Act.

⁸² Commerce Commission "Transpower Capital Expenditure Input Methodology: Reasons paper" (31 January 2012), [1.3.11]-[1.3.12].

⁸³ The investment test is an assessment of the costs and benefits of potential investments using discounting of relevant costs and benefits in the electricity market over a defined calculation period to identify a preferred investment option (set out in Schedule D of the Capex IM).

⁸⁴ Transmission alternatives are alternatives to investment in the grid. Where use of a transmission alternative avoids a transmission investment that would otherwise be major capex, the transmission alternative is classified as a 'non-transmission solution' (see the definition of 'non-transmission solution' in the Capex IM).

- A8 Under Part 4, Transpower is subject to two types of regulation:
- A8.1 IPP regulation:⁸⁵ Under Part 4 of the Act we are responsible for determining an IPP in relation to the electricity lines services supplied by Transpower. The IPP we set under this regulation determines the maximum revenues that Transpower can recover from customers, as well as the quality standards it must meet, for each year of each five-year regulatory period.⁸⁶ The IPP for RCP2, which applies for the five-year regulatory period ending 31 March 2020, is set out in the *Transpower Individual Price-Quality Path Determination 2015* [2014] NZCC 35 (the **Transpower IPP Determination**).
- A8.2 Information disclosure (**ID**) regulation:⁸⁷ This form of regulation enables us to require Transpower to publicly disclose certain information to allow interested persons to assess whether the Part 4 purpose is being met. The ID requirements for Transpower are set out in the *Transpower Information Disclosure Determination 2014* [2014] NZCC 5 (the **Transpower ID Determination**). The ID requirements do not apply to a specific regulatory period and continue to apply until they are revoked or amended under s 52Q of the Act.
- A9 These regulatory mechanisms are supported by IMs, which set out the underlying rules, requirements, and processes that must be applied by us when we determine Transpower's IPP and ID requirements. The IPP and ID determinations also stipulate which IMs apply.⁸⁸ There are two IM determinations that apply to Transpower:
- A9.1 *Transpower Input Methodologies Determination 2010* [2012] NZCC 17, as amended and consolidated as at 28 February 2017 (the **Transpower IM Determination**). This determination was reviewed as part of the 2015/16 IM review.⁸⁹ It sets out methodologies for:
- A9.1.1 Cost allocation;
 - A9.1.2 Asset valuation;
 - A9.1.3 Treatment of taxation;
 - A9.1.4 Cost of capital;

⁸⁵ The Commerce (Part 4 Regulation – Transpower) Order 2010.

⁸⁶ Under s 53M(4) of the Act, a regulatory period must be five years, but under s 53M(5) the Commission may set a period of four years if it considers this would better meet the Part 4 purpose.

⁸⁷ Section 54F of the Act.

⁸⁸ Both we and Transpower are required to apply the IMs.

⁸⁹ We published the majority of our decisions on the 2015/16 IM review in December 2016. Those decisions covered all aspects of the Transpower IM Determination except for decisions on the IRIS, which were published on 29 June 2017.

- A9.1.5 Specification of price;
- A9.1.6 IRIS; and
- A9.1.7 Reconsideration of the price-quality path.

A9.2 *Transpower Capital Expenditure Input Methodology Determination 2012* [2012] NZCC 2, as amended and consolidated as at 1 June 2018 (**Capex IM**). Broadly, the Capex IM sets out five things:

- A9.2.1 the process for submitting, assessing, and approving Transpower's base capex proposals;
- A9.2.2 the process for submitting, assessing, and approving Transpower's major capex proposals;
- A9.2.3 a number of capex-related incentives, which are applied through the IPP;
- A9.2.4 the requirements for Transpower to propose grid output measures, which may then be set as quality measures in the IPP; and
- A9.2.5 the requirements for Transpower to provide an integrated transmission plan (**ITP**). The purpose of the ITP is to explain Transpower's view of the long-term operation and development of the grid.

A10 Part 4 applies to both the transmission services and system operator services supplied by Transpower.⁹⁰ However, we have not included the revenues and costs associated with Transpower's system operator services in the IPP. This is because we consider that the existence of a separate arm's-length contract (the SOSPA referred to above) between Transpower and the Electricity Authority for these services should result in outcomes consistent with the Part 4 purpose for those services. As such, the Capex IM does not currently apply to capital expenditure relating to the SOSPA.⁹¹

⁹⁰ Section 150(1) of the Electricity Industry Act 2010 amended the definition of 'electricity lines services' under section 54C(1) of the Act to clarify that system operator services are included as part of the conveyance of electricity by line, and hence are regulated services under Part 4.

⁹¹ For similar reasons, the Capex IM will not usually apply to capital expenditure relating to contracts for transmission services between Transpower and another party where the party that is contracting with Transpower agrees in writing that the terms and conditions are reasonable or reflect workable or effective competition for the provision of the goods and services. These are referred to as 'new investment contracts'. Above n 82, at [2.4.14].

The Electricity Authority's role in regulating Transpower

- A11 The Electricity Authority's statutory objective is to promote competition in, reliable supply by, and the efficient operation of, the New Zealand electricity industry for the long-term benefit of consumers.⁹² The Electricity Authority develops, administers and enforces the Code; contracts with service providers to operate the electricity market and system; and analyses and monitors performance of the electricity market and industry.
- A12 The Electricity Authority's functions with respect to Transpower include:
- A12.1 Setting the Grid Reliability Standards (**GRS**).⁹³ The GRS are a set of standards against which the reliability performance of the existing grid (or future developments to it) can be assessed.
 - A12.2 Setting the guidelines that Transpower must follow when developing the TPM. The TPM sets out how Transpower's total transmission revenue (as approved by the Commission) is allocated between transmission customers that are required to pay the charges calculated under the TPM. The Electricity Authority is currently reviewing the TPM guidelines.
 - A12.3 Setting requirements regarding the use, and contents, of transmission agreements, including setting a default transmission agreement. Transmission agreements are the contracts Transpower has with distribution companies, major users that are directly connected to the grid, and generators that are directly connected to the grid.
 - A12.4 Establishing requirements regarding interconnection asset services – for example, providing information on capacity, reliability, and availability of those assets.⁹⁴
 - A12.5 Contracting Transpower to provide system operator services. The system operator is responsible for the real-time coordination of the power system, including scheduling and dispatching electricity in a manner that avoids undue fluctuations in frequency and voltage on the transmission grid.
 - A12.6 Contracting Energy Market Services, a division of Transpower, to act as financial transmission rights (**FTR**) manager. The FTR manager is responsible for the creation and allocation of FTRs.

⁹² See: <http://www.ea.govt.nz/>.

⁹³ The GRS are set out in Schedule 12.2 of the Code.

⁹⁴ Subpart 6 of Part 12 of the Code.

Linkages between our regulation of Transpower and that of the Electricity Authority

- A13 Section 54V of the Act sets a number of requirements for us and the Electricity Authority to interact on certain matters relating to our respective roles in regulating the electricity industry, including Transpower. We also have a memorandum of understanding with the Electricity Authority with respect to our respective roles in the electricity industry.⁹⁵
- A14 Some aspects of the Electricity Authority's role with respect to Transpower are particularly relevant to the Capex IM:
- A14.1 The GRS that the Electricity Authority has set in the Code are incorporated by reference into our definition of 'major capex' as well as the investment test we apply when assessing major capex proposals.⁹⁶
- A14.2 The Electricity Authority's concept of GEIP is incorporated by reference into the Capex IM as follows:⁹⁷
- A14.2.1 as a factor we may consider when evaluating a major capex proposal;⁹⁸
- A14.2.2 Transpower must demonstrate how a proposed major capex investment reflects GEIP;⁹⁹ and
- A14.2.3 under the investment test for major capex, Transpower must quantify its project costs using GEIP.¹⁰⁰

⁹⁵ Memorandum of Understanding between the Electricity Authority and the Commerce Commission, (December 2010), available at: https://comcom.govt.nz/_data/assets/pdf_file/0029/60788/MOU-Electricity-Authority-and-Commerce-Commission-December-2010.pdf.

⁹⁶ Clause 1.1.5 and Schedule D of the Capex IM.

⁹⁷ 'Good electricity industry practice' is defined in Part 1 of the Code as: **good electricity industry practice** in relation to transmission, means the exercise of that degree of skill, diligence, prudence, foresight and economic management, as determined by reference to good international practice, which would reasonably be expected from a skilled and experienced **asset** owner engaged in the management of a transmission network under conditions comparable to those applicable to the **grid** consistent with applicable law, safety and environmental protection. The determination is to take into account factors such as the relative size, duty, age and technological status of the relevant transmission network and the applicable law [bold terms in original].

⁹⁸ Clause C2(a)(i) of the Capex IM.

⁹⁹ Clause G5(12) of the Capex IM.

¹⁰⁰ Clause D6(6) of the Capex IM.

- A15 GEIP is also relevant to our assessment of Transpower's IPP proposals. As noted in our RCP2 decision paper, we consider that GEIP reflects the appropriate planning and performance standards for a prudent supplier.¹⁰¹ As such, we had regard to GEIP when considering whether Transpower's RCP2 base capex proposal was consistent with an expenditure outcome representing the efficient costs of a prudent supplier. We consider this concept to be consistent with the Part 4 purpose, which is a required consideration under the capex evaluation criteria.¹⁰²
- A16 The Electricity Authority is currently reviewing the TPM guidelines and considering new TPM guidelines that would lead to a change in the way transmission charges are shared among transmission customers.¹⁰³ Relevantly, the Electricity Authority is considering changing the TPM guidelines to make transmission charges more service-based and cost-reflective. The Electricity Authority is preparing a formal proposal for consultation purposes.¹⁰⁴ If the Electricity Authority ultimately changes the TPM guidelines in the manner noted above, we expect this would heighten the interests of parties that would benefit from (and pay for) specific transmission investments in our processes for assessing Transpower's capex proposals.

¹⁰¹ *Setting Transpower's individual price-quality path for 2015 – 2020* [2014] NZCC 23 (29 August 2014), at [5.29].

¹⁰² Clause 6.1.1(2)(b) of the Capex IM.

¹⁰³ See: <http://www.ea.govt.nz/development/work-programme/pricing-cost-allocation/transmission-pricing-review/>.

¹⁰⁴ See: <https://www.ea.govt.nz/development/work-programme/pricing-cost-allocation/transmission-pricing-review/development/progress-update-on-tpm-review/>.

Attachment B Regulatory framework and evaluation approach for the IPP reset

Purpose of this attachment

- B1 The purpose of this attachment is to describe the high-level framework and evaluation approach we have applied in reaching our draft decisions for the IPP reset. It explains:
- B1.1 the relevant requirements under the Act;
 - B1.2 the IMs we must follow to assess Transpower's proposal and to reach our decisions on an IPP for Transpower; and
 - B1.3 how we have evaluated Transpower's proposal.

What we are required to do under the Commerce Act 1986

- B2 Part 4 of the Act provides for the regulation of the price and quality of goods or services in markets where there is little or no competition and little or no likelihood of a substantial increase in competition.¹⁰⁵ For an overview of the regulation applying to Transpower, see Attachment A.
- B3 Transpower is subject to IPP regulation under Part 4.¹⁰⁶ Transpower is also subject to ID regulation under Part 4.¹⁰⁷
- B4 We are in the process of setting an IPP for Transpower for RCP3. We are aiming to complete this process by 28 November 2019. The IPP will set out:¹⁰⁸
- B4.1 the maximum revenue which Transpower can charge for each pricing year of RCP3 (an explanation of the link between forecast expenditures and Transpower's revenues and pricing is provided in Chapter 6 of our Process paper);^{109, 110}

¹⁰⁵ Section 52 of the Act.

¹⁰⁶ The individual price-quality path provisions of s 53ZC apply to Transpower by way of an Order in Council under s 52N of the Act. The Order in Council came into force on 1 October 2010 and expires 20 years later, on 30 September 2030.

¹⁰⁷ Section 54F of the Act.

¹⁰⁸ Section 53M of the Act sets out the necessary components of a price-quality path.

¹⁰⁹ Above n 31, at Chapter 6.

- B4.2 the quality standards that will apply to Transpower, some of which may be revenue linked;¹¹¹ and
- B4.3 the regulatory period, for which we are proposing five years.
- B5 We have a broad discretion to determine the IPP under section 53ZC of the Act:
- 53ZC Price-quality path for individual businesses
- (1) If individual price-quality regulation applies to goods or services supplied by a supplier, the Commission may set the price-quality path for that supplier using any process, and in any way, it thinks fit, but must use the input methodologies that apply to the supply of those goods or services.
- (2) The following provisions of subpart 6 apply (with all necessary modifications) where individual price-quality regulation is imposed:
- (a) sections 53M and 53N;¹¹²
- (b) section 53ZB.¹¹³
- B6 In exercising this discretion, we must apply the relevant IMs:
- B6.1 The **Transpower IM Determination**, which we must apply in determining key inputs of the calculation of maximum revenue under the IPP;¹¹⁴ and
- B6.2 The **Capex IM**,¹¹⁵ which we must apply in setting:
- B6.2.1 Transpower's base capex allowances for RCP3 and any base capex allowance adjustment mechanism;
- B6.2.2 grid output measures;
- B6.2.3 incentives for Transpower; and

¹¹⁰ Transpower's pricing years run from 1 April through to 31 March. This is to align with the pricing years of electricity distributors, as the Transpower lines charges are combined for consumers with distributors' charges. Transpower's financial forecasts and actual financial performance are measured and reported on the basis of its financial reporting years ending 30 June. We match up each disclosure year which end on 30 June with the nearest preceding pricing year for revenue setting purposes.

¹¹¹ Clause 2.2.1 of the Capex IM.

¹¹² Section 53M relates to the content and timing of price-quality paths, and s 53N relates to monitoring compliance with price-quality paths.

¹¹³ Section 53ZB sets out what happens to price-quality paths if IMs change.

¹¹⁴ Above n 67.

¹¹⁵ Above n 43.

B6.2.4 the base capex projects or programmes to be included in the IPP as 'listed projects'.

B7 When determining the IPP we must make decisions that promote the purpose of Part 4 of the Act. The purpose of Part 4 as stated in s 52A is:

... to promote the long-term benefit of consumers ... by promoting outcomes that are consistent with outcomes produced in competitive markets such that suppliers of regulated goods or service –

- (a) have incentives to innovate and to invest, including in replacement, upgraded, and new assets; and
- (b) have incentives to improve efficiency and provide services at a quality that reflects consumer demands; and
- (c) share with consumers the benefits of efficiency gains in the supply of the regulated good or services, including through lower prices; and
- (d) are limited in their ability to extract excessive profits.

Assessing Transpower's base capex proposal

- B8 In assessing Transpower's base capex proposal, we will be guided by whether the proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier.¹¹⁶
- B9 We consider this concept to be consistent with the Part 4 purpose, which is a required consideration under the capex evaluation criteria.¹¹⁷
- B10 In applying this concept, we consider that a 'prudent supplier' is a supplier whose planning and performance standards reflect GEIP. A useful definition of GEIP, in relation to electricity transmission services, is found in the Electricity Industry Participation Code 2010 (**Code**).¹¹⁸

¹¹⁶ Above n 65, at [A15].

¹¹⁷ Clause 6.1.1(2)(b) of the Capex IM.

¹¹⁸ 'Good electricity industry practice' is defined in Part 1 of the Code as: **good electricity industry practice** in relation to transmission, means the exercise of that degree of skill, diligence, prudence, foresight and economic management, as determined by reference to good international practice, which would reasonably be expected from a skilled and experienced **asset** owner engaged in the management of a transmission network under conditions comparable to those applicable to the **grid** consistent with applicable law, safety and environmental protection. The determination is to take into account factors such as the relative size, duty, age and technological status of the relevant transmission network and the applicable law [bold terms in original].

- B11 In evaluating the base capex expenditure proposal in Transpower’s proposal, we must apply the evaluation criteria in the Capex IM, being:
- B11.1 the general evaluation criteria set out in clause 6.1.1(2) of the Capex IM (**general capex evaluation criteria**); and
 - B11.2 the specific base capex evaluation criteria referred to in clause 6.1.1(3) of the Capex IM and specified in Schedule A of the Capex IM (**base capex evaluation criteria**).
- B12 These are together referred to as the **capex evaluation criteria**.
- B13 The general capex evaluation criteria are:¹¹⁹
- B13.1 whether what is proposed is consistent with the Transpower IM Determination and the Capex IM;
 - B13.2 the extent to which what is proposed will promote the purpose of Part 4 of the Act; and
 - B13.3 whether the data, analysis, and assumptions underpinning what is proposed are fit for the purpose of the Commission exercising its powers under Part 4 of the Act, which includes consideration of the accuracy and reliability of data and the reasonableness of assumptions and other matters of judgement.
- B14 The base capex evaluation criteria are specified in Schedule A of the Capex IM. They include:
- B14.1 general factors we must have regard to when evaluating Transpower’s proposal, such as reasonableness of key assumptions, overall deliverability of the proposed base capex during the current regulatory period, and the extent to which grid output targets were met in the previous regulatory period;
 - B14.2 a non-exhaustive list of criteria we may use when evaluating each identified programme of work set out in the base capex proposal, such as reviewing the process Transpower used to determine each identified programme’s reasonableness and cost effectiveness;¹²⁰ and

¹¹⁹ Clause 6.1.1(2) of the Capex IM.

¹²⁰ Identified programmes are base capex projects or programmes of work which are forecast to be undertaken by Transpower in the next regulatory period (in this case, RCP3), and they are selected by

B14.3 a list of evaluation techniques we may employ, such as process benchmarking, and process and functional modelling.

B15 The base capex evaluation criteria are not exhaustive, and the weighting of different criteria is at our discretion. Also, while Transpower is required to submit a base capex proposal,¹²¹ the final decisions on Transpower's base capex allowances ultimately rest with the Commission. We are not required to agree with Transpower about any aspect of the proposed expenditure allowances.

Assessing Transpower's opex proposal

B16 In contrast to base capex, there is no IM that sets out rules about how we should determine or evaluate forecast opex for RCP3. However, we consider the criteria to be applied should not be materially different to the criteria that apply to base capex, particularly given the need to direct capex expenditure towards achieving cost-effective and efficient solutions, and the potential cost trade-offs between capex and opex that this implies.

B17 Therefore, consistent with our approach to assessing base capex, in assessing opex we will be guided by:

B17.1 the extent to which what Transpower proposes will promote the purpose of Part 4 of the Act; and

B17.2 where they can be usefully applied to opex, the base capex evaluation criteria.

B18 In considering the extent to which Transpower's opex proposal will promote the Part 4 purpose, we will be guided by whether Transpower's proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier (ie, where a 'prudent supplier' is a hypothetical transmission business facing the same circumstances as Transpower whose planning and performance standards reflect GEIP).

Assessing Transpower's proposed grid output measures

B19 As defined in the Capex IM, a 'grid output measure':¹²²

means a measure that quantifies the output or benefit (where 'benefit' may include reduction in risk) delivered by the **grid**, investment in the **grid**, or expenditure facilitating or enabling future investment in the **grid**

reference to categories or criteria agreed between the Commission and Transpower under clause 2.2.1 of the Capex IM prior to Transpower submitting its expenditure proposal.

¹²¹ Clause 2.2.1(3) and Part 7 of the Capex IM.

¹²² Clause 1.1.5 of the Capex IM.

- B20 The Capex IM requires Transpower to propose, and for us to set, certain types of grid output measures, while providing Transpower with the opportunity to also propose other grid output measures.¹²³
- B21 In setting the grid output measures, we are primarily seeking to provide Transpower with incentives to provide services at a quality that reflects consumer demands, in line with the Part 4 purpose. We must also apply the evaluation criteria in Schedule A of the Capex IM relating to grid output measures, which include (for example):¹²⁴
- B21.1 the extent to which a measure is a recognised measure of either or both:
- B21.1.1 risk in the supply of electricity transmission services; and
- B21.1.2 performance of the supply of electricity transmission services; and
- B21.2 the relationship between the grid output measure and expenditure by Transpower.
- B22 The Capex IM provides for two types of grid output measures: revenue linked and non-revenue linked.¹²⁵
- B23 Under any revenue-linked grid output measures, Transpower will be rewarded for outperforming the performance targets and penalised for underperforming the performance targets, as a quality incentive under section 53M(2) of the Act.
- B24 For the revenue-linked grid output measures, we will determine:¹²⁶
- B24.1 grid output targets;
- B24.2 caps – to limit the amount of positive revenue adjustment;
- B24.3 collars – to limit the amount of negative revenue adjustment; and
- B24.4 grid output incentive rates – the amount of money at risk for each unit of output between the cap and the collar.
- B25 We determine how the quality standards we set for Transpower are prescribed, but these standards must be based on, and be consistent with, any quality standards for Transpower as set by the Electricity Authority under the Code.¹²⁷

¹²³ Clause 2.2.2 of the Capex IM.

¹²⁴ Clauses A4-A6 of the Capex IM.

¹²⁵ Clause 2.2.2 of the Capex IM.

¹²⁶ Clause 2.2.2(1)(d) of the Capex IM.

Attachment C How we propose to implement our draft decisions

Purpose of this attachment

C1 The purpose of this attachment is to explain how we intend to give effect to our draft decisions for the IPP reset.

Summary of requirements

C2 Our draft decisions, the applicable draft deliverable, and how we intend to use our powers under the Act to give effect to these decisions are summarised below in Table C1 and Table C2. We note that ID requirements proposed under s 53B of the Act are included in the draft IPP determination.

Table C1 Summary of draft decisions relating to the Transpower IPP

Draft decision	Draft deliverable or intended deliverable	Applicable provision in the Act
Regulatory period		
5-year regulatory control period	Draft IPP determination	Section 53M(1)(c) and s 53ZC(2)(a)
5.13% WACC (pending final WACC rate to be set in October 2019)	Cost of capital determination for Transpower's IPP from 1 April 2020	Section 52S (applying the Transpower IM Determination applying to an IPP in respect of the cost of capital) and s 52P
Quality standards and grid output measures		
Set quality standards and grid output measures for the GP1 and GP2 grid performance measures	Draft IPP determination	<ul style="list-style-type: none"> Quality standards are made under s 53M(1)(b) and s 53ZC(2)(a) Revenue-linked incentives made under s 53M(2) and s 53ZC(2)(a)

¹²⁷ Sections 53M(3) and 54V(6) of the Act.

Draft decision	Draft deliverable or intended deliverable	Applicable provision in the Act
Set quality standards and grid output measures for the AP1 and AP2 asset performance measures	Draft IPP determination	<ul style="list-style-type: none"> Quality standards are made under s 53M(1)(b) and s 53ZC(2)(a) Revenue-linked incentives made under s 53M(2) and s 53ZC(2)(a)
Adopt a "pooling" approach to setting quality standards for grid performance measures GP1 and GP2	Draft IPP determination	Section 53M(1)(b) and s 53ZC(2)(a)
Adopt a "deadband zone" approach to setting quality standards for asset performance measures AP1 and AP2.	Draft IPP determination	Section 53M(1)(b) and s 53ZC(2)(a)
Set the GP-M grid performance measure, the number of unplanned interruptions of less than one minute's duration, as a non-revenue linked reporting measure.	Draft IPP determination	Section 53M(1)(b) and s 53ZC(2)(a)
Set a GP-M quality standard, the number of unplanned interruptions of less than one minute's duration.	Draft IPP determination	Section 53M(1)(b) and s 53ZC(2)(a)
Set asset health measures as quality standards and remove Transpower's proposed revenue-linkage. Asset health measure quality standards set between the percentage of assets with AHI>8 following proposed investment and percentage of assets with AHI>8 without intervention.	Draft IPP determination	Section 53M(1)(b) and s 53ZC(2)(a)
Set revenue at risk across all grid output measures at +/- 1.46% of RCP3 revenue (including service performance measures).	Draft IPP determination	Section 53M(2) and s 53ZC(2)(a)

Draft decision	Draft deliverable or intended deliverable	Applicable provision in the Act
Capex		
<p>Approve total base capex of \$1152.5m, comprised of:</p> <ul style="list-style-type: none"> • Renewal capex – AC Substations of \$180.4m. • Renewal capex – ACS Buildings and Grounds of \$39.5m. • Renewal capex – Transmission Lines of \$452.7m. • Renewal capex – HVDC and Reactive Assets of \$104.1m. • Renewal capex – Secondary Assets of \$200.2m. • Enhancement and Development of \$59m. • ICT Capex of \$113.6m. • Business Support Capex of \$17.1m • Adjustment for PQ and grid-related ICT benefits of -\$14.0m. 	Draft IPP determination	Section 52S (applying the Capex IM, s 53M(1)(a)(ii) and s 53ZC(2)(a)
Opex		
<p>Approve total RCP3 opex allowance of \$1,303.6m (\$2017/18), allocated against specific expenditure categories as below:</p> <ul style="list-style-type: none"> • Approve maintenance expenditure of \$538.9m. • Accept Transpower’s proposed deliverability adjustment of -\$29.1m • Approve AM&O expenditure of \$309.2m. • Approve Business Support opex of \$220.6m. • Approve ICT opex of \$195.9m. • Approve Insurance opex of \$68.1m. 	Draft IPP determination	Section 53M(1)(a)(ii) and s 53ZC(2)(a)
No allowance at this stage for costs of implementing new TPM	N/A	N/A
Revenue path design		
Annual revenues smoothed.	Draft IPP determination	Section 53M(1)(a)(ii) and s 53ZC(2)(a)

Draft decision	Draft deliverable or intended deliverable	Applicable provision in the Act
Forecasts of pass-through costs and recoverable costs included within the smoothed revenue path.	Draft IPP determination	Section 53M(1)(a)(ii) and s 53ZC(2)(a)
EV account balance forecast as at 30 June 2020, and recovery of the forecast amount included within the revenue path.	Draft IPP determination	Section 53M(1)(a)(ii) and s 53ZC(2)(a)
Variance between these forecast amounts and the actual amounts annually washed up, with the difference included in the EV account.	Draft IPP determination	Section 53M(1)(a)(ii) and s 53ZC(2)(a)
Recovery of amounts in the EV account deferred until RCP4.	Draft IPP determination	Section 53M(1)(a)(ii) and s 53ZC(2)(a)
Mechanism to reopen the price path and recover some of the EV account balance in RCP3 if recovery of the balance over only RCP4 would be likely to cause a price shock to Transpower's customers.	Draft IPP determination and draft Transpower IM amendments determination	Section 52X, s 53M(1)(a)(ii) and s 53ZC(2)(a)
Pass-through and recoverable costs		
FENZ levy treated as a recoverable cost.	Draft Transpower IM amendments determination	Section 52X
Energy Complaints Scheme levy treated as a pass-through cost.	Draft Transpower IM amendments determination	Section 52X

Table C2 Summary of draft decisions relating to reporting requirements

Information requirements	Draft deliverable or intended deliverable	Applicable provision in the Act
Annual compliance reporting		
Transpower to provide a director-certified statement of compliance with the price path when setting its prices through the TPM. Certified by Directors. Provided each November, within 5 days of announcement of the HVAC and HVDC revenue amounts.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Annual compliance statement (ex-post) – statement of compliance with price path, quality standards, incentive calculations, and wash-up calculations. Reporting date 80 working days from end of period. (Changed from the end of the 3rd week of October).	Draft IPP determination	Section 53N and s 53ZC(2)(a)

Information requirements	Draft deliverable or intended deliverable	Applicable provision in the Act
Statement of reasons for any non-compliance with the price path.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Statement of reasons for any non-compliance with any quality standard or, in cases where the quality standard is set at a value other than the collar and performance remains compliant with the quality standard, reasons for being outside the cap or collar of the incentive range.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Performance and Breach reporting		
Report breach of service performance measures (GP1 and GP2) at the same time as Annual Compliance Statement. Transpower to provide expert report within 80 working days from end of period of non-compliance with quality standard.	Draft IPP determination	Section 53M(2)(d)
Report breach of availability measures (AP1 and AP2) at the same time as Annual Compliance Statement. Transpower to provide expert report within 80 working days from end of period of non-compliance with quality standard.	Draft IPP determination	Section 53M(2)(d)
Report breach of service performance measure (GP-M) at the same time as Annual Compliance Statement.	Draft IPP determination	Section 53M(2)(d)
Reporting related to service performance measures (GP1 and GP2). Reporting requirement when annual service performance quality standard is not met.¹²⁸ Transpower to provide reporting at the same time as Annual Compliance Statement.	Draft IPP determination	Section 53B
Reporting related to availability measures (AP1 and AP2). Reporting requirement when annual availability is in the deadband between the collar and the quality standard. Transpower to provide reporting at the same time as Annual Compliance Statement.	Draft IPP determination	Section 53B

¹²⁸ For service performance GP1 and GP2, the quality standards and collars are the same.

Information requirements	Draft deliverable or intended deliverable	Applicable provision in the Act
<p>Reporting related to service performance measures (GP1 and GP2).</p> <p>Comprehensive reporting requirement for interruptions over 12 hours and interruptions causing a loss of supply of more than one system minute. Transpower to publicly report within 42 working days following each interruption.</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Draft IPP determination	Section 53B
<p>Reporting related to service performance measure (GP-M).</p> <p>Simple reporting to disclose momentary interruptions that affect customer supply.</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Draft IPP determination	Section 53B
<p>Report on availability – return to service time (AP3) and communication of delays to planned outage return times (AP4).</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Draft IPP determination	Section 53B
<p>Reporting related to asset availability measure (AP5).</p> <p>Simple reporting to disclose the extent to which Transpower places customers on N security.</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Draft IPP determination	Section 53B
<p>Report to disclose post-interruption event survey results of affected customers to assess timeliness of Transpower information provision following event (CS1).</p> <p>Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.</p>	Draft IPP determination	Section 53B
Wash-ups and other technical price path reporting		
<p>Publishing the forecast MAR used for the pricing year, the HVAC revenue and the HVDC revenue.</p>	Draft IPP determination	Section 53N and s 53ZC(2)(a)

Information requirements	Draft deliverable or intended deliverable	Applicable provision in the Act
Publishing summary of pass-through costs and recoverable costs.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Publishing explanations for any voluntary revenue reductions made by Transpower when setting its prices or carrying out its wash-up calculations.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Publication of the rolled forward EV account balance.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Publication of approved base capex commissioned/spend.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Publishing wash-up calculation resulting in EV account entry.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Publishing EV account summary.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Updated forecast summary of the EV account that demonstrates the forecast balance at the start of the next RCP.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
EV adjustment calculations (where a potential price shock triggers reopening of price path).	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Publication of the forecast closing balance in the EV account for the final disclosure year of RCP2 (estimated balance at 30 June 2020 to be washed up when actual balance is calculated).	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Transpower to annually publish and explain IRIS incentive amounts that Transpower will recover or bear based on its performance in the previous disclosure year.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Major capex projects and listed projects reopeners		
Transpower to submit director-certified and independently assured new maximum allowable revenue amounts for remaining pricing years of RCP3 within 80 working days of the end of the period of our approval of the capex amount under the reopener.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Providing updated summary of approved base capex.	Draft IPP determination	Section 53N and s 53ZC(2)(a)
Asset health developments reporting		
Transpower to produce a roadmap for developing asset and network risk modelling for RCP3 by 1 October 2020.	Draft IPP determination	Section 53B

Information requirements	Draft deliverable or intended deliverable	Applicable provision in the Act
Transpower to report annually on its progress towards implementing asset health models, risk-based decision-making frameworks,¹²⁹ and asset life-extension models.¹³⁰	Draft IPP determination	Section 53B
Mid-RCP independent expert assessment of Transpower's progress towards implementing asset health models, risk-based decision-making frameworks, and asset life-extension models.	Draft IPP determination and s 53ZD notice	Section 53B and s 53ZD
Introduce annual reporting on performance of Transpower's proposed asset health measures as though there was revenue at risk as a trial measure.	Draft IPP determination	Section 53B
Disclosure of how Transpower would have performed in relation to the proposed revenue-linked asset health pilot scheme, had the scheme existed.	Draft IPP determination	Section 53B
Cost estimation		
Transpower to report annually for completed projects on variances between cost estimates in Transpower's various capex proposals and the cost estimates included in the project delivery business cases. Reporting will include an expanded narrative on completed projects that vary +/-30% from their estimated costs. Transpower to provide annual summary report at the same time as Annual Compliance Statement.	Draft IPP determination and s 53ZD notice	Section 53B and s 53ZD
Customer consultation		
Transpower to publish customer engagement plan for RCP3 by 1 October 2020.	Draft IPP determination	Section 53B
Transpower to report on the extent and effectiveness of its consultation in relation to actual base capex.	Draft IPP determination	Section 53B

¹²⁹ Including a risk-based CBA framework for secondary asset protection scheme capex planning, and to support the asset health models for HVDC assets and the life-extension models for substation management system assets.

¹³⁰ For substation management system assets.

Information requirements	Draft deliverable or intended deliverable	Applicable provision in the Act
Transpower to publish post-project review for significant capex projects.	Draft IPP determination	Section 53B
Transpower to obtain a mid-period independent expert opinion on its proposed engagement process leading up to its RCP4 proposal.	Draft IPP determination	Section 53B

Proposed IM changes needed to give effect to the draft decisions

- C3 To give effect to some of our RCP3 decisions, we consider that some amendments to the Transpower IM Determination and Capex IM are required. We have proposed:
- C3.1 an amendment to the circumstances in which an IPP may be reconsidered within a regulatory period, where we are proposing to no longer reopen the Transpower price-quality path each year to recover/return incentive and wash-up amounts through ‘EV adjustments’, except in limited circumstances;
 - C3.2 the introduction of a new pass-through cost in the Transpower IM Determination for levies payable by all members of the Energy Complaints Scheme operated by Utilities Disputes Limited;
 - C3.3 the introduction of a new recoverable cost for FENZ levies in the Transpower IM Determination;
 - C3.4 amendments to the IRIS IMs in the Transpower IM Determination to correct implementation errors; and
 - C3.5 an amendment to the ‘base capex standard incentive rate’ in the Transpower Capex IM where the rate is changed from 33% to 26%.
- C4 We have also proposed clarifying in the Transpower IM Determination that pecuniary penalties cannot be treated as ‘operating costs’. These proposed IM amendments are discussed in a separate reasons paper, which we have published alongside this paper.¹³¹

¹³¹ Above n 38.

- C5 In addition, we consider that the base capex allowance adjustment mechanism (**BCAM**), as it currently stands, likely needs amending to appropriately balance the risks to consumers and Transpower that the ultimately approved E&D amount, after application of the BCAM, is too high or too low.¹³²
- C6 We intend to publish a draft amendment to the Capex IM with our proposed amendments to the BCAM after we have received submissions on this paper.

¹³² As set out below in paragraphs G137 to G160.

Attachment D How we propose to implement the outcomes from the IM review and the Capex IM review

Purpose of this attachment

- D1 The purpose of this attachment is to explain how we propose to implement IM amendments made as a result of our 2015/16 IM review and 2017/18 Capex IM review in the Transpower IPP for RCP3.
- D2 This attachment sets out how we have implemented the following IM amendments:
- D2.1 our changes to the calculation methodology for the WACC;¹³³
 - D2.2 our changes to the price-quality path provisions to clarify the error reopener and materiality thresholds for reopening the price path;¹³⁴ and
 - D2.3 our changes to the calculation methodology for the IRIS.¹³⁵
- D3 This attachment also explains how we have implemented the following Capex IM amendments:
- D3.1 our changes to the major capex incentives regime;¹³⁶
 - D3.2 our change to set a default incentive rate of 15% for major capex;¹³⁷
 - D3.3 our change to apply one of two incentive rates for base capex projects;¹³⁸
 - D3.4 our change to move the basis of the base capex expenditure adjustment incentive from operating on the value of commissioned assets to operating on actual expenditure;¹³⁹
 - D3.5 our change to limit our ability to exclude expenditure from the base capex expenditure incentives in specific circumstances;¹⁴⁰

¹³³ Commerce Commission "[Input methodologies review decisions: Report on the IM review](#)" (20 December 2016), at [67]-[72].

¹³⁴ Above n 133, at [110]-[111].

¹³⁵ Above n 133, at [114]-[115].

¹³⁶ Commerce Commission "[Transpower capex input methodology review: Decisions and reasons](#)" (29 March 2018), at [74]-[103].

¹³⁷ Above n 136, at [120]-[129].

¹³⁸ Above n 136, at [140]-[156].

¹³⁹ Above n 136, at [157]-[160].

- D3.6 our change to the grid output adjustment;¹⁴¹
- D3.7 our change to remove the base capex policies and processes adjustment;¹⁴²
- D3.8 our change to introduce the option for an expenditure adjustment mechanism for base capex Enhancement and Development (**E&D**) projects;¹⁴³
- D3.9 our change to require Transpower to provide an estimate of transmission charge changes and benefits delivered by each base capex proposal (including listed projects);¹⁴⁴ and
- D3.10 our changes to the information requirements in schedule F.¹⁴⁵

Implementation of 2016 Transpower IM amendments

WACC calculation

- D4 As a result of our 2015/16 IM review, we made amendments to our cost of capital IM for Transpower, including to our term credit spread differential (**TCSD**) calculation methodology for Transpower.¹⁴⁶
- D5 For RCP3 we intend to make our WACC determination by 30 September 2019, in accordance with the applicable cost of capital IM for Transpower. This WACC rate will be applied in making our final IPP determination for RCP3 in November 2019.

Price-quality path

- D6 As a result of our 2015/16 IM review, we made amendments to our specification of price (ie, price-quality path) IMs for Transpower to:¹⁴⁷
- D6.1 expand the scope of the existing 'error' reopener provision to address the situation where an IPP was set on the basis of any type of error, including cases where incorrect data was used in setting the IPP, or where the data was correct but was applied incorrectly;

¹⁴⁰ Above n 136, at [B22]-[B26].

¹⁴¹ Above n 136, at [B29]-[B35].

¹⁴² Above n 136, at [170]-[178].

¹⁴³ Above n 136, at [179]-[193].

¹⁴⁴ Above n 136, at [329]-[338].

¹⁴⁵ Above n 136, at [339]-[343].

¹⁴⁶ Above n 133, at [67]-[72].

¹⁴⁷ Above n 133, at [110]-[111].

- D6.2 add 'revenue-linked grid output measure' to the error event provisions for reconsideration of the IPP; and
- D6.3 clarify that the 1% materiality threshold on allowable revenue for the error reopener only applies to errors in allowable revenue, rather than errors that might affect other aspects of the price-quality path.
- D7 For RCP3 the error event reconsideration of the price-quality path will apply if we identify a clearly unintended circumstance where the RCP3 IPP was determined based on an error. This reopener may apply to the price path (subject to the restriction described in paragraph D6.3 above), quality standards or grid output measures.
- D8 Because this reconsideration provision is self-contained in the Transpower IMs, it does not require any supporting drafting in the draft IPP determination.

IRIS

- D9 As a result of our 2015/16 IM review, we amended the Transpower IM 'opex incentive amount' calculation to fit the purpose of the 'adjustment to the opex incentive' by using a modified version of the 'capex incentive adjustment' calculation.¹⁴⁸
- D10 For RCP3 the forecast opex incentive amount (including an estimate of the adjustment to the opex incentive amount) for each disclosure year will be included as a forecast recoverable cost in the smoothed price path. The adjustment to the opex incentive amount is required to be calculated for the second disclosure year of RCP3 once the actual opex values for the penultimate and last years of RCP2 are available.
- D11 To the extent that the actual values differ from the forecast amounts we use in setting the RCP3 price path, the difference will be washed up and recorded in the EV account, and will later be applied in setting the RCP4 smoothed price path.
- D12 The forecast opex incentive wash-up process for RCP3 is prescribed in the draft IPP determination.

¹⁴⁸ Above n 133, at [110]-[111].

Implementation of 2018 Capex IM amendments

Major capex incentive regime

- D13 As a result of our 2017/18 Capex IM review, we amended the Capex IM to change the major capex regime to an ex-ante framework by replacing three asymmetric ex-post incentive mechanisms (the major capex efficiency adjustment, the major capex overspend adjustment and the major capex project output adjustment) with a single ex-ante symmetric mechanism (the major capex expenditure and output adjustment).¹⁴⁹
- D14 For RCP3 the major capex expenditure and output adjustment will be calculated annually and the resulting value of the incentive will be entered in Transpower's EV account. The RCP3 price path will not ordinarily be updated annually. The balance in the EV account would generally be carried forward for inclusion in the RCP4 price path, unless the 'EV adjustment' reconsideration provision in the Transpower IM determination is applied at any stage.
- D15 Because the incentive mechanism is largely self-contained in the Capex IM, it does not require detailed drafting in the draft IPP determination.

Setting a default incentive rate of 15% for major capex

- D16 As a result of our 2017/18 Capex IM review, we amended the Capex IM to prescribe a default incentive rate for major capex of 15%, but we decided to retain the ability to tailor the incentive rate for major capex projects in specific circumstances.¹⁵⁰
- D17 The incentive rates set out in the Capex IM will be applied to major capex projects that we approve during the course of RCP3.
- D18 Because the incentive mechanism is largely self-contained in the Capex IM, it does not require detailed drafting in the draft IPP determination.

Two incentive rates for large base capex projects

- D19 As a result of our 2017/18 Capex IM review, we amended the Capex IM to apply one of two incentive rates for base capex projects, which (at that time) was a standard rate of 33%, and a low rate of 15% for large base capex projects that meet specified criteria.¹⁵¹

¹⁴⁹ Above n 136, at [74]-[103].

¹⁵⁰ Above n 136, at [120]-[129].

¹⁵¹ Above n 136, at [140]-[156].

D20 We have made a draft decision to change the base capex standard incentive rate in the Capex IM from 33% to 26% (which is explained in our separate paper setting out our proposed IM amendments). This change is reflected in the draft IPP determination.

Expenditure-based incentive mechanism

D21 As a result of our 2017/18 Capex IM review, we amended the Capex IM to change the basis of the base capex expenditure adjustment incentive from operating on the value of commissioned assets to operating on actual expenditure.¹⁵²

D22 For RCP3 we have set two total forecast base capex numbers in the draft IPP determination for each year, one for the price-quality path (based on the value of commissioned assets) and one for incentives (based on actual incurred expenditure). This is reflected in our draft IPP determination.¹⁵³

Limiting our ability to exclude expenditure from the base capex expenditure incentives

D23 As a result of our 2017/18 Capex IM review, we amended the Capex IM to limit our ability to exclude expenditure from the base capex expenditure incentives to the following circumstances:¹⁵⁴

D23.1 Where expenditure on a base capex project has expanded in scope and has become a major capex project; or

D23.2 Where cost elements of base capex in the base capex allowance can vary significantly due to factors beyond the control of Transpower.

D24 Because the incentive mechanism is largely self-contained in the Capex IM, it does not require detailed drafting in the draft IPP determination.

Grid output adjustment

D25 As a result of our 2017/18 Capex IM review, we amended the Capex IM to require Transpower to propose performance-based measures and asset health measures, and allow us to determine asset health grid output measures and link them to revenue.¹⁵⁵

D26 In its RCP3 proposal Transpower complied with the amended requirements of the Capex IM. Attachment F of this paper sets out our draft decision that we do not propose to revenue link asset health grid output measures for RCP3.

¹⁵² Above n 136, at [157]-[160].

¹⁵³ Schedules C1 and C2 of the draft IPP determination.

¹⁵⁴ Above n 136, at [B22]-[B26].

¹⁵⁵ Above n 136, at [B29]-[B35]

Base capex policies and processes adjustment

D27 As a result of our 2017/18 Capex IM review, we amended the Capex IM to remove the base capex policies and processes adjustment.¹⁵⁶

D28 The draft IPP determination does not include this measure.

E&D base capex allowance adjustment mechanism

D29 As a result of our 2017/18 Capex IM review, we amended the Capex IM to introduce the option for an expenditure adjustment mechanism for base capex E&D projects.¹⁵⁷

D30 We have not included this mechanism on our draft decisions for RCP3, as we consider it likely needs amending to appropriately balance the risks to consumers and Transpower that the ultimately approved E&D amount, after application of the mechanism, is too high or too low.

D31 We will explore improving the workability of this mechanism through an amendment to the Capex IM and will then consider whether any additional E&D expenditure should be applied under the revised mechanism. Our views are set out in more detail in Attachment G.10.

Costs and benefits of base capex proposals

D32 As a result of our 2017/18 Capex IM review, we amended the Capex IM to require Transpower to provide an estimate of the change in transmission charges and an explanation of the system and service benefits delivered by each base capex proposal.¹⁵⁸

D33 For RCP3 Transpower provided this information as part of its base capex proposal and will also include this information as part of any listed project approval applications during RCP3.

Information requirements in Schedule F

D34 As a result of our 2017/18 Capex IM review, we amended the Capex IM to update the base capex qualitative information requirements in Schedule F.¹⁵⁹

D35 In its RCP3 proposal Transpower complied with the amended requirements of the Capex IM.

¹⁵⁶ Above n 136, at [170]-[178].

¹⁵⁷ Above n 136, at [179]-[193].

¹⁵⁸ Above n 136, at [329]-[338].

¹⁵⁹ Above n 136, at [339]-[343].

Attachment E Update on the high-level description of the financial model

Purpose of this attachment

- E1 The purpose of this attachment is to briefly explain:
- E1.1 how Transpower's financial model based on the building blocks financial inputs has changed since that model was used by us to set the RCP2 IPP in November 2014;
 - E1.2 how Transpower has used the financial model to make updates to the forecast MAR for our approval during RCP2;
 - E1.3 how we have used the financial model to allow us to demonstrate the estimated financial effects of the draft decisions in this paper; and
 - E1.4 how we will ask Transpower to update the financial model using the finalised expenditure allowances, to enable us to set the IPP determination before we publish this in November 2019.

The financial model and how it has changed

- E2 The specification for the building blocks calculation of the forecast MAR for each pricing year of RCP2 is set out in Schedule D of the Transpower IPP Determination.¹⁶⁰
- E3 We have made a draft decision to incrementally build on the RCP2 Transpower IPP Determination in setting the IPP determination for RCP3, which includes the building blocks approach and use of an updated version of the RCP2 financial model.
- E4 Transpower maintains the RCP2 financial model which enables it to update the forecast MAR each year in RCP2. The results of the calculations are required to be included in Transpower's annual compliance statement,¹⁶¹ and these are subject to an assurance opinion by an independent auditor.¹⁶² Two of Transpower's directors are required to certify the annual compliance statement in the format set out in Schedule K of the Transpower IPP Determination.
- E5 Transpower has various input models that provide the input information necessary to meet the specification in Schedule D of the Transpower IPP Determination and these are also subject to assurance review.

¹⁶⁰ Schedule D of the Transpower IPP Determination.

¹⁶¹ Clause 20.1.9 of the Transpower IPP Determination.

¹⁶² Clause 26 of the Transpower IPP Determination.

- E6 Transpower maintains the financial model for any amendments to the Transpower IMs or the Transpower IPP Determination during the RCP.¹⁶³
- E7 Material changes proposed to the way the price path is calculated and applied for RCP3 are included in our draft decisions described in Chapter 2, Chapter 3 and Attachment J of this paper. The most significant are the inclusion of forecast pass-through costs and recoverable costs in the forecast MAR in the RCP3 price path, and the smoothing of the building block values for each redefined forecast MAR across RCP3 in the form of annual amounts of 'maximum allowable revenue'.¹⁶⁴
- E8 Transpower published its financial model for interested persons with its RCP3 proposal.¹⁶⁵ This version of the financial model has been updated for changes in the price path between RCP2 and our draft price path decisions for RCP3.

Using the financial model to calculate updates to the forecast MAR in RCP2

- E9 Under its compliance reporting for RCP2, Transpower is required after each disclosure year to carry out a wash-up calculation of actual revenue and cost values against the forecast values used to set the forecast MAR at the start of the pricing year. Transpower is required to apply the building blocks approach set out in Schedule E of the Transpower IPP Determination.
- E10 Transpower also calculates incentive amounts for the disclosure year in accordance with the Capex IM and the Transpower IPP Determination.
- E11 The results of the wash-ups and the incentive calculations are recorded in Transpower's EV account.
- E12 The financial model is then used in the next available pricing year to calculate an update of the forecast MAR. That update is used to update Transpower's pricing through the TPM. Under the price path reconsideration provisions of the Transpower IMs, the forecast MAR may only be updated for:
- E12.1 further major capex approved by us since the forecast MAR was last updated;

¹⁶³ For example, we are currently separately consulting on the appropriate regulatory treatment of changes to the GAAP accounting standards for operating lease payments. In its RCP3 version of the financial model, Transpower has adopted one of the two options for that treatment. We consider this acceptable for the draft decisions. A further update to the model can be expected following our consultations and any final amendments to the Transpower IMs in this regard.

¹⁶⁴ The definition of maximum allowable revenue and the process for turning the building blocks forecast MAR values into a smoothed price path of annual maximum allowable revenue values are specified in the Transpower IPP Determination.

¹⁶⁵ Available at: <https://www.transpower.co.nz/keeping-you-connected/industry/rcp3/rcp3-proposal-securing-our-energy-future-2020-%E2%80%93-2025>.

- E12.2 further approved base capex listed projects values set by us since the forecast MAR was last updated; and
- E12.3 the EV account balance that is required to be returned to/recovered from Transpower's customers.¹⁶⁶

Using the financial model to calculate the effects of our draft decisions

- E13 We have used a version of Transpower's RCP3 version of the financial model to calculate the estimated revenue effects of our draft decisions, as described in the Executive Summary of this paper.
- E14 Our calculations based on the draft decisions in this paper do not include any estimate of the major capex or base capex listed project values that we may approve during RCP3. Those approvals will be separate decisions during RCP3 and, as described above, will be implemented through our reconsideration of the price path during the period.
- E15 In order to apply the model for our draft decisions in this paper, we needed to make some simplified adjustment assumptions that we consider should not materially affect those estimated effects. Those assumptions are:
 - E15.1 Application of an estimated WACC rate of 5.13% in place of the rate used by Transpower in its RCP3 proposal (5.5%);¹⁶⁷
 - E15.2 simplified conversions of base capex adjustments proposed in our draft decisions in this paper to forecast nominal and commissioned adjustment values, and opex adjustments to nominal adjustment values;
 - E15.3 simplified spreading of expenditure adjustments proposed in our draft decisions described in this paper across the 5 years of RCP3; and
 - E15.4 applying adjustments to HVAC expenditure.

¹⁶⁶ We are separately consulting on changes to the Transpower IMs on modifying the EV account reconsideration provision so that it would only apply in RCP3 and future RCPs when there is likely to be a shock effect from rolling the EV account balance forward to the next RCP in accordance with our RCP3 IPP draft decisions.

¹⁶⁷ The 5.13% estimate of the RCP3 WACC rate is based on the information disclosure 67th percentile vanilla WACC rate for electricity distribution businesses (ie, local lines companies), which is the most recent estimate of the WACC that we published on our web site on 30 April 2019, available at: https://comcom.govt.nz/data/assets/pdf_file/0027/142659/2019-NZCC-7-Cost-of-capital-determination-EDBs-and-Airports-ID-30-April-2019.pdf.

How Transpower will finalise the financial model for RCP3

- E16 Consistent with the approach we adopted for setting the Transpower IPP Determination, following our consideration of submissions and cross-submissions on the draft decisions in this paper, we plan to request Transpower to update the financial model for our final expenditure and quality decisions we intend to make by 29 August 2019.
- E17 Subject to any further decisions on process that we make as a result of our August 2019 decisions, that update of the financial model should only leave outstanding a final adjustment for the RCP3 price-quality WACC rate to replace the estimated 5.13% rate, which we aim to determine and publish in September 2019.¹⁶⁸
- E18 Our request of Transpower will be made under s 53ZD of the Act and will require both an independent assurance opinion on the model and its price path outputs, and director certification by two of Transpower's directors.

¹⁶⁸ The Transpower 67th percentile vanilla mid-point estimate of WACC rate is required by the Transpower IMs to be published in accordance with clause 3.5.5(1) of the Transpower IMs.

Attachment F Quality standards and grid output measures

Glossary

Table F1 Glossary of quality dimensions

Quality term	Part 4 reference	Transpower reference	Decision document reference	Description
Quality standard	Commerce Act s 53M(3)	N/A	Our proposed quality standards for grid output measures	Quality standards may be prescribed in any way the Commission considers appropriate (such as targets, bands, or formulae) and may include (without limitation)— (a) responsiveness to customers; and (b) in relation to electricity lines services, reliability of supply, reduction in energy losses, and voltage stability or other technical requirements.
Grid output measure	Transpower Capex IM Part 1 clause 1.1.5(2) p.14	Grid Outputs Report	Our proposed grid output measures	Grid output measure means a measure that quantifies the output or benefit (where ‘benefit’ may include reduction in risk) delivered by the grid , investment in the grid , or expenditure facilitating or enabling future investment in the grid .
Asset performance measure (service performance)	Transpower Capex IM Part 1 clause 1.1.5(2) p.9	Grid Outputs Report p.8 (proposed measures GP1, GP2, AP1-AP4, CS1)	Attachment F.2: Revenue-linked asset performance measures	An asset performance measure means a grid output measure that quantifies the performance, reliability or availability of the grid, whether at the level of- (a) individual assets; (b) an aggregation of assets, such as by substation; or (c) the grid .
Asset health grid output measure	Transpower Capex IM Part 1 clause 1.1.5(2) p.9	Grid Outputs Report p.17	Attachment F.4: Asset health measures	An asset health grid output measure means a grid output measure that: (a) quantifies the fitness for service of the grid , whether at the level of- (i) individual assets; (ii) an aggregation of assets, such as by substation; or (iii) the grid ; and (b) reflects the output or benefit (where ‘benefit’ may include a reduction in risk) delivered by expenditure- (i) on asset refurbishment ; (ii) on asset replacement ; or (iii) which is operating expenditure .

Quality term	Part 4 reference	Transpower reference	Decision document reference	Description
Measure of grid performance (service performance)	Transpower Capex IM Part 1 clause 1.1.5(2) p.16	Grid Outputs Report p.17 (proposed measures GP1, GP2, AP1-AP4)	Attachment F.1: Grid performance (GP) measures	<p>A measure of grid performance means measure that quantifies the level of service received by consumers.</p> <p>Service performance is also known as a measure of grid performance.</p> <p>Grid performance is a subset of an asset performance measure as this is, in part, an outcome of asset performance.</p>
Revenue-linked grid output measure	Transpower Capex IM Part 1 clause 1.1.5(2) p.19 and Clause B2	Grid Outputs Report Section 4 p. 24	Our proposed grid output measures	<p>A revenue-linked grid output measure means grid output measure to which the grid output mechanism applies.</p> <p>A grid output mechanism means the formula by which the grid output adjustment is calculated, as specified in the table in clause B2(1).</p>
Grid output incentive rate	Transpower Capex IM Part 1 clause 1.1.5(2) p.14 and Clause B2	N/A	Attachment F.7: How we have set incentive rates for the service performance measures	<p>A grid output incentive rate means the amount of money that Transpower may recover or must bear, as the case may be, per unit of the grid output measure, as a result of the quantum of difference between the grid output for a disclosure year and the grid output target, which rate will be expressed as a-</p> <p>(a) positive number where an increase in grid output is intended to result in an increase in revenue; and</p> <p>(b) negative number where an increase in grid output is intended to result in a decrease in revenue.</p>
Cap	Transpower Capex IM Part 1 clause 1.1.5(2) p.11 and Clause B2	N/A	Approach to assessing quality	A cap means specified grid output which limits the amount of positive revenue adjustment arising from the calculation of the grid output adjustment through the application of the grid output mechanism .
Collar	Transpower Capex IM Part 1 clause 1.1.5(2) p.12 and Clause B2	N/A	Approach to assessing quality	A collar means specified grid output which limits the amount of negative revenue adjustment arising from the calculation of the grid output adjustment through the application of the grid output mechanism .
Grid output target	Transpower Capex IM Part 1 clause 1.1.5(2) p.14 and Clause B2	N/A	Approach to assessing quality	A grid output target means the quantum of output at which the grid output adjustment will be nil.

Quality term	Part 4 reference	Transpower reference	Decision document reference	Description
Performance measure development (PMD) initiatives	Setting Transpower's IPP for 2015 – 2020, Attachment I	Grid Outputs Report Section 6.5 p. 39	Attachment F.3: Non-revenue linked measures	Development of performance measures during RCP2. These consist of six measures that Transpower proposed and three that we included as a result of customer demand. The RCP2 PMD initiatives are summarised in Table I2 of "Setting Transpower's Individual Price-Quality Path for 2015 – 2020".

Purpose of this attachment

- F2 This attachment sets out our draft decisions on grid output measures and quality standards for the Transpower IPP reset for RCP3.
- F3 For the RCP3 IPP reset Transpower has proposed grid output measures. We are required by the Capex IM to evaluate that proposal and set quality standards in accordance with the Act.¹⁶⁹

Draft decisions

- F4 Our draft decisions are:
- F4.1 to set revenue-linked grid performance measures (measures GP1 and GP2) and asset performance measures (measures AP1 and AP2), all with associated quality standards;
 - F4.2 to set a normalisation approach for the grid performance measures (GP1 and GP2) and asset performance measures (AP1 and AP2) for events that are wholly beyond the reasonable control of Transpower;
 - F4.3 to set non-revenue-linked grid performance measure (GP-M), with an associated quality standard;
 - F4.4 to set non-revenue-linked asset performance measures (measures AP3, AP4 and AP5), and for post-event communications (measure CS1), with no associated quality standards;
 - F4.5 to include reporting requirements based on the time to restore supply, including either simple or comprehensive reporting,¹⁷⁰

¹⁶⁹ Above n 31, at 16.

- F4.6 to retain reporting requirements for the grid performance measures and asset performance measures explaining the reasons for Transpower being outside the cap or collar of the incentive range in any measure;
- F4.7 to not link Transpower's proposed asset health measures to revenue, to approve running the proposed asset health measures as a trial for future revenue-linked measures, and to apply quality standards, as follows:
 - F4.7.1 require Transpower, as part of the annual IPP reporting process, to report on the asset health measures as if these were revenue-linked;
 - F4.7.2 require a limited scope mid-RCP3 expert review after Year Two of RCP3 to provide expert insight into Transpower's progress on its developments in this area (including asset health reporting), with details of the review process to be specified in the IPP determination; and
 - F4.7.3 to specify minimum asset health quality standards that are set between the proposed trial asset health measures' collar values, and what this would be without intervention in each asset class for each year of RCP3;
- F4.8 to require comprehensive reporting whenever a quality standard for any grid output measure is breached;
- F4.9 to set quality standards through a 'pooling' approach for grid performance measures and through a 'deadband' zone approach for asset performance measures; and
- F4.10 to set a total revenue at risk for Transpower across all grid output measures of +/-1.46% of RCP3 revenue (including service performance measures, but not asset health measures).

¹⁷⁰ Simple reporting relating to the GP-M measure includes: cause(s) of the interruption; interruption date and time; interruption MW and duration including any affected GXP location(s) that includes generation connections to the grid. Comprehensive reporting (for long duration interruptions and major interruptions) includes: simple reporting requirements plus additional reporting on actions that Transpower has taken to minimise the effect of the loss of supply event; and lessons learnt for the future.

Table F2 Summary of proposed measures and our draft decision reasoning (superseded RCP2 measures in blue)

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Proposed quality standard in RCP3	Explanation and draft decision reasoning
RCP3 Reliability - Grid Performance (GP1)	Symmetric incentive	Yes	Set at collar	<ul style="list-style-type: none"> RCP2 measure “Number of unplanned interruptions each year by customer category”. RCP3 measure changed to “Number of unplanned interruptions each year across all POS in a sub-category”. Quantity of POS increased from 222 in RCP2 to 229 in RCP3 (Table 5 TP Grid Outputs Report). Change by Transpower supported by consultation. Refined measure based on level of security, levels of demand and evaluation of economic consequence. Verifier concluded consultation effective and measures address areas of likely concern to customers. Set symmetric measure with targets, caps and collars. Accept TP proposal. Propose pooling across all POS categories - 2 out of 6 POS pool in a 2 out of 3 year rolling time period - alleviates sample size volatility.¹⁷¹ Set as revenue-linked measure and make revenue quantum change to ensure consistency with default price-quality path (DPP). Set quality standard at collar - check of historical performance suggests this is appropriate.

¹⁷¹ As explained further in Attachment F.1, for grid performance measures GP1 and GP2 there are six POS measures – high economic consequence and material economic consequence, each for N sites and N-1 sites, and N and N-1 generator sites. A contravention of the quality standard in either GP1 or GP2 requires two of the six measures to not be met twice in a three-year rolling period. There are two separate quality standards for pooled measures GP1 and GP2.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Proposed quality standard in RCP3	Explanation and draft decision reasoning
RCP3 Reliability - Grid Performance (GP2)	Symmetric incentive	Yes	Set at collar	<ul style="list-style-type: none"> • RCP2 measure “Average duration of unplanned interruptions by customer category”. RCP3 measure changed to “Average duration of unplanned interruptions greater than 1 minute across all POS in a sub-category”. • Quantity of POS increased from 222 in RCP2 to 229 in RCP3 (Table 5 TP Grid Outputs Report). • Change by Transpower supported by consultation. Refined measure based on level of security, levels of demand and evaluation of economic consequence. Verifier concluded consultation effective and measures address areas of likely concern to customers. • Set symmetric measure with targets, caps and collars. Accept TP proposal. Propose pooling across all POS categories - 2 out of 6 POS pool in a 2 out of 3 year rolling time period - alleviates sample size volatility. • Set as revenue-linked measure and make revenue quantum change to ensure consistency with DPP. • Set quality standard at collar - check of historical performance suggests this is appropriate.
RCP3 Reliability - Grid Performance (GP-M)	Not revenue linked	No	Set at 116 momentary interruptions per year	<ul style="list-style-type: none"> • Formerly Transpower development initiative PMD6 in RCP2. • Decided to retain given submitter support in Transpower’s consultation process. • Quality standard set at 116 momentary interruptions per year of RCP3. This is based on historical data from Transpower.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Proposed quality standard in RCP3	Explanation and draft decision reasoning
RCP3 Reliability - Grid Performance (GP1, GP2 and GP-M)	Reporting only (ID)	No	N/A	<ul style="list-style-type: none"> Propose introducing reporting requirements for interruption events based on length of time to restore supply.¹⁷² Propose comprehensive reporting requirement for interruptions over 12 hours and/or over one system minute. (GP1 and GP2) Propose reporting on reasons for being outside the cap or collar of the incentive range and/or not meeting the quality standard. (GP1 and GP2) Introduce simple reporting requirement for disclosure of momentary interruptions. (GP-M) Reporting would be submitted at the same time as the IPP annual compliance statement. (GP1 and GP2)
RCP2 Reliability - Grid Performance (GP3)				<ul style="list-style-type: none"> RCP2 measure “Duration of 90th percentile unplanned interruption by customer category”. Not proposed by Transpower in RCP3. We agree because GP3 not necessary for RCP3 - GP2 measure will capture effect of most of the same interruptions.
RCP2 Reliability – Development measure (PMD6)				<ul style="list-style-type: none"> RCP2 measure “Number of unplanned momentary interruptions” previously not linked to revenue. “Energy not supplied for each POS for each unplanned interruption” previously not linked to revenue. Not proposed by Transpower in RCP3 – but we proposing to keep as a reporting requirement and quality measure GP-M (for momentary interruptions). Submitter support for this during Transpower’s engagement process.

¹⁷² Simple reporting relating to the GP-M measure includes: cause(s) of the interruption; interruption date and time; interruption MW and duration including any affected GXP location(s) that includes generation connections to the grid. Comprehensive reporting (for long duration interruptions and major interruptions) includes: simple reporting requirements plus additional reporting on actions that Transpower has taken to minimise the effect of the loss of supply event; and lessons learnt for the future.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Proposed quality standard in RCP3	Explanation and draft decision reasoning
RCP2 Reliability – Development measure (PMD7)				<ul style="list-style-type: none"> RCP2 measure “Energy not supplied for each POS for each unplanned interruption” previously not linked to revenue. Not proposed by Transpower in RCP3 because TP considered the information reporting (on energy not supplied) better served by reporting closer real-time information on TP’s website.
RCP2 Reliability – Development Measure (PMD9)				<ul style="list-style-type: none"> RCP2 measure “Extent that Transpower provides its reports to affected parties on unplanned interruptions within 15 working days of the interruption” previously linked to revenue. Not proposed by Transpower in RCP3 because TP already obligated to provide post-event reporting under connection contracts with customers.
RCP3 Availability - Asset Performance (AP1)	Symmetric incentive	Yes	Set below collar with deadband	<ul style="list-style-type: none"> RCP3 measure same as RCP2 measure - “% availability of HVDC” – planned and unplanned. Set symmetric measure with targets, caps and collars. Disagree with some of TP’s reasoning for target based on historical data and inclusion of high impact low probability (HILP) event but agree with proposed 1% range. Set new adjusted target (with adjusted caps and collars). Set quality standard below collar with deadband - we are not pooling AP measures. Sample size issues and Pole 2 upgrade outage issues also considered as mitigating factors in quality setting.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Proposed quality standard in RCP3	Explanation and draft decision reasoning
RCP3 Availability - Asset Performance (AP2)	Symmetric incentive	Yes	Set below collar with deadband	<ul style="list-style-type: none"> • RCP3 measure same as RCP2 measure - “% availability of selected HVAC circuits” – planned and unplanned. • More assets than RCP2 AP2 measure. Focus on assets with greatest market impact. Quantity of selected circuits increased to 71 in RCP3 (Table 16 TP Grid Outputs Report). • Set as symmetric measure with targets, caps and collars. Disagree with TP’s target value. Historical data suggests that Transpower’s proposed measures not challenging. Propose amending target cap and collar based on historical data analysis. • Caps and collars set at one standard deviation from target based on historical data analysis. • Set quality standard below collar with deadband based on additional standard deviation from collar. • Historical analysis suggests TP performance over last 10 years between collar and quality standard - we are not pooling AP measures so sample size issues considered as mitigating factors in quality setting.
RCP3 Availability - Asset Performance (AP1 and AP2)	Reporting only (ID)	No	No	<ul style="list-style-type: none"> • Propose comprehensive reporting for being outside the cap or collar of the incentive range and/or not meeting the quality standard. • Reporting to include cause(s) of being outside the cap or collar and/or not meeting the quality standard, impact on Transpower’s customers, and lessons learned for the future. • Reporting would be submitted at the same time as the IPP annual compliance statement.
RCP2 Availability – Development Measure (PMD4)				<ul style="list-style-type: none"> • RCP2 measure “Extent that Transpower meets planned outage restoration times”. • PMD4 and PMD8 in RCP2 now AP4 measure in RCP3.
RCP2 Availability – Development Measure (PMD8)				<ul style="list-style-type: none"> • RCP2 measure “Extent that Transpower meets planned outage start times for critical circuits and equipment”. • PMD4 and PMD8 in RCP2 now AP3 measure in RCP3.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Proposed quality standard in RCP3	Explanation and draft decision reasoning
RCP3 Availability - Asset Performance (AP3)	Reporting only (ID)	No	No	<ul style="list-style-type: none"> • New RCP3 measure “Return to service time: Extent that Transpower keeps to planned outage times in relation to the selected HVAC assets”. • AP3 amalgamation of intent of performance measure development initiatives PMD4 and PMD8 from RCP2. • AP3 to measure and report daily outages of the 71 HVAC circuits from AP2 returned to service two or more hours after original return to service time estimate. • Consider measures have value to customers and stakeholders and propose we retain AP3. • Do not revenue link or set quality standard in RCP3 until we judge usefulness of the measure. No support for revenue linking or quality standard from submitters. • Reporting would be submitted at the same time as the IPP annual compliance statement.
RCP3 Availability - Asset Performance (AP4)	Reporting only (ID)	No	No	<ul style="list-style-type: none"> • New RCP3 measure “Extent that Transpower communicates delays to planned outage return times”. • No previous RCP2 measure but close to intent of PMD4. • AP4 to measure and report on the percentage of time 1.5 or more hours’ notice given to market if assets returned to service late (based on original planned return to service time). • Consider measures have value to customers and stakeholders and propose we retain AP4. • Do not revenue link or set quality standard in RCP3 until we judge usefulness of measure. No support for revenue linking or quality standard from submitters. • Reporting would be submitted at the same time as the IPP annual compliance statement.
RCP2 Availability – Development Measure (PMD5)				<ul style="list-style-type: none"> • RCP2 measure “Extent that Transpower places customers on N security”. • PMD5 in RCP2 now AP5 measure in RCP3.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Proposed quality standard in RCP3	Explanation and draft decision reasoning
RCP3 Availability - Asset Performance (AP5)	Reporting only (ID)	No	No	<ul style="list-style-type: none"> Former RCP2 measure PMD5 “Extent that Transpower places customers on N security”. Not proposed by Transpower for RCP3 but we feel this measure provides useful information for customers. We will be seeking reporting about customers placed on reduced levels of supply security with a view to introducing this as a quality standard in RCP4. Reporting will include when this occurs, how long customers are subject to reduced supply security and what steps Transpower has taken to inform these customers that they are likely to be on reduced supply security.
RCP2 Customer Service – Development Measure (PMD1)				<ul style="list-style-type: none"> RCP2 measure “Time to provide initial information following an unplanned interruption”. PMD1, PMD2 and PMD3 in RCP2 now CS1 measure in RCP3.
RCP2 Customer Service – Development Measure (PMD2)				<ul style="list-style-type: none"> RCP2 measure “Time to provide initial information following an unplanned interruption (greater than 30 minutes)”. PMD1, PMD2 and PMD3 in RCP2 now CS1 measure in RCP3.
RCP2 Customer Service – Development Measure (PMD3)				<ul style="list-style-type: none"> RCP2 measure “Accuracy of notified restoration times following unplanned interruptions”. PMD1, PMD2 and PMD3 in RCP2 now CS1 measure in RCP3.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Proposed quality standard in RCP3	Explanation and draft decision reasoning
RCP3 Customer Service Measure (CS1)	Reporting only (ID)	No	No	<ul style="list-style-type: none"> • RCP3 measure “Existing post-event survey. Focuses on timely information provision and communications”. • CS1 an amalgamation of performance measure development initiatives PMD1, PMD2 and PMD3 from RCP2. • Do not revenue link. No support for revenue linking by submitters. Do not set quality standard - too early to develop meaningful quality standards. Propose running CS1 as a trial standard during RCP3. One submitter supported quality standard. • CS1 reporting to disclose post-interruption event survey results of affected customers to assess timeliness of Transpower information provision following event. • Potentially set quality standard and link to revenue in RCP4. • Reporting would be submitted at the same time as the IPP annual compliance statement.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Proposed quality standard in RCP3	Explanation and draft decision reasoning
RCP3 Asset Health (AH)	Not revenue linked	No	Set between TP proposed AH and “no-investment” estimate of AH in each asset class.	<ul style="list-style-type: none"> • RCP2 measures volumetric but were not met for variety of reasons (eg, asset condition assessment identified no replacement necessary, etc.) • RCP3 measures proposed based on percentage of assets with AH score of 8 or greater (assets in poor or very poor condition) in each RCP3 year. • Do not revenue link - not convinced TP has robust asset condition data for many assets in its fleet. Proposed asset health measures could face similar practical issues as the volumetric measures in RCP2. • Set quality standards in each AH measures asset class to act as a safety net in order that asset health will not degrade significantly over RCP3. • Set quality standard levels between the ‘no investment’ outcome¹⁷³ percentage of assets with an AHI score>8 and the forecast outcome percentage of assets with an AHI>8, in each year and in each asset class in the proposed asset health measures.

¹⁷³ The ‘no investment’ outcome is the asset health score of each asset class had there been no investment during that year (ie, the extent that asset condition has worsened without any investment).

Approach to assessing quality

- F5 The Capex IM requires Transpower to propose, and for us to set, certain types of grid output measures, while providing Transpower with the opportunity to also propose other grid output measures.¹⁷⁴ We may approve or set different grid output measures from those that Transpower proposes.
- F6 In setting the grid output measures, we are primarily seeking to provide Transpower with incentives to provide services at a quality that reflects consumer demands, in line with the Part 4 purpose.¹⁷⁵
- F7 The Capex IM provides for two types of grid output measures: revenue linked, and non-revenue linked. Under any revenue-linked grid output measures, Transpower will be financially rewarded for outperforming performance targets and penalised for underperforming performance targets.
- F8 Non-revenue linked measures may be used to better understand Transpower's performance.
- F9 For the revenue-linked grid output measures, we determine:¹⁷⁶
- F9.1 grid output targets;
 - F9.2 caps – to limit the amount of positive revenue adjustment;
 - F9.3 collars – to limit the amount of negative revenue adjustment;¹⁷⁷ and
 - F9.4 grid output incentive rates – the amount of money at risk for each unit of output between the cap and the collar.
- F10 Figure F2 provides an overview of how the incentive scheme operates for the revenue-linked grid output measures (GP1, GP2, AP1 and AP2 measures).

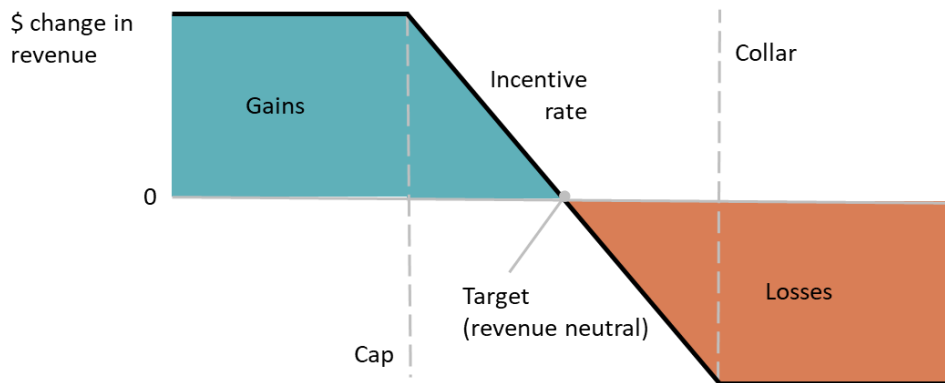
¹⁷⁴ Clause 2.2.2 of the Capex IM.

¹⁷⁵ We must also apply the criteria in Schedule A clause A4-A6 of the Capex IM which includes the extent to which each measure is a recognised measure of risk in the supply and performance of electricity transmission services, and the relationship between the grid output measure and expenditure by Transpower.

¹⁷⁶ Clause 2.2.2(1)(d) of the Capex IM.

¹⁷⁷ This could also be a trigger point that, if outside the cap or collar, may require additional reporting.

Figure F2 Overview of revenue-linked incentive scheme



- F11 We may also link the quality standard to a non-financial incentive mechanism, such as special purpose reporting requirements.¹⁷⁸
- F12 Any non-revenue linked measures that are not linked to quality standards would be simply an ID requirement. Our proposed RCP3 ID requirements include measures AP3, AP4, AP5 and CS1.
- F13 In addition to the revenue at risk under the revenue-linked service performance measures, we also determine applicable quality standards for the purposes of compliance with the Act.¹⁷⁹ We determine how the quality standards we set for Transpower are prescribed, and these standards must be based on, and be consistent with, any quality standards for Transpower as set by the Electricity Authority under the GRS in the Code.
- F14 Our proposed quality standards are designed to provide a minimum level of quality for the performance elements in Transpower's proposed measures. These performance elements are designed at N or N-1 supply security in line with Schedule 12.2 of the GRS in the Code.¹⁸⁰

¹⁷⁸ For example, s 53M(2)(d) of the Act.

¹⁷⁹ Section 53M(3) of the Act.

¹⁸⁰ The GRS is a network security standard, while our quality standards are performance limits for network assets designed to those security standards.

- F15 Quality standards set by us differ from the grid output measures proposed by Transpower, and Transpower is not required to propose the quality standards to be associated with its grid output measures in its proposal. For the service performance measures, Transpower will be rewarded for outperforming the performance targets, while being penalised for underperforming under the incentive scheme.¹⁸¹ If a quality standard is breached, statutory penalties as well as financial penalties could apply for that underperformance.¹⁸²
- F16 For any revenue-linked output measure, the associated quality standard may be set at the level of the target, collar/cap, or at any other level where we consider an appropriate incentive would be provided by enforcement action under the Act.
- F17 Therefore, it would possible for Transpower to be exposed to both a financial penalty under the grid output measure for its underperformance up to the point where the standard is contravened, and a statutory penalty under the Act for the contraventions of the standard.
- F18 The extent to which both financial penalties and statutory penalties can potentially apply depend on the relationship between the value used to set the quality standard and the values set for the target and the collar under the grid output measure. For the current RCP, RCP2, Transpower's quality standards were set at the level of the target, but for RCP3 we are proposing to set quality standards at different levels than the target.

Quality considerations

- F19 When making our draft decisions, we have considered the following matters:
- F19.1 the legal framework;
 - F19.2 the broad economic quality framework;
 - F19.3 interaction of quality dimensions and proposed measures with other incentives applying to Transpower;
 - F19.4 consideration of quality dimensions and quality scheme options; and
 - F19.5 consideration of the proposed quality measures.

¹⁸¹ The incentive reward or penalty applies up until the cap or collar is reached and where no further reward or penalty will apply.

¹⁸² Section 54V of the Act.

Legal framework

- F20 For RCP2 we set Transpower’s grid output measures by reference to the Act and in accordance with the requirements of the Capex IM.¹⁸³ During RCP2 we reviewed the package of incentive measures that apply to Transpower’s capex.¹⁸⁴
- F21 We may set a quality standard to apply when thresholds across multiple grid output measures are not met (which we refer to as a ‘pooled’ approach), with some or all of those measures having an associated incentive scheme. The pooling may be across different measures, sub-categories of measures (for example, across POS), or across time (for example, if the limit is not met for two out of three years).
- F22 The value for a quality standard may be set outside of the range allowed for grid output measures. This approach could lead to what we refer to as a ‘deadband’ range for a measure if the quality standard is set at a less stringent level than the collar of the incentive range, which is where no financial incentive would apply.¹⁸⁵
- F23 In applying this framework, there are three main types of measures that we can set for Transpower’s RCP3 quality measures:
- F23.1 Quality standard with an associated revenue-linked incentive scheme (can include a pooling approach across measures and/or across years). This may also have additional reporting requirements under ID or under the IPP compliance reporting requirements.
 - F23.2 Quality standard only (can include a pooling approach across measures and/or across years). This may also have additional reporting requirements under ID or under the IPP compliance reporting requirements, which might include a pilot non-revenue linked incentive scheme.
 - F23.3 Reporting-only measures (no link to revenue for incentives and no applicable quality standard) under ID.
- F24 Our summary of the dimensions of quality we propose to apply are summarised in Table F3.

¹⁸³ Above n 101, at 42 and Attachment B.

¹⁸⁴ Above n 65, at 28.

¹⁸⁵ We would be relying on the possibility of enforcement of the quality standard to persuade Transpower not to further reduce quality, possibly supplemented by a non-financial incentive scheme.

Table F3 Summary of quality dimensions proposed for RCP3

Category of quality dimension		Quality standards				Disclosure requirements	
Category	Measure	Quality incentive scheme		No quality incentive scheme		Shadow quality standard	Shadow revenue linked
		Financial (revenue linked)	Non-financial (reporting)	Shadow revenue linked	Standard only		
Grid output measures – Grid Performance	GP1	✓	✓				
	GP2	✓	✓				
	GP-M		✓				
Grid output measures – Asset Performance	AP1	✓	✓				
	AP2	✓	✓				
	AP3					✓	
	AP4					✓	
	AP5					✓	
Asset health	AH			✓			
Customer service	CS1					✓	

Broad economic quality framework

- F25 Our form of regulation for Transpower, revenue-cap regulation, involves setting a revenue path which Transpower can outperform and thereby earn additional profits. This is an important way to incentivise efficiencies which are later passed back to customers at the reset of the regulatory period.
- F26 However, one way for Transpower to cut costs is to cut quality of service (for example, by reducing maintenance costs, which may lead to more frequent power interruptions). Hence, we set a price-quality path which include quality standards and may also include quality incentives.
- F27 The concept of FCM implicitly underpins our building blocks approach to implementing our regulation. FCM allows a regulated supplier the opportunity to earn normal returns over the lifetime of an investment and provide it with a chance to maintain the financial capital it has invested.

- F28 Under our form of regulation, the FCM concept is applied on an ex-ante basis. Therefore, regulated suppliers are expected to earn a normal return at the beginning of each regulatory period, and have the opportunity to make higher profits through cost savings and other efficiency or quality improvements, as well as through innovations, where those savings, improvements and innovations benefit customers and consumers in the long term.
- F29 Ex-ante, one would not expect suppliers acting consistent with GEIP to earn less than a normal return due to quality incentive scheme penalties (or quality standard contraventions penalties or compensation) alone. Ex-post however, suppliers may do so due to performance or conduct not consistent with GEIP, as reflected in those standards and incentive schemes.
- F30 Ideally, quality incentive schemes should be designed to minimise the risk of windfall gains or losses to Transpower due to circumstances that it has less control of, or an ex-ante expectation of a net penalty even where Transpower is acting consistent with GEIP.

Interaction with other incentives

- F31 Table F4 provides the context for the grid output measures against the range of drivers of behaviour that may impact Transpower's expenditure and quality decision-making processes, and how these may interact with the quality scheme.

Table F4 Summary of incentives that influence Transpower's behaviour

Incentive driver	Effect
Opex IRIS	Provides constant incentive rate for Transpower to achieve cost efficiencies during the period. This is in the interests of end-use consumers, as efficiency savings are shared with customers. However, the revenue path may encourage over-forecasting and underspending (not by improving efficiency but by cutting quality).
Base capex expenditure adjustment	Provides constant incentive for Transpower to achieve cost efficiencies on the base capex allowance during the period. This is in the interests of end-use consumers, as efficiency savings are shared with customers. However, the revenue path may encourage over-forecasting and underspending (not by improving efficiency but by cutting quality).
Major capex expenditure and output adjustment	Incentives to reduce costs on major capex projects and meet specified outputs. This is in the interests of end-use consumers, as efficiency savings are shared with customers. However, the revenue path may encourage over-forecasting and underspending (not by improving efficiency but by cutting quality). Major capex approval process mitigates this risk.
WACC uplift	Mitigates the risk of underinvestment due to mis-estimation of the WACC. Our expectation is that this uplift may provide Transpower with incentives to invest in assets and earn a higher than mid-point return, although because we cannot observe the actual WACC this incentive effect is unknown.

Incentive driver	Effect
Quality enforcement	Encourages investment in, and maintenance of, the network to not let quality degrade below a certain level. Gives an incentive to provide a minimum standard of quality. The standard mitigates the broad expenditure incentives to let quality degrade below a level that we consider justifies an investigation into the quality outcome and may result in legal action.
Quality incentive scheme	Adjusts the natural incentives of a revenue path by providing for additional/reduced revenue for changes in quality (financial incentives are limited by caps and collars). In principle it provides a marginal incentive to adjust quality to the point where the marginal costs of adjustment equal the incentive set (which in turn should ideally reflect consumer preferences).
Reporting requirements (ID)	Provides transparency to stakeholders on how Transpower is operating its network and its performance. Encourages acting as a prudent network operator.
External factors (The Code, GEIP etc.)	Ensures that Transpower meets certain requirements of performance on its grid. Encourages acting as a prudent network operator. Reputational harm from major outages.

Quality dimensions and quality scheme options

F32 Based on our legal framework, there are a range of quality options that we can implement for different dimensions of Transpower's quality performance. Some of these options are shown in Table F5.

Table F5 Quality measure options

Penalty/reward	Quality standard	Description
Symmetric quality incentive scheme	Standard = collar value	Symmetric cap, collar and incentive rate around the target under the quality incentive scheme, where the quality standard is set at the collar value.
	Standard = target value	Symmetric cap, collar and incentive rate around the target under the quality incentive scheme, where the quality standard is set at the target value. This was our approach in RCP2.
	Deadband applies (standard less stringent than collar value)	Symmetric cap, collar and incentive rate around the target under the quality incentive scheme, where the quality standard is set at a less stringent level than the collar value (no financial incentive applies in the deadband range).

Penalty/reward	Quality standard	Description
Asymmetric quality incentive scheme (lower collar bound)	Standard = collar value	Asymmetric measure where there is a larger range between the target and collar compared with the cap and target or differential incentive rates applying above and below the target value. ¹⁸⁶ The quality standard is set at the collar value.
	Deadband (standard less stringent than collar value)	Asymmetric measure where there is a larger range between the target and collar compared with the cap and target or differential incentive rates applying above and below the target value. The quality standard is set at a less stringent level than the collar value.
Asymmetric quality incentive scheme (penalty only)	Standard = collar value	A penalty-only scheme where Transpower would be financially penalised for reductions in quality, with no reward for improving quality relative to the target value. The quality standard is set at the collar value.
	Deadband (standard less stringent than collar value)	A penalty-only scheme where Transpower would be financially penalised for reductions in quality, with no reward from improving quality relative to the target value. The quality standard is set at a less stringent level than the collar value.
Consumer compensation scheme	Depends on how the scheme is set up. Could allow for a range of settings	Similar to a penalty-only incentive scheme, the principal difference is that each customer is compensated for interruptions they experience, rather than the penalties that are pooled and distributed less directly.
Pooling of measures (across different performance measures or across time)	Allows for a range of combinations for setting the quality standard	<p>Allows for different options to result in a breach:</p> <ul style="list-style-type: none"> • Multiple collars (or less stringent levels) needing to be outside of the range to result in a breach • Collar value (or less stringent levels) not met for a number of years in a row before resulting in a breach • Aggregate cap on penalties/rewards so that rewards in one measure might offset penalties in another, but aggregate reward could be capped at zero (or at a lower amount than the penalty).

¹⁸⁶ We may apply this measure if we consider that there should be a stronger incentive to not reduce quality compared with potential upside that Transpower should receive from increasing quality.

Penalty/reward	Quality standard	Description
No quality incentive scheme	Quality standard only	Quality standard applies, and there is no marginal financial incentive from the incentive scheme to improve or reduce quality.
	Reporting only (ID)	No quality standard applies, but Transpower is required to report on performance. In the case of a pilot non-revenue linked incentive scheme, this may be with the purpose of considering linking the measure to revenue in future periods.

Consideration of quality measures

F33 In determining which of the available options most suitably matches up with the characteristics of a specific measure, factors that may be relevant to our decision include:

- F33.1 What are customer or consumer preferences? Do consumers want higher (or lower) quality? What are they willing to pay? Do we have an idea of what Transpower's customers and lines services consumers value, and to what extent?
- F33.2 How mature is the measure and the robustness of data? For example, how confident are we in the target level?
- F33.3 Does the quality measure incentivise efficiency improvements? Will the efficiency improvement be shared with consumers?
- F33.4 Does the quality standard unduly hinder or disincentivise innovative solutions from Transpower? Does the incentive measure associated with the quality standard incentivise innovation?
- F33.5 Does the quality standard incentivise appropriate renewal of assets?
- F33.6 Does the measure incentivise energy efficiency and demand-side management and the reduction of energy losses? Does it disincentivise it?
- F33.7 Does the quality measure limit Transpower's ability to extract excessive profits?
- F33.8 How volatile is the measure and how much control does Transpower have over it?
- F33.9 Should measures be combined (for example, if we are considering a pooled approach)?

- F33.10 What is the relationship between the quality standards we set and what is the probability of contravention (including the effect of enforcement discretion)?
- F33.11 Is the quality standard reflective of the harm we are trying to prevent?
- F33.12 Is there anything that might make the standards difficult to enforce?
- F33.13 Will the quality standards be compatible with the possibility of secondary liability and compensation?
- F33.14 How does the measure interact with other incentives on Transpower? What other tools might we consider to achieve the objectives?
- F33.15 Would it be unduly burdensome for Transpower to comply? Is the difficulty of compliance proportionate to the harm we are trying to avoid?
- F33.16 What is the level of revenue at risk taking into account interactions with other incentive schemes? Is it high enough to promote change? Is it so high that it promotes change beyond what is desirable?

Proposed grid output measure changes from RCP2

High-level approach

- F34 Grid output measures are proposed every five years by Transpower and are set by us as part of the IPP reset. In addition, we set binding quality standards. Transpower has proposed that we simplify and rationalise its grid output measures for RCP3 compared to RCP2. It states that this reflects its consultation with customers and stakeholders.¹⁸⁷
- F35 Our intention is to build on RCP2 to incentivise behaviours around risk assessment and quality to ensure the best outcomes for consumers. In our draft decisions for RCP3 we are proposing that pooling of measures is adopted in some cases, and that the quality standards are set in other cases beyond the incentive regime. We have proposed new reporting requirements and mechanisms through the RCP3 period.
- F36 We re-evaluate Transpower's proposed grid output measures at each reset. This is a continuous process over time, where we aim to improve the suite of quality measures, resulting in incentives on Transpower to deliver further benefits to customers.

¹⁸⁷ Transpower's Service Measures consultation process documentation is available at: www.transpower.co.nz/transpower-service-level-refresh-rcp3.

- F37 The regime has matured significantly over the first two regulatory control periods and we look to continue improving it for RCP3. Transpower has undertaken an engagement process in developing its quality measures proposed for RCP3. We are providing stakeholders (customers, consumers and others) further opportunity for involvement via our consultation process.
- F38 Our approach to setting quality standards that are enforceable under the Act has also matured since we set the RCP2 quality standards. These were set in the midrange of the quality incentive scheme (ie, at the target value for performance) and have proven to be aspirational.¹⁸⁸
- F39 In RCP2 Transpower's grid performance measures for the quality incentive scheme were disaggregated to a POS level, reducing the sample size in each POS sub-category of the measure (and providing more measures that Transpower need to manage and that could potentially be breached).¹⁸⁹ This meant that large, outlier events could directly lead to breaches of the quality standard. This is why we have proposed quality standards for RCP3 based on pooling of measures across grid performance POS sub-categories and over time.¹⁹⁰
- F40 We have set the RCP3 quality standards that realistically reflect Transpower's historical performance and provide a minimum level of quality to consumers that is in line with that historical performance.
- F41 Our proposed RCP3 grid output measures comprise both service performance measures and asset health measures. Service performance measures are directly related to the performance of grid assets such as asset availability, customer supply reliability, and the electricity market, while asset health measures are subjective assessments of asset condition.
- F42 Our proposed service performance measures include measures of grid performance (including the number and duration of interruptions across different POS of the grid), asset performance (the availability of key systems in the grid) and customer service (for example, provision of information and communication with customers).

¹⁸⁸ However, in our 2014 reasons paper we noted that we would not take enforcement action for performance below the quality standard but better than the collar (above n 101, at [4.40]).

¹⁸⁹ We consider that disaggregation of the grid performance measures is prudent to provide more accurate incentives for service performance (and a minimum level of quality) that reflects consumer demand at each POS.

¹⁹⁰ This effectively increases the sample size of the measures and ensures that one-off events do not directly result in breaches of the quality standards. This is explained further in Attachment F.1.

- F43 Table F6 below shows the changes in service performance measures from RCP2 to those we propose for RCP3. This shows which measures we propose to retain (or discontinue) for RCP3 and which performance measure development initiatives we propose to rationalise into new measures. Table F6 describes what aspect of performance each of the codes (eg, 'GP1') measure.
- F44 Transpower's proposed grid output measures have been informed by its consultation with stakeholders to date.¹⁹¹ The Verifier's opinion was that Transpower's consultation with its stakeholders on grid output measures has been moderately effective.¹⁹²
- F45 Transpower has proposed to discontinue the GP3 measure (duration of the 90th percentile unplanned interruption) from RCP2 because causes of these large events are typically driven by specific circumstances and this is not a meaningful indicator of performance.¹⁹³ There was general support in submissions, apart from Contact Energy, for the removal of the GP3 measure.
- F46 Transpower has proposed to rationalise the RCP2 performance measure development initiatives into the following measures for RCP3, including:
- F46.1 rationalising PMD4 and PMD8 into the new AP3 measure;
 - F46.2 rationalising PMD1, PMD2 and PMD3 into the new customer service measure CS1;
 - F46.3 reliability development measures PMD6, PMD7 and PMD9 have been discontinued for RCP3;¹⁹⁴ and
 - F46.4 availability development measure PMD5 discontinued for RCP3.¹⁹⁵

¹⁹¹ As summarised in: Transpower "Service and Asset Health Engagement Paper 3" (June 2018), available at: [https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/Engagement%20Paper%203%20\(June%202018\).pdf](https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/Engagement%20Paper%203%20(June%202018).pdf)

¹⁹² Above n 29, at 90.

¹⁹³ Above n 191, at 25.

¹⁹⁴ Transpower has proposed to discontinue PMD6 as it does not consider it is an appropriate measure of performance as Transpower states that most momentary interruptions are outside of its control. PMD7 has been proposed not to be continued because it was considered that reporting on energy not supplied would be better served through reporting closer to real-time information on Transpower's website. PMD9 is already reported on as Transpower is obligated to provide post-event reporting under connection contracts with its consumers.

- F47 Most feedback supported Transpower’s proposal to rationalise (and in some cases not adopt) the performance measure development initiatives for RCP3. Contact Energy submitted that development measures PMD6 and PMD9 should be developed into performance measures for RCP3 with financial incentives.¹⁹⁶
- F48 For performance measure development initiative PMD6, Transpower noted in its engagement process that the information on momentary interruptions may be of interest to customers but is inappropriate as a performance measure. Transpower has proposed collecting the relevant data and communicating the information through industry working groups.¹⁹⁷
- F49 MEUG suggested that PMD6 from RCP2 is a useful measure to understanding the number and trend of momentary interruptions over time. It also notes that identifying the cause of each incident would add value to the measure.¹⁹⁸

Approach raised in the Issues paper

- F50 In our Issues paper we sought further views from stakeholders on whether:
- F50.1 Transpower’s proposed measures cover the main dimensions of performance in RCP3;
 - F50.2 there were any performance measures missing; and
 - F50.3 all of the proposed measures add value for consumers.

¹⁹⁵ There was mixed support during Transpower’s RCP3 engagement process to retain PMD5 as a measure for RCP3. Transpower proposed to discontinue PMD5 for RCP3 because while the rationale for the information remains valid, the usefulness to customers and Transpower’s own decision-making needs to be further explored. Transpower also noted that the grid performance measures should also provide insights over time as to the underlying trend in levels of security. See: Transpower “Services report” (September 2017), at 25, available at: https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/2017%20ITP%20Services%20Report.pdf.

¹⁹⁶ Above n 191, at 25.

¹⁹⁷ Transpower “Service Engagement Paper 2 (April 2017), at 18, available at: https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/Engagement%20Paper%20%20-%20April%202017.pdf.

¹⁹⁸ MEUG noted that to further improve the PMD6 measure could be to identify the cause for POS with a high concentration of businesses sensitive to momentary fluctuations (and hence an important aspect of transmission service to those consumers). See: Transpower “Service Performance Measures Customer Feedback Summary” (November 2016), available at: https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/Service%20Performance%20Measures%20Feedback%20Summary%20December%202016.pdf.

Response in submissions

F51 New Zealand Institute of Economics Research (**NZIER**) (for MEUG) submitted that the proposed measures cover the main dimensions of performance and carry over the key aspects from RCP2.¹⁹⁹ NZIER wanted a more detailed explanation of how the incentive rates had been calculated for the service performance measures.

Our view

F52 We generally agree with Transpower's proposed changes for RCP3 following its consultation process and consider that Transpower has proposed the appropriate measures of quality.

F53 However, we propose to include ID requirements relating to momentary interruptions (RCP2 measure PMD6) named GP-M for RCP3. Transpower will already be collecting the data and stakeholders (for example, Contact Energy and MEUG) have suggested that reporting the information would be beneficial to customers.

Our draft decision

F54 For the grid output measures that will apply for RCP3, our draft decision is to adopt:

F54.1 Transpower's proposed measures;²⁰⁰ and

F54.2 the RCP2 PMD6 measure as a reporting requirement, which would be renamed measure GP-M for RCP3 with an associated quality standard.²⁰¹

¹⁹⁹ NZIER "Transpower IPP 2020-2025: Comment in Issues Paper – NZIER report to MEUG" (25 February 2019), at 1.

²⁰⁰ We have proposed to adopt Transpower's proposed targets, caps and collars, but with a lower revenue at risk compared with Transpower's proposal. Refer to Attachment F.6 for more information.

²⁰¹ In this case, the quality standard is based on meeting a certain value, and the associated reporting requirement is to ensure compliance with the standard and provide information to interested parties.

Table F6 Our draft decision on service performance measure changes for RCP3

Category	RCP2			Our draft decision for RCP3		
	Code	Measure	Linked to revenue?	Code	Measure	Linked to revenue?
Reliability	GP1	Number of unplanned interruptions each year by customer category	Yes	GP1	Number of unplanned interruptions each year across all POS in a sub-category	Yes
	GP2	Average duration of unplanned interruptions by customer category	Yes	GP2	Average duration of unplanned interruptions greater than 1 minute across all POS in a sub-category	Yes
	GP3	Duration of 90 th percentile unplanned interruption by customer category	Yes			
	PMD6	Number of unplanned momentary interruptions	No	GP-M	Number of unplanned momentary interruptions (not proposed by Transpower for RCP3)	No
	PMD7	Energy not supplied for each POS for each unplanned interruption	No			
	PMD9	Extent that Transpower provides its reports to affected parties on unplanned interruptions within 15 working days of the interruption	No			

Category	RCP2			Our draft decision for RCP3		
	Code	Measure	Linked to revenue?	Code	Measure	Linked to revenue?
Availability	AP1	% availability of HVDC	Yes	AP1	% availability of HVDC	Yes
	AP2	% availability of selected HVAC circuits	Yes	AP2	% availability of selected HVAC circuits	Yes
	PMD4	Extent that Transpower meets planned outage restoration times	No	AP3	Extent that Transpower keeps to planned outage times	No (ID)
	PMD8	Extent that Transpower meets planned outage start times for critical circuits and equipment	No			
				AP4	Extent that Transpower communicates delays to planned outage return times	No (ID)
	PMD5	Extent that Transpower places customers on N security	No	AP5	Extent that Transpower places customers on N security	No (ID)
Customer service/event communication	PMD1	Time to provide initial information following an unplanned interruption	No	CS1	Existing post-event survey. Focuses on timely information provision and communications	No (ID)
	PMD2	Time to provide initial information following an unplanned interruption (greater than 30 minutes)	No			
	PMD3	Accuracy of notified restoration times following unplanned interruptions	No			

Our proposed grid output measures

High-level approach

F55 We have proposed revenue-linked service performance measures and associated targets, caps, collars and incentive rates for each POS category of grid performance (**GP**), and for each measure of asset performance (**AP**). Our proposed measures are outlined in Table F7 and are explained further in subsequent sections of this attachment.²⁰²

Table F7 Our proposed service performance measures incentive summary

Measure and category	Cap	Target	Collar	Quality standard*	Incentive rate	\$ at risk
GP1: number of interruptions (per annum)					\$ per event	
N-1 security high economic consequence	0	7	14	14	183,333	1,466,667
N-1 security material economic consequence	7	24	41	41	21,630	389,333
N security high economic consequence	4	6	8	8	133,333	266,667
N security material economic consequence	9	23	37	37	21,000	336,000
N-1 security generator	5	9	13	13	33,333	133,333
N security generator	6	12	18	18	22,222	133,333
GP2: average duration of interruption (min)					\$ per min	
N-1 security high economic consequence	30	92	154	154	42,512	2,933,333
N-1 security material economic consequence	36	61	86	86	28,840	778,667
N security high economic consequence	0	103	206	206	5,178	533,333
N security material economic consequence	0	140	280	280	4,800	672,000
N-1 security generator	50	174	298	298	2,151	266,667
N security generator	11	93	175	175	3,252	266,667
AP1: HVDC availability (%)					\$ per 1%	
HVDC availability	99.75%	98.75%	97.75%	96.75%	400,000	400,000
AP2 HVAC availability (%)					\$ per 1%	
HVAC availability (71 selected assets)	99.2%	99.0%	98.8%	98.6%	4,000,000	800,000
Total revenue at risk						
Revenue at risk (%)						1.46%

Note: Revenue amounts are in nominal \$s

*The quality standard for the grid performance measures is also based on a pooling criterion (explained in Attachment F.1).

²⁰² Table F16 below displays Transpower's proposed targets, caps, collars, incentive rates and \$ at risk.

- F56 We have also proposed non-revenue-linked (reporting only) service performance measures AP3, AP4, AP5 and CS1 under ID. We propose that these measures would have no associated quality standards attached. Our reasons are further explained later in this attachment.
- F57 In RCP2 we implemented revenue-linked asset health incentive measures for Transpower. We consider that these volumetric asset health measures did not provide Transpower with appropriate incentives. This is because the volumetric measures were based on number of outputs produced rather than the outcome on quality, and therefore Transpower may have been incentivised to undertake work unnecessarily to meet the specific targets (or face a penalty for not doing so).
- F58 Transpower has proposed a new methodology for evaluating and measuring asset health and proposed that these measures be revenue-linked. However, we consider that the asset health measures should not be linked to revenue. This is also discussed later in this attachment.
- F59 As shown in Table F7, our draft decision is to expose Transpower to a total revenue at risk of 1.46% before adjusting for tax and time value of money. After these adjustments, the post-tax income at risk is approximately 1%.
- F60 We note that the proposed level of revenue at risk for EDBs in the DPP will combine with the reward and penalty amounts from the IPP to affect electricity prices. Our draft DPP decision is to propose a constant incentive rate for the quality incentive scheme so the revenue at risk will vary across different EDBs.

Reasons for addressing this issue

- F61 We are required under the Capex IM to set revenue-linked and non-revenue-linked measures for Transpower.

Approach raised in the Issues paper

- F62 In our Issues paper we discussed Transpower's proposed grid output measures from Transpower's proposal. This included how Transpower's proposed grid output measures had changed from the RCP2 measures and the reasons for the change.
- F63 Transpower has proposed to increase revenue at risk from the RCP2 level. We discussed the implications of this increase and sought views from stakeholders on whether this increase was appropriate.
- F64 We discussed the Verifier's view on Transpower's proposed grid output measures and whether the Verifier could be satisfied that the proposed measures satisfied GEIP.

F65 We also provided our view of Transpower's proposed grid output measures and issues identified by the Verifier.

Response in submissions

F66 Submissions were generally supportive of Transpower's proposed measures and changes from RCP2.

Further detail

F67 Further detail on our draft decisions, and our reasons for those draft decisions, is provided in the following sections of this paper:

F67.1 Attachment F.1 – grid performance measures;

F67.2 Attachment F.2 – asset performance measures;

F67.3 Attachment F.3 – non-revenue-linked measures;

F67.4 Attachment F.4 – asset health measures;

F67.5 Attachment F.5 – normalisation approach for service performance measures;

F67.6 Attachment F.6 – level of revenue at risk for grid output measures; and

F67.7 Attachment F.7 – incentive rates for the service performance measures.

Our proposed quality standards for grid output measures

High-level approach

F68 Transpower is not required to propose quality standards. We set them as part of the IPP process.

F69 The setting of quality standards for the IPP requires consideration of how the revenue-linked, reporting measures and quality standards are expected to interact and the quality outcomes that may result. Quality standards are a key and enforceable component of the IPP which must also be consistent with the Electricity Authority's Code.

F70 By contrast to RCP2 (and the previous DPP reset), for RCP3 we have proposed to set quality standards that are not necessarily set at the incentive measure settings (ie, target, cap or collar).

F71 As a starting point, we have based the proposed revenue-linked (as well as non-revenue-linked) grid output measures on historical information and the quality considerations above. Once our proposed measures were decided, we determined where the appropriate quality standard should be.

- F72 In setting the quality standards, we have considered what minimum level of quality customers and consumers demand, while ensuring that the standard will not be breached so frequently that it results in unnecessary investigation that potentially undermines the effect of the standard.
- F73 Table F8 outlines our draft decision on quality standard levels for each of the revenue-linked grid output measures.

Table F8 Our draft decision on quality standards for revenue-linked grid output measures

Measure	Penalty/reward	Quality standard	Pooling of measures?
GP1 measures (for different POSs)	Symmetric	Standard = collar	Yes
GP2 measures (for different POSs)	Symmetric	Standard = collar	Yes
AP1	Symmetric	Deadband to apply (standard < collar)	No
AP2	Symmetric	Deadband to apply (standard < collar)	No
Asset health	Symmetric (but not linked to revenue) ²⁰³	Deadband to apply (standard > collar) ²⁰⁴	No
GP-M	Reporting only	Set at 116 momentary interruptions per year	No
AP3	Reporting only	-	-
AP4	Reporting only	-	-
AP5	Reporting only	-	-
CS1	Reporting only	-	-

- F74 Our draft decision is to require comprehensive reporting if Transpower does not meet any of the quality standards, including reporting details on:

F74.1 the causes of the breach;

F74.2 the impact on Transpower's customers over the period;

²⁰³ We are proposing that asset health is not linked to revenue, but we are running as a trial link to revenue. We are using Transpower's proposed asset health targets, caps and collars and setting the quality standard outside of Transpower's proposed incentives range.

²⁰⁴ The quality standard is above the collar because a higher asset health score indicates poorer asset quality.

F74.3 actions that Transpower took to minimise the effect of loss of supply causes; and

F74.4 lessons learned for the future.

Reason for addressing this issue

F75 Quality standards ensure a minimum level of quality for consumers. The combination of the quality standard with financial and/or non-financial incentives is intended to influence performance towards the target performance.

F76 In setting quality standards, we may consider whether:

F76.1 it may be inappropriate to set the standard at that target if (a) we do not have strong confidence in the (pooled) target(s) and/or (b) there are factors outside Transpower's control which affect its ability to meet the (pooled) target(s), as then we would have to rely on our enforcement discretion to decide whether Transpower's performance was inappropriate; or

F76.2 we might be more confident that the collar is an appropriate minimum level of the relevant dimension of quality.

F77 If both those factors (ie, confidence in the target, and the extent to which there are factors outside Transpower's control) are significant, the standard might then be more akin to a 'safety net' (ie, at a less stringent level than the collar), to ensure that a particular metric (or pool of metrics) does not drop below some minimum performance level. In that case, we would need to rely on our enforcement discretion much less, as a breach of the standard is highly likely to reflect poor or unacceptable performance.

F78 The setting of our proposed measures, which have been based on historical information, are only expected to be breached if Transpower allows quality to significantly deteriorate. Therefore, any contravention would warrant investigation into the cause, harm to customers, and potential liability.

Approach raised in the Issues paper

F79 In our Issues paper we noted the relationship between quality standards and the different grid output measures in the quality incentive scheme. We sought views from stakeholders on where the quality standards should be set and whether they were appropriate for specific non-revenue-linked measures.

Response in submissions

F80 Submissions on the Issues paper were generally supportive of reporting requirements for Transpower when quality standards (or performance obligations) were breached.^{205, 206}

F81 Transpower considered that quality standards for service performance measures should not be linked to the incentive values (target or collar value) but should be separately determined. Transpower stated:²⁰⁷

The incentive settings are designed to balance multiple considerations, including the need for symmetry between the cap value and the collar value. This does not automatically yield a collar value that is suitable for use as a quality standard. The risk with using the collar value is that threshold may be too low, triggering unnecessary need for Commission investigation.

Attachment F.1: Grid performance (GP) measures

High-level approach

F82 We propose to retain the GP measures for RCP3 to enable interested persons to assess Transpower's grid reliability and ability to provide an uninterrupted transmission service to customers. These measures include:

F82.1 GP1, measuring the number of unplanned interruptions greater than one minute, across all POS in each sub-category, for every year of RCP3; and

F82.2 GP2, measuring the average duration of unplanned interruptions greater than one minute, across all POS in each sub-category, for every year of RCP3.

F83 Table F9 summarises our proposed grid performance measures for RCP3.

²⁰⁵ Mercury "Transpower's individual price-quality path for the next regulatory control period – Submission on Issues paper" (28 February 2019).

²⁰⁶ Vector "Transpower IPP 2020: Issues paper – Vector comments" (28 February 2019).

²⁰⁷ Above n 71, at 14.

Table F9 Our proposed grid performance measures

Measure and category	Cap	Target	Collar	Quality standard	Incentive rate	\$ at risk ²⁰⁸
GP1: number of interruptions (per annum)					\$ per event	
N-1 security high economic consequence	0	7	14	14	183,333	1,466,667
N-1 security material economic consequence	7	24	41	41	21,630	389,333
N security high economic consequence	4	6	8	8	133,333	266,667
N security material economic consequence	9	23	37	37	21,000	336,000
N-1 security generator	5	9	13	13	33,333	133,333
N security generator	6	12	18	18	22,222	133,333
GP2: average duration of interruption (min)					\$ per min	
N-1 security high economic consequence	30	92	154	154	42,512	2,933,333
N-1 security material economic consequence	36	61	86	86	28,840	778,667
N security high economic consequence	0	103	206	206	5,178	533,333
N security material economic consequence	0	140	280	280	4,800	672,000
N-1 security generator	50	174	298	298	2,151	266,667
N security generator	11	93	175	175	3,252	266,667

Note: Revenue amounts are in nominal \$s and not referenced to any particular year

F84 Following its consultation process with stakeholders on modifications to its proposed measures, Transpower proposed to remove the service performance measure on P90 longest duration interruptions (previously GP3).²⁰⁹ We agree that the RCP2 measure GP3 is not necessary for RCP3, as the GP2 measure will capture the effect of most of the same interruptions.

F85 For the proposed RCP3 grid performance measures (GP1 and GP2), Transpower has refined the POS categories (based on their level of security) and sub-categories (based on levels of demand and evaluation of economic consequence from an unplanned interruption) from RCP2.²¹⁰ Following its consultation process on proposed changes to the service performance, stakeholders generally supported Transpower's proposed change in POS categorisation.²¹¹

²⁰⁸ Revenue at risk for the GP measures are explained in Attachment F.6.

²⁰⁹ Most feedback on Transpower's proposal to not adopt the GP3 measure for RCP3 supported this proposal, but one submitter did not (above n 29, at 93).

²¹⁰ Transpower "Grid Outputs Report 2018" (2018), at 10, available at: www.transpower.co.nz/keeping-you-connected/industry/rcp3/rcp3-proposal-securing-our-energy-future-2020---2025.

²¹¹ Above n 29, at 93.

F86 We have proposed quality standards for measures GP1 and GP2 with associated targets, caps, collars, incentive rates for each POS category for each measure. We propose to adopt Transpower’s proposed GP1 and GP2 measures for the POS categories. We have cross-checked the proposed measures against Transpower’s historical performance, and we consider that the measures are appropriate.²¹²

What the Verifier said

F87 The Verifier considered that the proposed service performance measures reflected the effectiveness of Transpower’s stakeholder consultation process, and based on the information that the Verifier had at the time, it concluded that the proposed service performance measures satisfied GEIP because:

F87.1 the proposed measures address areas of service performance that are likely to be of most concern to consumers, especially those that are directly connected; and

F87.2 the introduction of economic consequence linked to value of lost load (**VoLL**) estimates for the GP1 and GP2 grid output measures “enhances the robustness of the measures because it incorporates the value that customers place on supply reliability into the service performance incentive mechanism”.^{213, 214}

F88 Transpower has stated that it is proposing that the RCP3 service performance targets be more aligned with historical performance, stating that “The RCP2 targets were aspirational and have proved too challenging” specifically the availability targets.²¹⁵

²¹² Transpower’s proposed GP1 targets on an 18-year average of interruptions not due to equipment failure and a 3-year average of interruptions due to equipment failure. This is because interruptions due to equipment failure have been much lower than historically from 2015 to 2017, but no robust trend over time for non-equipment failure interruptions.

²¹³ Above n 29, at 106.

²¹⁴ VoLL is an estimate of the economic value, in dollars per MWh, that a consumer places on electricity they plan to consume but do not receive because of an interruption. Transpower has applied a value of VoLL of \$25,000 per MWh and applied a 33% incentive rate to take into account the proportion borne by Transpower under the incentive scheme. The VoLL estimate used is an average as VoLLs at different GXPs can vary significantly. For more information, see Transpower’s VoLL study: <https://www.transpower.co.nz/sites/default/files/publications/resources/Value%20of%20Lost%20Load%20%28VoLL%29%20Study%20-%20June%202018.pdf>.

²¹⁵ Above n 210, at 28.

F89 The Verifier's view was that:²¹⁶

the primary objective in setting service performance targets should be to satisfy all relevant legislative and regulatory requirements. Any divergences from these requirements should only be considered upon request of individual directly connected customers.

F90 The Verifier concluded that the proposed RCP3 grid output targets are largely consistent with RCP2 although POS had moved category and some customers will have higher or lower reliability and restoration performance. In summary though, due to the evolving situation with the grid output measures at the time of writing, the Verifier could not fully satisfy itself that the proposed targets for the grid output measures satisfied GEIP.

F91 The Verifier was not able to verify Transpower's claim that the proposed RCP3 service performance measure targets were consistent with historical data.

Approach raised in the Issues paper

F92 In our Issues paper, we outlined Transpower's proposed grid performance measures and how Transpower has proposed to link these measures to revenue.²¹⁷

F93 We noted Transpower's consultation with stakeholders on its proposed grid output measures (including the GP measures), noting that the consultation did not cover the proposed caps, collars or target values, the level of revenue at risk or the applicable incentive rates applied.^{218, 219}

F94 We outlined the Verifier's view of Transpower's proposed RCP3 grid output measures and our view of the measures.

F95 We sought views from stakeholders on how we should set quality standards for the GP measures, whether there were any measures that were missing and whether there were comments on the proposed targets, caps, collars or other values were appropriate.

²¹⁶ Above n 29, at 107.

²¹⁷ Above n 33, at Chapter 5.

²¹⁸ Transpower "Securing our Energy Future 2020 – 2025 – Regulatory Control Period 3 – Draft Proposal for Consultation August 2018" (August 2018), at 34–36.

²¹⁹ Above n 191, at 10-13.

Response in submissions

- F96 MEUG submitted that the proposed measures covered the key areas of grid reliability and carried over the key aspects from RCP2.²²⁰ Mercury also broadly agreed that the key quality dimensions were covered, but could be constructed to provide overall benefit to consumers through market efficiency measures (for example, lost load, grid congestion and grid losses).²²¹
- F97 Meridian supported quality standards without revenue-linked performance measures as the revenue at risk will not provide a strong enough incentive.²²²
- F98 Transpower also noted that with respect to its proposed GP measures:²²³

With respect to quality standard breaches, statistically we expect the collar for at least one GP1 or GP2 measure will not be met each year during RCP3.

Our view

- F99 As noted above, we propose using Transpower's proposed grid performance target, cap, collar and incentive rate measures for RCP3.²²⁴
- F100 We propose setting the quality standard at the collar value for each measure and having a pooled approach to compliance for contravening the standard under the Act. The pooling would apply for GP1 across all POS categories and GP2 across all POS categories for a rolling time period (ie, GP1 and GP2 can be breached separately and the rolling time periods do not interact across GP1 and GP2).
- F101 This means that to breach either of the GP quality standards, a certain amount of measures within the GP1 POS measures or across the GP2 POS measures will need to not be met for two out of a three year rolling period for each individual pool.
- F102 Table F10 demonstrates the criteria for a contravention under the grid performance measures.

²²⁰ Above n 199, at 1.

²²¹ Above n 205, at 2.

²²² Meridian "Transpower IPP - Issues Paper" (28 February 2019), at 5-6.

²²³ Above n 71, at 34.

²²⁴ We have used Transpower's approach for calculating incentive rates, but have applied a scaling factor to adjust the revenue at risk. This is explained in Attachment F.6.

Table F10 Criteria for measuring contravention of grid performance standards

Quality measure (pool)	Number of POS collar limits not met	Rolling period (years)
GP1	2/6	2/3
GP2	2/6	2/3

- F103 In setting the quality standard criteria for the GP measures in RCP3 we have considered how Transpower would have performed historically (under the proposed RCP3 measures). Since 2006, based on our proposed breach criteria, Transpower would have contravened the standard once under the GP1 measure and twice under the GP2 measure.
- F104 Many of the POS measures have a very small number of observations (three POS have 20 observations or less), so the rolling period and pooling of measures aims to effectively increase the sample size and reduce the risk of a quality breach from volatility due to a low number of observations.
- F105 Increasing the sample size has the effect of reducing variance in the sample(s) and the sample means will gather more symmetrically around the population mean. Under the central limit theorem, if the sample size is greater than 30, the sampling distribution approximates the standard normal distribution.²²⁵
- F106 Assuming that the objective is to highlight performance that is falling below acceptable levels, we recommend that a combination of trend (more than one year), and pool (combined measures), is adopted as the non-compliance criteria.
- F107 We have selected the 2/6 measure as a judgement call on what may indicate deterioration below acceptable levels of quality over time, based on historical Transpower performance against the collar for different POS. Transpower noted in its submission on our Issues paper that statistically the collar is expected not be met for at least one GP1 or GP2 measure during RCP3.
- F108 Including the intertemporal pooling in the non-compliance criteria (2/3 years) could filter single-year performance issues in individual measures while highlighting potential deterioration in performance over multiple years.²²⁶

²²⁵ Sang Gyu Kwak and Jong Hae Kim “Central limit theorem: the cornerstone of modern statistics” (Korean Journal of Anesthesiology, April 2017, 70(2): 144-156), available at: <https://pdfs.semanticscholar.org/12ec/69400753af453abb0bc797ed94e3dcc6b1c8.pdf>.

²²⁶ We are proposing to use two of out three years rather than a longer period (for example, three out of five years) because we want any enforcement action to be able to be undertaken without having to wait a significant period of time (eg, five years).

F109 We consider there is a need to balance variations in quality leading to an unnecessary need for Commission investigation, and the need to capture events that are worthy of investigation. In setting the quality standard criteria for the GP measures in RCP3, we have considered how Transpower would have performed historically (under the proposed RCP3 measures).

F110 Figure F3 shows the results of Transpower's historical performance against the proposed measures going back to 2006. Based on our proposed contravention criteria, Transpower would have been outside the range of the collar limit for 2/6 measures four times since 2006 for GP1 and five times for GP2. This would have resulted in one contravention for GP1, and two contraventions for GP2 since 2006.

Figure F3 Outcomes of proposed GP measures based on historical performance

GP1	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
N-1 Security High Economic Consequence	33	13	2	13	21	6	6	3	4	3	4	11	6
N-1 Security Material Economic Consequence	68	35	28	23	40	33	18	27	15	13	20	30	48
N Security High Economic Consequence	5	5	7	4	10	5	5	2	4	4	5	9	4
N Security Material Economic Consequence	33	49	24	37	11	36	25	26	11	22	10	16	15
N-1 Security Generator	20	15	8	11	15	19	12	20	8	7	15	7	18
N Security Generator	15	17	22	29	16	13	6	15	12	6	6	10	15
GP2	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
N-1 Security High Economic Consequence	66	227	37	75	266	127	28	22	30	27	96	69	69
N-1 Security Material Economic Consequence	46	58	66	77	69	56	97	84	62	46	94	83	18
N Security High Economic Consequence	55	36	80	124	136	42	89	16	497	447	119	68	133
N Security Material Economic Consequence	544	50	55	75	96	53	145	39	68	343	1,189	249	280
N-1 Security Generator	152	61	225	116	109	374	439	113	123	473	108	104	124
N Security Generator	45	34	18	160	309	254	90	64	77	208	96	84	82

x = breach of the collar
x = worse than target
x = better than target

F111 We propose to make Transpower's GP measures symmetric because we consider the GP measures for different POSs have a range of sample sizes and can have large variability across years. Therefore, we consider that there should be an incentive scheme around the target with a constant incentive rate above and below (to the cap and collar). In the absence of marginal improvements or reductions in quality, we would expect the variability to be around the target level on average.

F112 The purpose of the incentive scheme is to incentivise Transpower to consider the price-quality trade-off when making investment and maintenance decisions. We consider that the incentive rates (and hence level of revenue at risk) for the GP measures will not incentivise overbuilding to get the maximum rewards from the incentive scheme.²²⁷

²²⁷ That is, costly quality improvements will not be undertaken at the relatively low incentive rate because the incentive reward for doing so will not outweigh the cost of the improvements.

- F113 In each individual year, if the measure is outside the cap or collar limits we would require an associated report outlining the cause.
- F114 We also propose to change the revenue weighting between the GP1 and GP2 measures. GP1 is fully an interruption frequency measure while GP2 contains the effect of both interruption frequency and interruption duration.
- F115 GP2, the duration of interruptions at each POS, is a function of the number of interruptions and the duration of each interruption. Ie, the number of interruptions is implicitly captured in the GP2 incentive measure.
- F116 We have carried out rebalancing calculations for the revenue at risk that attempts to equally weight the incentives on the effect of interruption frequency and interruption duration across GP1 and GP2. This results in a weighting of 33.3% for GP1 (number on interruptions) and a 66.7% weighting for GP2 (duration of interruptions).
- F117 This follows other regulatory regimes overseas which have reduced the weighting of frequency of interruptions in relation to duration of interruptions.²²⁸
- F118 Our draft decision is to de-weight measure GP1 to 33.3% of combined GP revenue at risk and increase GP2 to 66.7% of combined GP revenue at risk. The total revenue at risk for GP1 and GP2 are displayed in Table F17.
- F119 In addition to the incentive measures and quality standards, we propose introducing reporting requirements for interruption events based on length of time to restore supply. We propose comprehensive reporting requirements for interruptions over 12 hours and over one system minute.
- F120 We consider that the comprehensive report should be required to be reported on within 60 days of the event, and include details on:
- F120.1 the cause(s) of the interruption;
- F120.2 interruption date and time;

²²⁸ In 2018, the AER increased the weighting of SAIDI (duration) to 60% and decreased the weighting of SAIFI (frequency) to 40% from previously distributing the incentives equally. See: Australian Energy Regulator “Amendment to the Service Target Performance Incentive Scheme (STPIS): Final decision” (November 2018), at 9. In Ofgem’s RIIO-ED1 scheme, Ofgem has a lower effective weighting of 27% for frequency of interruptions and 73% for duration of interruptions. See: Ofgem “Electricity Distribution Price Control Review Final Proposals - Incentives and Obligations” (7 December 2009), at 85, available at: https://www.ofgem.gov.uk/sites/default/files/docs/2009/12/fp_2_incentives-and-obligations-final_0.pdf.

F120.3 the impact on Transpower's customers - interruption MW and duration including any affected GXP location(s) that includes generation connections to the grid;

F120.4 actions that Transpower has taken to restore supply; and

F120.5 lessons learned for the future.

F121 The comprehensive report would require all of the above points, while simple reporting requirements we propose for the GP-M measure will require only the first three points.²²⁹ This reporting would be required at the same time as the IPP annual compliance statement.²³⁰

F122 In addition to reporting on large interruption events, we would also retain reporting requirements on the reasons why Transpower has failed to meet the collar value for any measures in a given disclosure year.²³¹

F123 By the pooled quality standard applying across a time period for the GP measures, in comparison to RCP2 there is less chance of a quality breach through the IPP period.²³² Therefore, we must consider the enforcement incentive from the risk of breaching the quality standard and the probability that we consider it will contravene.

Alternatives considered

F124 We have considered the merits of:

F124.1 having a quality standard with no revenue-linked incentive scheme;

F124.2 setting our own measures rather than using Transpower's proposed measures;

F124.3 setting a deadband zone for quality standards; and

F124.4 options for the pooled measures for setting the quality standards.

²²⁹ We consider that it is appropriate to introduce these reporting requirements to provide transparency on the cause of significant interruptions to us and interested stakeholders, and because Transpower has removed the reliability reporting performance measure development initiatives (PMD 7, and PMD9) for RCP3.

²³⁰ Clause 20 of the Transpower IPP Determination.

²³¹ Clause 20.1.2(b) of the Transpower IPP Determination.

²³² That is, when there is no pooling there is a chance to contravene every year of the period, whereas with pooling we would need to wait for a number of years to take enforcement action.

Alternatives considered – Quality standard with no incentive scheme

- F125 As discussed in the quality considerations section, we consider that Transpower should have incentives to maintain quality for demand and generator connections in the presence of the expenditure incentives to reduce costs (which could be done through reductions in quality).
- F126 We consider that revenue-linked incentives on reliability provide better incentives to move towards a price-quality balance reflecting what customers value, as long as the incentives are not too strong. We discuss this in terms of marginal benefit (MB) for Transpower and customers from improvements in quality and the marginal cost (MC) for Transpower and consumers of the improved quality.
- F127 The marginal benefit for Transpower (MB_T) is the revenue-linked incentive reward and for customers (MB_C) is the value placed on improved reliability. The marginal cost for Transpower (MC_T) is the increased expenditure (net of IRIS paybacks) and for customers (MC_C) is the incentive payments (including IRIS).
- F128 Ideally, MB would be the same for suppliers and customers, which would more likely achieve the efficient level of quality. This is unlikely to be exactly the case in reality but basing the incentive rate on VoLL (the value that customers place on loss of supply) is a pragmatic approximation to reflect customers' willingness to pay for improved quality.
- F129 With the appropriate, or even conservative, revenue-linked incentive settings profit maximising suppliers will be:
- F129.1 encouraged to find inexpensive solutions to improve reliability – $MB_T > MC_T$ and $MB_C > MC_C$;
- F129.2 neither encouraged or discouraged to find cost-neutral solutions to improve reliability – $MB_T = MC_T$ and $MB_C \geq MC_C$; and
- F129.3 discouraged to find expensive solutions to improve reliability – $MB_T < MC_T$ and $MB_C < MC_C$.
- F130 However, we acknowledge if the revenue-linked incentives are too strong then Transpower may be encouraged to find solutions where the costs to customers can exceed the benefit to customers – $MB_T > MC_T$ and $MB_C < MC_C$.
- F131 Conversely, if the revenue-linked incentives are too weak, or zero, then Transpower will not be encouraged to find all solutions that would move towards a price-quality balance reflecting marginal costs and benefits for both Transpower and customers.

- F132 Transpower has proposed the incentive rates for the GP measures to be set by comparing to the VoLL at each POS, which is based on the average value customers place on reducing interruptions. This provides a link (even if imperfect) to the average value that customers may place for reductions in quality for different POS.
- F133 A conservative incentive strength based on (or lower than) average VoLL is unlikely to drive suppliers to improve quality beyond what customers are willing to pay for. This is because by using VoLL we are approximating, on average, the incentive strength to what the average customer is willing to pay for at the margin.
- F134 If we were to not link the measures to revenue and only apply a quality standard (to mitigate the effect of expenditure incentives) there would be no financial incentive to maintain or improve performance above the level of the standard (after taking potential fluctuations into account).
- F135 We considered setting the measures ourselves (ie, not taking Transpower's proposed values) based on historical data. Comparing Transpower's proposed targets, caps and collars to historical averages, Transpower's values are generally more difficult to meet compared with the averages.
- F136 This is because Transpower has disaggregated interruptions due to equipment failure and other causes. Interruptions due to equipment failure have been significantly lower during the last 3 years of the observation period, so this has been reflected in the proposed measures for RCP3.

Alternatives considered – Setting our own measures

- F137 We considered whether a deadband zone would be appropriate for the GP measures (as we have proposed for the AP measures). We consider that the pooling approach for compliance across the GP measures is a more appropriate method of ensuring the balance between unnecessary Commission investigation and capturing events that are in fact worthy of investigation.
- F138 Since many of the GP POS categories have low numbers of sites (observations), we consider that pooling increases the effective sample size in a way that the deadband option would not.

Alternatives considered – Pooled compliance options

- F139 For compliance with the quality standard under the Act, we considered varying approaches of pooled compliance across multiple years or for annual compliance.
- F140 For example, potential options we have considered include:
- F140.1 Non-compliance based on a single year - having two pools of interruption number and interruption duration, N and N-1 security pools, or high and material economic consequence and generator pools.

F140.2 Non-compliance based on multiple year performance - two consecutive years in any measure, or three consecutive years in any measure.

F140.3 Non-compliance for generator and demand connections separately - two consecutive years in any measure other than generator sites or two consecutive years in any generator measure.

F140.4 Non-compliance based on a combination of the above approaches - two consecutive years breaches in any measure in both number and duration pools, or, two consecutive years in any N-1 measures or four measure breaches in a single year.

F141 We have considered these different options and consider that a mix of pooling for different pools of measures as well as across time was appropriate. The pooling across the GP1 and GP2 measures effectively increases the sample size of the measures as a whole and reduces the impact of volatility from low numbers of observations. This is also part of the reason for not having separate pools for generator and non-generator pools, as there are only 9 N security generator sites (and 44 N-1 security generator sites).

Our draft decision

F142 For the grid performance measures applying to RCP3, our draft decision is to:

F142.1 use Transpower's proposed targets, caps, collars for GP1 and GP2;

F142.2 for quality standards, set compliance criteria using a pooling approach – a GP1 pool and a GP2 pool. A contravention would require 2/6 measures not being met in a given pool for a period of 2/3 years; and

F142.3 set reporting requirements whenever a POS being outside the collar value (even if there is no contravention in that year).

Attachment F.2: Revenue-linked asset performance measures

High-level approach

F143 We propose to retain the two revenue-linked AP measures for RCP3 to assess Transpower's grid availability which impacts on the market's least-cost generation dispatch. These measures are:²³³

F143.1 AP1, measuring planned or unplanned availability of the HVDC system; and

F143.2 AP2, measuring planned or unplanned availability of selected HVAC assets.

²³³ Measures AP3 and AP4 are discussed later in the non-revenue-linked measures section.

F144 Table F11 summarises our proposed grid performance measures for RCP3.

Table F11 Our proposed asset performance measures

Measure and category	Cap	Target	Collar	Quality standard	Incentive rate	\$ at risk ²³⁴
AP1: HVDC availability (%)					\$ per 1%	
HVDC availability	99.75%	98.75%	97.75%	96.75%	400,000	400,000
AP2 HVAC availability (%)					\$ per 1%	
HVAC availability (71 selected assets)	99.2%	99.0%	98.8%	98.6%	4,000,000	800,000

F145 In Transpower's consultation process on modifications to its proposed measures, stakeholders supported Transpower's proposal to retain the AP measures and review the assets covered in HVAC circuits for the AP2 measure.²³⁵

F146 Following consultation, Transpower has proposed the AP2 measure to cover 71 selected assets including 110 kV and 220 kV circuits, interconnecting transformers, and bus sections that could have most impact on the market when out of service.²³⁶

F147 We have proposed quality standards for measures AP1 and AP2 with associated targets, caps, collars, and incentive rates for each measure.

F148 For the AP1 measure, Transpower proposed a target of 98.5%, adjusted to 97.8% for the years affected by the Pole 2 replacement programme. The target value allows 1% for unavailability from scheduled outages, and 0.5% for forced (unplanned) outages. Transpower proposed the cap and collar to be one percentage point either side of the target.

F149 For the AP2 measure, Transpower proposed a target value of 98.9% over RCP3 with a cap of 99.5% and collar of 98.3%.

What the Verifier said

F150 The Verifier considered that the proposed service performance measures (including asset performance measures) reflected the effectiveness of Transpower's stakeholder consultation process and based on the information that the Verifier had at the time, it concluded that the proposed service performance measures satisfied GEIP.

²³⁴ Revenue at risk for the AP measures are explained in Attachment F.6.

²³⁵ Most feedback on Transpower's proposal to not adopt the GP3 measure for RCP3 supported this proposal, but one submitter did not. See the Verifier report, above n 29, at 93.

²³⁶ Above n 210, at 14.

- F151 Transpower has stated that it is proposing that the RCP3 service performance targets be more aligned with historical performance, stating that “The RCP2 targets were aspirational and have proved too challenging”, specifically the availability targets.²³⁷
- F152 The Verifier concluded that the proposed RCP3 grid output targets are largely consistent with RCP2 although POS had moved between categories and some customers will have higher or lower reliability and restoration performance. In summary though, due to the evolving situation with the grid output measures at the time of writing its report, the Verifier could not fully satisfy itself that the proposed targets for the grid output measures satisfied GEIP.

Approach raised in the Issues paper

- F153 In our Issues paper, we outlined Transpower’s proposed asset performance measures and how Transpower has proposed to link these measures to revenue.²³⁸
- F154 We noted Transpower’s consultation on its proposed grid output measures, which did not cover the proposed caps, collars or target values, the level of revenue at risk or the applicable incentive rates applied.^{239, 240}
- F155 We outlined the Verifier’s view of Transpower’s proposed RCP3 grid output measures and our view of the measures.
- F156 We sought views from stakeholders on how we should set quality standards for the AP measures, whether there were any measures that were missing and comments on whether the proposed targets, caps, collars or other values were appropriate.

Response in submissions

- F157 MEUG submitted that the proposed measures cover the key areas of grid reliability and carry over the key aspects from RCP2.²⁴¹ Mercury also broadly agreed that the key quality dimensions were covered, but could be constructed to provide overall benefit to consumers through market efficiency measures (for example, lost load, grid congestion and grid losses).²⁴²

²³⁷ Above n 210, at 28.

²³⁸ Above n 33, at Chapter 5.

²³⁹ Above n 218, at 34–36.

²⁴⁰ Above n 191, at 10-13.

²⁴¹ Above n 199, at 1.

²⁴² Above n 205, at 2.

F158 Meridian supported quality standards without revenue-linked performance measures, as the revenue at risk would not provide a strong enough incentive.²⁴³

F159 Transpower considered that quality standards for service performance measures should not be linked to the incentive values (target or collar value) but should be separately determined. Transpower stated:²⁴⁴

The incentive settings are designed to balance multiple considerations, including the need for symmetry between the cap value and the collar value. This does not automatically yield a collar value that is suitable for use as a quality standard. The risk with using the collar value is that threshold may be too low, triggering unnecessary need for Commission investigation.

Our view

F160 For the AP1 measures Transpower proposed a target of 98.5%, adjusted to 97.8% for the years affected by the Pole 2 replacement programme (ie, an additional 0.7% of unavailability from scheduled outages).

F161 We proposed to maintain consistent incentive measures (target, cap, and collar) throughout the period and allow Transpower to net out the actual impact of the Pole 2 replacement programme. Therefore, our proposed target would apply to all years of RCP3 (with the impacts of Pole 2 replacement in a given year netted out).

F162 We have allowed a maximum adjustment in a given year of 0.7% unavailability to allow for the impact of the Pole 2 project.²⁴⁵ These adjustments can be made in three of the five years, consistent with Transpower's proposal.²⁴⁶

F163 The adjustment for the Pole 2 replacement program will also be netted out for the annual quality standard in years impacted by the Pole 2 replacement program (up to 0.7% as in the incentive measures).

F164 We consider that reducing the target (and associated caps and collars) for total unavailability for years affected by the Pole 2 program could lead to potential incentive issues. If only a small amount of Pole 2 replacement work is undertaken in a given year, Transpower will have a much lower target value for that year and could make windfall gains through the incentive mechanism.

²⁴³ Above n 222, at 5-6.

²⁴⁴ Above n 71, at 14.

²⁴⁵ In its proposal Transpower allowed 0.7% unavailability (in three of the five years of the period) to account for the Pole 2 project.

²⁴⁶ Above n 210, at 13-14.

F165 Our proposed approach allows Transpower the same amount of flexibility in the incentive measures (0.7% in a given year) while ensuring that only the actual impact of the Pole 2 replacement program is accounted for in the disclosed measures.

F166 We consider that 1% is an appropriate level of contingency for scheduled outages, but do not agree with Transpower's rationale for the 0.5% for forced outages. As Transpower stated, looking at the data, the 0.5% target could be perceived as being high compared to historical data. Transpower stated that:²⁴⁷

The 0.5 per cent target also takes into account the risk of a HILP (high impact low probability) event, such as Cook Strait cable failure. For example, a single Cook Strait cable outage for a year would correspond to a forced unavailability of 16.67 per cent for that year. If this event is spread across 30 years, that would correspond to a forced unavailability of 0.55 per cent per year.

F167 We do not consider that the impact of HILP events should be taken into account when estimating the expected level of forced outages related to reliability events in any given year. HILP analysis is concerned with unexpected events and Transpower's analysis treatment is more relevant to identifying cable failure HILP event reliability benefits in a cost-benefit analysis. These reliability benefits can be used to justify either insurance or some form of design mitigation measure.

F168 Based on historical data, we do not think that the 0.5% is justified and we propose to reduce the forced outage allowance to 0.25%.²⁴⁸ This results in a target level of 98.75% for AP1. We have applied Transpower's proposed range of 1% for setting the collar and cap around the target value (ie, a cap of 99.75% and collar of 97.75%).

F169 For the quality standard applying to the AP1 measure, we consider that a 'deadband' zone between the collar and standard is appropriate. In this range no direct financial incentives would apply, although incentives are provided by the risk of contravention if the quality standard is not met. We consider that having a wider gap between the collar and the standard is appropriate given that we are not proposing pooling for the AP measures for compliance purposes.

F170 If we were to set the quality standard at the collar value it could result in a greater risk of unnecessary investigations of contravention from service fluctuations. In the past Transpower has efficiently bundled projects while lines are out of service, resulting in lower availability in some years. We have also taken this into account when setting the quality standard below the collar value.

²⁴⁷ Above n 210, at 35.

²⁴⁸ Since 2014 forced unavailability for Poles 2 and 3 have an average of 0.15%. This is far below the proposed 0.5%.

- F171 Hence, we are proposing the quality standard for the AP1 measure to be a further 1% below the collar value, ie, at 96.75%.²⁴⁹
- F172 We have not relied on statistical analysis in setting the AP1 measures because relevant information is only available since 2011 and during the early years of the data Pole 1 was being decommissioned which resulted in significant unavailability (that we would not expect now since the Pole replacement).
- F173 For the AP2 measure, Transpower proposed a target value of 98.9% over RCP3, with a cap of 99.5% and collar of 98.3%. As shown in Figure F4, based on Transpower's proposed measures it would be above the target for most of the historical data and never breach the collar value.

Figure F4 AP2 historical performance based on Transpower proposed measures

AP2	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transpower proposed	99.1%	99.0%	99.2%	99.3%	98.9%	98.9%	99.3%	99.1%	98.9%	98.9%	99.1%	99.0%	98.6%

x = breach of the collar
x = worse than target
x = better than target

- F174 We consider that, based on historical data, Transpower's proposed target value does not appear challenging. We have used a ten-year averaging period to derive the target value of 99.0%. We have used ten years of data, as we consider that this time period provides a robust amount of historical observations and includes relevant data based on the most recent observations.
- F175 We considered a longer averaging period would not be appropriate, as it would incorporate the effects of performance historically where we had provided Transpower with allowances to resolve any availability issues.
- F176 We have proposed caps and collars on one standard deviation of the target, based on the same ten-year averaging period. We consider that this would incorporate the volatility of the measure associated with that used to estimate the target value.²⁵⁰ This gives a cap of 99.2% and a collar of 98.8%.

²⁴⁹ Based on historical data following the Pole 3 commissioning (2014/15 onwards), Transpower would not have contravened the proposed quality standard.

²⁵⁰ Assuming that availability is normally distributed, we would expect Transpower to be below two standard deviations from the target with a probability of 2.2% in a given year.

F177 We also propose to use a ‘deadband’ zone to set the quality standard for the AP2 measure. To estimate this value, we have proposed adding a further standard deviation to the collar value to provide additional contingency. This results in a quality standard of 98.6%.

F178 Figure F5 demonstrates Transpower’s HVAC availability performance based on our proposed values. Historically Transpower would not have breached the quality standard but would have been in the deadband zone between the collar and standard.

Figure F5 AP2 historical performance based on Commission proposed measures

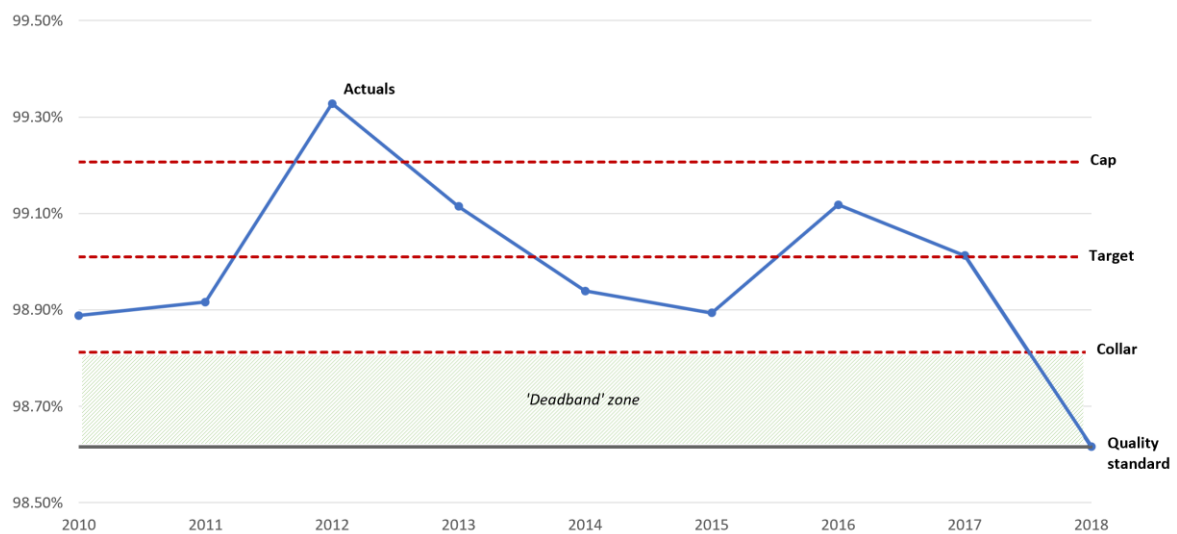
AP2	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Commission proposed	99.1%	99.0%	99.2%	99.3%	98.9%	98.9%	99.3%	99.1%	98.9%	98.9%	99.1%	99.0%	98.6%

x	= breach of quality standard
x	= between collar and quality standard (deadband)
x	= worse than target
x	= better than target

F179 We are proposing to apply a deadband between the collar and the quality standard. We consider that setting the quality standard outside the incentive range is appropriate because we are not proposing pooling for the AP measures. We consider the quality standard settings better reflect Transpower’s historical performance.

F180 Figure F6 illustrates how our proposed AP2 incentive measures (cap, collar and target) and quality standard compare against Transpower’s historical performance.

Figure F6 AP2 – % Availability of HVAC



F181 For both measures AP1 and AP2, we will retain annual compliance reporting requirements, Transpower will have to report on why it has failed to meet the collar value for any measures in a given disclosure year.

Alternatives considered

F182 We have considered the merits of:

F182.1 having a quality standard with no revenue-linked incentive scheme;

F182.2 setting asymmetric incentive rates; and

F182.3 pooling the AP measures for compliance purposes.

Alternatives considered - Quality standard with no incentive scheme

F183 As discussed in the quality considerations section, we consider that Transpower should be provided with incentives to maintain quality for demand and generator connections given the expenditure incentives to reduce costs (potentially through reductions in quality).

F184 We consider that revenue-linked incentives on reliability provide better incentives to move towards a price-quality balance reflecting what customers (and consumers) value, as long as the incentives are not too strong. We discuss this in terms of marginal benefit (MB) for Transpower and customers from improvements in quality and the marginal cost (MC) for Transpower and customers of the improved quality.

F185 The marginal benefit for Transpower (MB_T) is the revenue-linked incentive reward and for customers (MB_C) is the value placed on improved reliability. The marginal cost for Transpower (MC_T) is the increased expenditure (net of IRIS paybacks) and for customers (MC_C) is the incentive payments (including IRIS).

F186 With the appropriate, or even conservative, revenue-linked incentive settings profit maximising suppliers will be:

F186.1 encouraged to find inexpensive solutions to improve reliability – $MB_T > MC_T$ and $MB_C > MC_C$;

F186.2 neither encouraged or discouraged to find cost-neutral solutions to improve reliability – $MB_T = MC_T$ and $MB_C \geq MC_C$; and

F186.3 discouraged to find expensive solutions to improve reliability – $MB_T < MC_T$ and $MB_C < MC_C$.

F187 However, we acknowledge if the revenue-linked incentives are too strong then Transpower may be encouraged to find solutions where the costs to customers can exceed the benefit to customers – $MB_T > MC_T$ and $MB_C < MC_C$.

- F188 Conversely, if the revenue-linked incentives are too weak, or zero, then Transpower will not be encouraged to find all solutions that would move towards a price-quality balance reflecting marginal costs and benefits for both Transpower and customers.
- F189 If we were to not link the measures to revenue and only apply a quality standard (to mitigate the effect of expenditure incentives) there would be no incentive to maintain or improve performance above the level of the standard. We would want firms to increase (or not reduce) quality where it is in the interests of customers and consumers (especially if the marginal willingness to pay from customers outweighs the marginal cost of improved quality). Without this mechanism there would be no financial incentive for marginal improvements in quality above the standard.

Alternatives considered – Setting asymmetric incentive rates

- F190 We have considered whether having an asymmetric incentive rate for the AP measures would be appropriate - ie, a lower incentive rate for improved quality (up to the cap), and the full-strength incentive rate for reduced quality (down to the collar). We considered this given that end-use consumers may not want to pay for increased quality.²⁵¹
- F191 Asymmetric incentives result in a higher downside revenue at risk and lower upside revenue at risk.
- F192 There is an argument that end-use consumers have more aversion to a deterioration in reliability than an improvement in reliability. In other words, consumers are willing to accept (**WTA**) a higher payment for lower reliability than they are willing to pay (**WTP**) for higher reliability. For example, London Economics, in advising Ofgem, considered that:²⁵²

... When consumers are used to enjoying a service that they pay for, they typically want greater payment in order to bear a loss of that service than they are willing to pay to retain it. This is because individuals feel a sense of ownership (property rights) for something they already have (in this case a secure electricity service). Psychologically, the loss from giving something up feels greater than the gain from keeping it and avoiding the loss.

²⁵¹ Although it will indirectly impact consumers through prices paid to retailers based on the wholesale electricity price.

²⁵² London Economics "[The Value of Lost Load \(VoLL\) for Electricity in Great Britain – Final report for OFGEM and DECC](https://www.ofgem.gov.uk/ofgem-publications/82293/london-economics-value-lost-load-electricity-gbpdf)" (July 2013), available at: <https://www.ofgem.gov.uk/ofgem-publications/82293/london-economics-value-lost-load-electricity-gbpdf>.

- F193 The two main reasons put forward for by London Economics are loss aversion and the endowment effect.²⁵³ Also, consumers will have made lifestyle and business decisions consistent with the status quo of service quality they receive.
- F194 PricewaterhouseCooper (**PwC**) undertook a consumer survey to assess how consumers value lost electricity. The results suggested that consumers' WTA an interruption is significantly higher than their WTP for avoiding an interruption, typically two to five times as much (although varies depending on several factors).²⁵⁴
- F195 Generators would value an increase in availability (as it impacts the wholesale electricity price). There will already be pressure from generators to maintain a suitable level of availability for the HVDC and HVAC systems.
- F196 However, if we set asymmetric incentive rates, there may not be an ex-ante expectation of a normal return, inconsistent with the FCM principle (as discussed in the quality considerations). Transpower has less control over some causes of unavailability and we set the measures based on historical averages, and therefore natural variation could result in an ex-ante expectation of a penalty to Transpower on average.

Alternatives considered – Pooling for compliance purposes

- F197 We considered pooling the AP measures for compliance with quality standards under the Act. As discussed above, we consider that having a deadband zone was more appropriate for the AP measures.

Our draft decision

- F198 For the asset performance measures applying to RCP3, our draft decision is to:
- F198.1 adjust Transpower's proposed target, cap and collar for the AP1 measure;
 - F198.2 set the AP2 measure based on historical data rather than Transpower's proposed values;
 - F198.3 set quality standards for AP1 and AP2 based on a deadband zone outside of the incentive range (ie, the quality standard below the collar value); and
 - F198.4 set reporting requirements whenever an availability measure is outside the collar value (even if there is no contravention in that year).

²⁵³ Loss aversion refers to people's tendency to strongly prefer avoiding losses to acquiring gains. The endowment effect refers to the hypothesis that a person's WTA for a good is greater than their WTP for it once their property right has been established.

²⁵⁴ PwC "Estimating the Value of Lost Load in New Zealand" (March 2018).

Attachment F.3: Non-revenue linked measures

High-level approach

- F199 During RCP2, Transpower has been trialling performance measure development initiatives (PMD measures) as part of its stakeholder engagement to refresh the service measures for RCP3. Transpower has rationalised a number of these PMD measures into three new non-revenue-linked measures for RCP3.
- F200 The measures aim to:
- F200.1 improve certainty around the return of assets back into service after a planned daily outage;
 - F200.2 provide timely communication to the market of delays to outage return times for a planned outage; and
 - F200.3 provide timely communication following an event.
- F201 The proposed RCP3 measures are:²⁵⁵
- F201.1 AP3, measuring and reporting on all daily outages of the 71 HVAC assets used in the AP2 revenue-linked measure that are returned two or more hours after the original return to service time;²⁵⁶
 - F201.2 AP4, measuring and reporting on the percentage of time 1.5 or more hours' notice is given to the market in the event assets are going to be returned late back to service (from the original planned return to service time); and
 - F201.3 CS1, measuring post-event communications through a survey process.²⁵⁷
- F202 We are proposing to retain a number of measures Transpower considered development measures in RCP2 but weren't proposed for RCP3. Specifically, we are proposing to retain the following ID requirements:
- F202.1 PMD5, an availability measure which measures the extent to which Transpower places customers on N security, from RCP2 to be named AP5 for RCP3; and

²⁵⁵ Above n 210, at 15.

²⁵⁶ In Transpower's consultation process on developing its proposal, stakeholders feedback supported replacing RCP2 performance measure development (PMD) initiatives PMD4 and PMD8 with the AP3 measure. The return to service buffer time was also shortened from the original four hours to two hours following consultation.

²⁵⁷ This measure incorporates RCP2 PMD initiatives 1, 2 and 3.

F202.2 PMD6, a performance measure which measures the number of unplanned momentary interruptions (interruptions under one minute), from RCP2 to be named GP-M for RCP3.

What the Verifier said

- F203 The Verifier was doubtful about the four-hour buffer Transpower had built into the proposed return to service measure (AP3). The Verifier considered that a four-hour buffer did not provide a strong incentive for Transpower to manage its outage processes and that a shorter time buffer would be more reasonable. Transpower has since shortened this to two hours in its proposal.
- F204 The Verifier did not state an opinion on the CS1 measure and the AP4 measure had not yet been developed for the Verifier to assess.

Approach raised in the Issues paper

- F205 In our Issues paper we asked for stakeholders' views on whether proposed measures AP3 and AP4 should be reporting-only measures, as they do not have a sufficient track record to justify linking to revenue or setting a quality standard.
- F206 We sought stakeholders' views on whether measure CS1 should have an associated quality standard, as it appears to be sufficiently mature.

Response in submissions

- F207 NZIER (for MEUG) and Mercury agreed that the AP3 and AP4 measures should not be linked to revenue.²⁵⁸
- F208 NZIER (for MEUG) supported measure CS1 having an associated quality standard.²⁵⁹
- F209 Transpower submitted that it is open to discussing trial quality targets for measure CS1, stating:²⁶⁰

We suggest trial standards, as we consider it is too soon under our new survey process to commit to meaningful quality standards.

Our view

- F210 We consider that, based on submissions and Transpower's engagement process, customers and stakeholders would value having these measures and we propose to retain them as non-revenue-linked measures for RCP3.

²⁵⁸ Above n 199 at 7 and above n 205, at 4.

²⁵⁹ Above n 199 at 7.

²⁶⁰ Above n 71, at 14.

- F211 We have considered whether to set a quality standard for the CS1 measure for RCP3. Transpower stated in its submission on our Issues paper that it is too early under its new survey process to develop meaningful quality standards for this quality dimension. We therefore propose running measure CS1 as a trial standard during RCP3, with the intention of setting a quality standard and potentially linking the measure to revenue in RCP4.
- F212 We will also require comprehensive reporting on the CS1 measure to inform a potential link to revenue in subsequent periods and allow stakeholders to have visibility on communication time following an event.
- F213 We are proposing not to set quality standards for the AP3 and AP4 measures as these are new measures for RCP3. As with CS1, we will consider potential links to revenue in subsequent periods with data from RCP3.
- F214 We are proposing to retain the RCP2 availability measure PMD5, which measures the extent to which Transpower places customers on N security, as a reporting requirement for RCP3 (named AP5). We consider that time on N security could be a leading indicator of deterioration of the grid and can have a significant impact on customers placed on N security if they are not given adequate warning to prepare for this. We intend to use this information to consider whether this will be a useful quality standard in RCP4.
- F215 We understand that some customers are already on N security, however, we are interested in situations where Transpower has placed customers on reduced levels of supply security and how often this happens. We will be seeking details about when this occurs, how long the customers are subject to reduced supply security and what steps Transpower has taken to inform these customers that they are likely to be on reduced supply security.
- F216 We note that from Transpower's RCP3 engagement process there was mixed feedback calling to continue measure PMD5 for RCP3.²⁶¹ Transpower note that the measure is not a strong driver of behaviour in its business and unplanned outages due to customers being on N security are captured through the reliability measures, and is resource intensive to collect.²⁶² We consider reporting on this measure will provide customers, consumers and us with meaningful information.

²⁶¹ Orion considered that it affects the security of supply so should be measured. Northpower noted that measures which simply focus on the number of days on N-security are not useful as they do not give a complete picture. Above n 198, at 7.

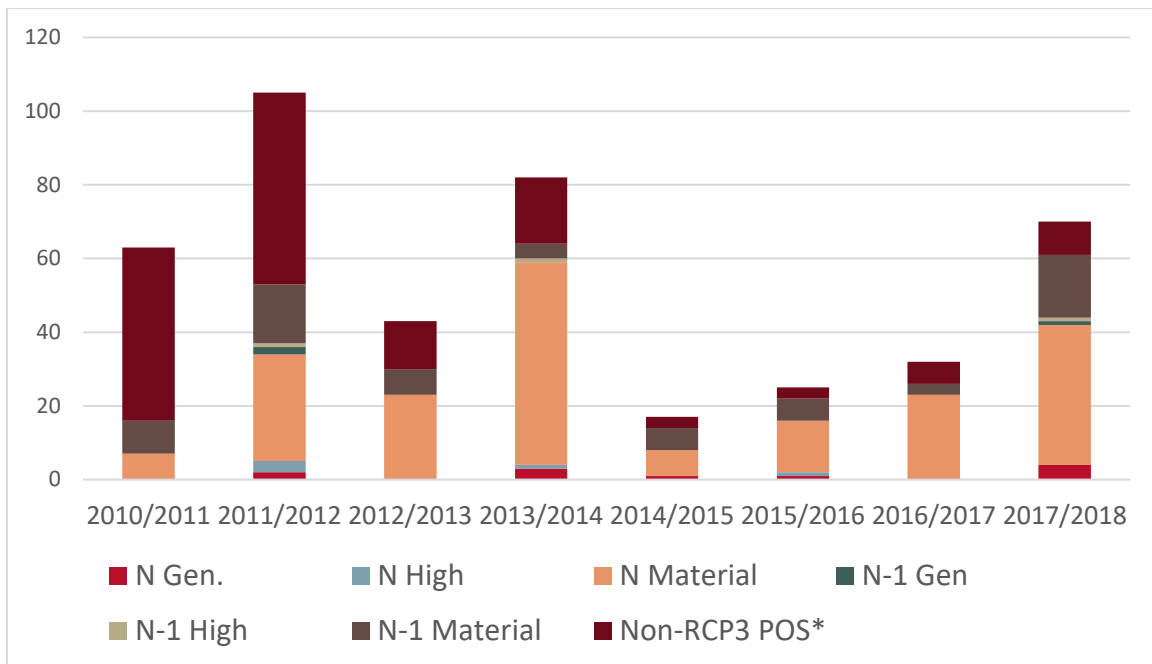
²⁶² Transpower "Service Engagement Paper 2" (April 2017), at 8-9.

F217 Transpower also noted in its RCP3 engagement process:²⁶³

Feedback from customers and stakeholders supported the view that PMD5 was not appropriate as a future performance measure and there is insufficient information to identify an optimal or target level, let alone derive incentive rates.

- F218 We are not proposing that the new AP5 measure will be linked to revenue or have an associated quality standard for RCP3 (ie, it is an ID requirement).
- F219 We are also proposing that RCP2 measure PMD6 remain as a non-revenue-linked reporting requirement for RCP3, named GP-M (grid performance – momentary interruptions). Transpower will already be collecting the data and stakeholders (for example, Contact Energy and MEUG) have suggested that reporting the information would be beneficial to customers and consumers.
- F220 We have set our proposed GP-M quality standard at 116 momentary interruptions (interruptions less than one minute) across all POS for each year of RCP3 (ie, an annual quality standard). The quality standard was calculated as two standard deviations from the historical average of momentary interruptions (2010/11 to 2017/18).
- F221 As this is the first time setting a quality standard for momentary interruptions, we have set our proposed quality standard at two standard deviations from the historical average as a safety net (to capture extreme outcomes). Based on data from 2010/11 to 2017/18, Transpower would not have met the quality standard historically.
- F222 We have proposed to set a quality standard aggregated across all POS (rather than at a POS category level) because the historical data includes data from non-RCP3 POS (POS that have been divested or decommissioned). We also note a low number of observations across a number of POS categories.
- F223 Figure F7 displays the number of momentary interruptions by POS from 2010/11 to 2017/18.

²⁶³ Above n 195, at 25.

Figure F7 Momentary interruption count by POS

*Non-RCP3 POS includes interruptions from POS that have been divested or decommissioned

Our draft decision

F224 For the non-revenue-linked measures, our draft decision is to:

F224.1 keep measures CS1, AP3 and AP4 as reporting only for RCP3 (and have no quality standard for these measures); and

F224.2 introduce the GP-M measure with an associated quality standard.

Attachment F.4: Asset health measures

High-level approach

F225 Transpower has proposed five asset health measures for RCP3. These measures are asset health target based rather than the volumetric refurbishment/replacement target-based measures set in RCP2, which we consider do not appear to be achieving their intended effect.

F226 Table F12 summarises the change of the asset health measures from RCP2 to RCP3.

Table F12 Comparison of RCP2 and RCP3 asset health measures

	RCP2	RCP3
Asset classes covered	<ul style="list-style-type: none"> • Transmission towers (painting) • Tower foundations (grillages) • Outdoor circuit breakers • Power transformers • Outdoor-to-indoor substation conversions 	<ul style="list-style-type: none"> • Tower protective coating (zinc coating or paint) • Tower foundations (grillages) • Insulators • Outdoor circuit breakers • Power transformers
Description of measure	Total number of asset replacements or refurbishments during the control period. There is a mixture of annual and 5-year targets.	The proportion of assets close to or overdue for intervention at the end of RCP3 (ie, AHI > 8).

F227 Transpower has argued that asset class selection in the proposed asset health scheme was influenced by a number of factors, including:

F227.1 they covered a wide range of asset types;

F227.2 included asset types with volumetric and non-volumetric replacement strategies; and

F227.3 contained asset types not subject to large variations due to project changes (like overhead conductors).²⁶⁴

F228 Transpower has proposed that the asset health measures would, for each of the asset classes in the scheme, monitor the proportion of assets that have an Asset Health Index (**AHI**) score of 8 or above in each year and at the end of RCP3, and also proposed that we revenue link these. An AHI score of 8 and above indicates an asset in poor or very poor health.²⁶⁵

F229 Table F13 reproduces Transpower's proposed cap, collar and incentive rates by asset class for its asset health incentive settings based on AHI scores greater than 8.²⁶⁶

²⁶⁴ Above n 210, at 20.

²⁶⁵ "An AHI score of 0 or 1 indicates a new asset. Over time, an asset deteriorates and moves through the asset health scores in the index until it is given a score of 8 or above, indicating that it is near the end of its useful life and that the probability of failure (which may cause an interruption to service) increases. This is generally when we decide to actively manage the asset" (above n 210, at 19).

²⁶⁶ Above n 210, at 29.

Table F13 Transpower proposed asset health measures summary²⁶⁷

Asset class	Cap (%)	2024/2025 Target (%)	Collar (%)	Incentive rate (\$m per % at 20% strength)	Maximum financial impact (\$m)
Tower grillage foundation	1.02	3.43	5.85	1.23	2.98
Tower protective coating	1.87	4.18	6.49	7.10	16.40
Insulators	0.76	3.50	6.25	0.76	2.09
Power transformers	7.62	8.88	10.14	3.26	4.10
Outdoor circuit breakers	4.88	5.85	6.82	0.82	0.79
Total					26.5

Verifier view of Transpower's proposed asset health measures

F230 The Verifier carried out a review of the Transpower proposed grid output measures and targets but noted that:²⁶⁸

It is important to note that our review has been undertaken prior to the finalisation of the grid output measures and targets, which will be subject to further stakeholder consultation in August 2018. Specifically, our review relates to information provided prior to Transpower's June 2018 stakeholder engagement, with some information we have been provided now outdated.

F231 Our analysis has confirmed that the proposed AH measures have changed since the Verifier review. While the asset classes have remained the same, Transpower's forecast of assets with an asset health index of 8 or above in each year of RCP3 is different. This does not mean the Verifier views are invalid, because it identified that these were set with a view to an acceptable level of risk. The changes indicate that Transpower has been progressing its asset criticality model that it uses to quantify this risk.²⁶⁹

²⁶⁷ Above n 210, at Table 11.

²⁶⁸ Above n 29, at 94.

²⁶⁹ The asset health measure changes over time can be seen by comparing Table 26 of the Verifier report with Table 8 of Transpower's Grid Outputs Report (above n 210).

F232 As general observations of the asset health measure framework proposed by Transpower, the Verifier noted that:

F232.1 the AHIs are based on a model of the actual condition of assets projected into the future based on specific factors which affect an asset's life. The AHI model can and is expected to be updated with actual field-recorded condition data and additional deterioration factors to improve the model predictions;

F232.2 updated data and modelled deterioration rates may result in a variation to the AHI score for the assets in a portfolio, and in this case, no capital expenditure has occurred, but the AHI may improve or worsen based on the actual field condition of assets; and

F232.3 Transpower has indicated in the Asset Health Pilot Report that changes in its work programme that provide benefits to customers should not result in a penalty.

F233 However, the Verifier concluded that:

F233.1 if the AHI modelling was a perfect representation of actual asset deterioration, the index would be equivalent to the old volume-based measures;

F233.2 the target and measure should be the volume of assets with an AHI greater than, rather than the percentage of assets. This means any change to the volume of new assets would not impact the score. Volume is also more closely related to the risk exposure;

F233.3 there are two possible approaches to the incentive value to be assigned to each asset portfolio. One method is a proportional allocation to each asset portfolio based on asset value or programme expenditure. Another approach, which we favour, is to base the allocation on agreed relative criticality. Relative criticality and a volume measure (with and without investment AHI greater than 8) would be easier to understand;

F233.4 the use of a 'deadband' is supported for each measure to allow for small variations between targets and actual outcomes.

Reasons for addressing this issue and what we said in the Issues paper

F234 We consider that having a good understanding of asset health is a cornerstone of effective asset management because:

F234.1 it informs asset replacement or refurbishment expenditure decisions; and

- F234.2 asset expenditure forecasts can be made with more certainty, particularly within the context of the regulatory approvals process.
- F235 We understand that it may be impractical to derive detailed asset health models and perform asset condition assessments for all asset types, but we expect that where asset health models are practical and useful, they should be developed and implemented.
- F236 The decision to derive asset health models and their level of complexity will be based on many considerations. However, for all primary assets, and selected secondary assets, we would expect that sufficient asset health modelling is being carried out and that adequate condition assessment processes exist to inform these models.
- F237 Improving the accuracy of expenditure forecasting is one reason we are so focussed on asset health modelling. Better asset health models lead to more confidence that Transpower's expenditure forecasts can be relied on. It would reduce the risks:
- F237.1 to customers that Transpower is over-forecasting expenditure; and
- F237.2 to Transpower that it is under-forecasting expenditure.
- F238 In our Issues paper we sought submitter feedback on a range of issues related to asset health and criticality modelling. We also asked questions related to the five asset health measures proposed by Transpower and the proposed revenue at risk for each, because Transpower had not consulted with stakeholders on the revenue at risk as part of its proposal development process. We sought submitter views on whether:
- F238.1 the proposed asset health measures cover the main dimensions that would be expected from Transpower in measuring its performance and if anything is missing;
- F238.2 the proposed asset health measures add value for customers;
- F238.3 a reporting requirement linked to asset management improvement processes, such as improved asset health modelling, would add value to Transpower's customers; and if there are any specific reporting features we should consider;
- F238.4 asset health measures should be revenue linked and whether the applicable quality standard should be the collar value or something else;
- F238.5 if revenue-linked asset health measures are agreed, they should be symmetric or asymmetric, ie, to possibly only reward good performance, or only penalise underperformance;

F238.6 they had comments in general about the targets, caps and collars for the asset health measures proposed by Transpower; and

F238.7 there should be a mechanism to recalibrate the proposed asset health measure targets during RCP3 to account for Transpower obtaining better asset condition data.

Response in submissions

F239 There was general view amongst submitters that robust asset health and critically modelling processes should lead to improved supply reliability. However, MEUG still expressed its frustration at what it considers to be Transpower's slow progress in this area.

F240 While Meridian expressed support for our suggestion of a mid-period verification review of progress on the asset health measures during RCP3, MEUG considered our proposal to implement a mid-period verification a weak incentive on Transpower, stating that:^{270, 271}

The proposed preferred option by the Commission to require an independent verification part way through RCP3 to report progress in this area seems to us to be a continuation of the weak incentives to date leading to delays in RCP1 and RCP2 from making real progress.

F241 There was not much submitter support for revenue linking the asset health measures apart from Transpower. Vector stated that while it expected improvements in asset condition to improve supply reliability, it had concerns that revenue linking of asset health measures would effectively reward Transpower twice, because routine expenditure on assets is already incentivised through the service performance measures.²⁷²

F242 NZIER (on behalf of MEUG) was also not supportive because, in its view, the Verifier was not able to satisfy itself that this was in accordance with GEIP, mainly because of the challenges around measuring changes in asset health.²⁷³

F243 On the same question, Transpower advocated for revenue linking the asset health measures, mainly because it considered an incentive regime:²⁷⁴

should encourage and reinforce a regulated supplier to behave and act in the interest of consumers.

²⁷⁰ Above n 222, at 6.

²⁷¹ Above n 69, at [4(b)].

²⁷² Above n 206, at 4.

²⁷³ Above n 199, at 6.

²⁷⁴ Above n 71, at 15.

F244 Transpower considered that its proposed asset health measures will assist it to:²⁷⁵

F244.1 understand the condition of assets and the probability of failure;

F244.2 address potential problems caused by assets near end-of-life;

F244.3 provide stakeholders and the regulator with a view of the state of assets;
and

F244.4 highlight potential work required to improve the condition of the grid.

F245 On the question of whether the asset health measures should be able to be recalibrated during RCP3 to account for Transpower obtaining better asset condition data, there was agreement from Transpower and Mercury. Transpower elaborated on the recalibration issue, stating that its preference for this was that the recalibration mechanism should avoid a reopening of the price path, which would be complex and costly. Transpower proposed that a better way to recalibrate the asset health measures would be to amend Capex IM Schedule B2(1) and it supplied potential Capex IM wording changes as a suggested solution.^{276, 277}

Supporting information from Transpower – RFI019 (asset field data)

F246 We also tested Transpower's processes around asset condition data and how this was quality assured. We asked this question as background information for our assessment of the proposed asset health measures. Transpower responded in its Issues paper submission that:²⁷⁸

F246.1 it still has some way to go to get the right data at the right time, right first time, into its systems easily;

F246.2 the challenge is significant, but necessary, to bring its data, standards and processes to an internationally leading level;

F246.3 of the 32 asset classes, it has addressed 20, with the balance to be completed before the end of RCP2;

F246.4 selected condition assessment processes have "been reviewed by an international expert and ensures we are collecting the right data, at the right quality, at the right time";

²⁷⁵ Above n 71, at 16.

²⁷⁶ Above n 71, at 16.

²⁷⁷ Above n 205, at 5.

²⁷⁸ Above n 71, at Appendix B.

- F246.5 better guidance on Condition Assessment (**CA**) at AC Substations for service provider field staff, with condition assessment photo guides and asset specific guidance on rating has been introduced; and
- F246.6 there are various assurance levels and steps by the various parties throughout the process to ensure CA data quality.
- F247 We consider Transpower has identified shortcomings in its asset condition data assessment processes and appears to be actively seeking improvements to these.
- F248 However, given the fact that this aspect of the business appears to require so much development, setting asset health measures with financial incentives has to be approached with caution. This is because a financial incentive scheme might result in windfall gains and losses rather than incentivise actions by Transpower that provide outcomes that customers and consumers value.
- F249 For this reason, we consider that asset health measures should not be revenue-linked and should only be reported on as if they were for RCP3. Additionally, imposing asset health-based quality standards may introduce unreasonable breach exposure for Transpower.

Supporting information from Transpower – RFI038 (future asset health classes)

- F250 We asked Transpower for additional information about its asset health model plans in an RFI, specifically what asset classes it intended to further develop for an asset health measure during RCP3. Transpower stated that it considered a number of factors when reviewing asset classes for future asset health model development and these included:
- F250.1 maturity of asset information and data management;
- F250.2 maturity of condition assessment techniques;
- F250.3 level of sophistication of analysis required for the decision-making process; and
- F250.4 materiality of the investment programme when compared to the cost of establishing and maintaining a model.

F251 Transpower also provided a tabular summary of how mature asset health models, asset criticality understanding, probability of failure curves and monetised risk understandings are for each asset class and it stated that its improvement plans in each area will focus on enhancing areas that have low coverage “where we assess there is economic value in such enhancement”.²⁷⁹

F252 Transpower also made specific reference to the transmission line conductor and structure issue identified by the Verifier, stating that:

we are looking to further develop and evolve our thinking in the areas of conductor management and tower corrosion. As such, we may make some changes to the data we collect, the basis on which health models are developed, and even our strategies for intervention. Given the significant current and future expenditure in these areas, we will be drawing on local and international expertise, where appropriate to ensure future investments remain optimal.

F253 We consider that Transpower has not sufficiently answered the question we posed in RFI038 as it has no concrete plans about what it intends to develop in RCP3. While there is a clear recognition of the transmission line conductor condition issues there was no mention of the improvements identified by the Verifier.

Supporting information from Transpower – worsening AHI scores

F254 As part of our review of the proposed asset health measures we noted that for some asset classes there was a greater forecast percentage of assets with asset health index scores of 8 or above (poor or very poor condition) at the end of RCP3 than at the start. We noted that these percentages, for each asset class and in each RCP3 year, are different from those that the Verifier reviewed.

F255 We tested with Transpower why some asset classes, namely the Power Transformers and Outdoor Circuit Breakers, would be in worse condition at the end of the period, and if this was related to analysis that is informing investment/risk trade-offs. Transpower responded reasons for this include:²⁸⁰

F255.1 it has moved to a more risk-based approach, with the consequences of failure having an impact on mitigation decisions;

F255.2 system change and unconfirmed customer commitments may delay investment;

F255.3 data errors can misrepresent asset health, and asset health models are data-driven;

²⁷⁹ Transpower response to RFI038: Asset health model – development of further asset classes.

²⁸⁰ Transpower’s response to RFI039: Asset health measures.

F255.4 alternative mitigation measures to replacement may be employed, such as more monitoring to enable contingency planning; and

F255.5 project bundling and integration of works may result in some asset work being done earlier or later.

F256 These are reasonable explanations given we have been influencing Transpower to implement risk-based investment decision making since the RCP1 decision.

Our view of Transpower's proposed asset health measures

F257 We propose that we do not link Transpower's proposed asset health measures to revenue for a variety of reasons:

F257.1 We are not convinced that Transpower has sufficiently robust asset condition data for many assets in its fleet. This means that the proposed asset health measures would face similar practical issues as the volumetric measures in RCP2, where field condition assessments revealed many assets did not need to be replaced. We do not want to penalise Transpower for making this investment deferral decision. While there was support for giving Transpower the ability to recalibrate its asset health targets based on asset condition field observations we consider that this may result in a complicated scheme that is difficult to administer and track.

F257.2 While we want Transpower to improve its asset data quality, condition assessment processes and understanding of asset health, we think that providing revenue incentives to do this with the present uncertainties, is not the right strategy. However, we do want to incentivise Transpower to improve its understanding of asset health in RCP3 in order that its expenditure forecasts in RCP4 can be better relied on.

F258 We therefore propose to implement a range of reporting measures that will incentivise Transpower to continue to improve data quality and maintain asset health. The proposed reporting measures include that we set for RCP3:

F258.1 an annual reporting requirement for Transpower to demonstrate progress on its asset health modelling, risk-based decision making and asset life-extension models that were recommended by the Verifier;

F258.2 an annual reporting requirement for Transpower to demonstrate how its proposed revenue-linked asset health scheme (which we are now proposing would not be revenue-linked) would have performed;

- F258.3 an annual reporting requirement for each asset class in the proposed asset health measures, if the percentage of assets at an asset health score greater than 8 is outside the collar value of the trial non-revenue-linked incentive scheme; and
- F258.4 a requirement for a limited scope, mid-period expert review after year two of RCP3 to provide expert insight into Transpower's progress, with details of the review process to be specified in the IPP determination.
- F259 We also propose to implement asset health quality standards that will serve the following purposes:
- F259.1 these will act as a safety net in order that asset health will not degrade significantly over RCP3 for the asset classes in the proposed asset health measures; and
- F259.2 in the absence of a fully functional risk model that can be used to set forward-looking quality standards, setting these based on asset health provides a more timely investment signal than reliability outcomes can provide. This is because asset investment decisions made now may not manifest as quality outcomes for years. Asset health as a feedback mechanism is almost a feed-forward signal in the overall investment/quality framework.
- F260 Following additional information from Transpower we have proposed quality standard levels at a quarter of the range between the no investment percentage of assets with an AHI>8 and the forecast investment percentage of assets with an AHI>8.
- F261 For example, for an asset class in the proposed asset health measures, and in a given year of RCP3, with a forecast investment AHI>8 percentage of 5% and a no investment AHI>8 percentage of 15%, then the quality standard will be set at an AHI>8 percentage of 12.5%. These quality standards are set out in Table F14.

Table F14 Proposed asset health quality standards summary

Asset class	AHI	2020/2021 (%)	2021/2022 (%)	2022/2023 (%)	2023/2024 (%)	2024/2025 (%)
Tower grillage foundation	forecast	5.75	5.69	4.72	2.95	3.43
	no invest	7.56	8.99	9.38	9.54	11.48
	quality std	7.11	8.17	8.22	7.89	9.47
Tower protective coating	forecast	4.72	4.66	4.81	4.48	4.18
	no invest	6.12	7.53	9.18	10.43	11.88
	quality std	5.77	6.81	8.09	8.94	9.96
Insulators	forecast	0.54	1.10	1.81	2.71	3.50
	no invest	1.88	4.10	6.85	9.71	12.65
	quality std	1.55	3.35	5.59	7.96	10.36
Power transformers	forecast	1.64	2.10	3.27	6.54	8.88
	no invest	3.74	4.21	6.07	9.35	13.08
	quality std	3.22	3.68	5.37	8.65	12.03
Outdoor circuit breakers	forecast	1.34	1.41	4.24	5.72	5.85
	no invest	2.22	2.69	6.12	8.27	9.08
	quality std	2.00	2.37	5.65	7.63	8.27

F262 We would like to see the expansion of the asset health measures in future to include further asset classes to better understand the asset health of Transpower's overall asset fleet. Transpower stated that the proposed RCP3 measures cover a significant proportion of the asset fleet, stating that:²⁸¹

The proposed five measures ensure an appropriate coverage of our Replacement and Refurbishment (R&R) capex programme. The current total value of expenditure of the five asset classes is \$390 million or 38 per cent of all grid R&R for RCP3.

F263 While the asset classes in the proposed asset health measures covers 38% of total assets and covers a range of asset types, we consider that Transpower could have focussed on some other key asset types that would help it ensure that its expenditure forecasts for RCP4 can be better relied upon.

²⁸¹ Above n 210, at 20.

F264 The Verifier identified asset classes and asset types where asset health modelling needed to improve. For some of those asset classes there is a predicted expenditure uplift in RCP4 that appears to be sustained into RCP5. We will be focussing on these asset classes and types when we set our reporting measures during RCP3, with a view to including these in any asset health measures in future resets. These include:

F264.1 HVDC and Reactive Assets – HVDC – we will be expecting Transpower to develop bespoke HVDC asset health models which are based on asset criticality and condition models typically used in power station facilities (refer Attachment G.4);

F264.2 HVDC and Reactive Assets – Reactive Assets – we will be expecting Transpower to develop suitable asset health models for these assets (refer Attachment G.5);

F264.3 Secondary Assets – SA Protection, Battery Systems and Revenue Meters - we expect Transpower to implement its plans to develop a risk-based cost-benefit analysis (**CBA**) framework for the evaluation of protection scheme capital expenditure planning; and

F264.4 Secondary Assets – SA Substation Management Systems - we expect Transpower to implement asset life-extension modelling by developing asset-centric health and criticality models.

Our draft decision

F265 Our draft decision is to not link Transpower’s asset health measures to revenue, but instead to:

F265.1 require Transpower, at the same time as the annual IPP reporting process, to report on the asset health measures as if these were revenue linked; and

F265.2 require a limited scope mid-RCP3 review after Year Two of RCP3 to provide expert insight into Transpower’s progress on its developments in this area (including asset health reporting), with details of the review process to be specified in the IPP determination; and

F266 Our draft decision is to specify minimum asset health quality standards that are set between the no investment percentage of assets with an AHI>8 and the forecast investment percentage of assets with an AHI>8. We have set these quality standard levels at 25% of the range between the two investment outcomes.

Attachment F.5: Normalisation of service performance measures

High-level approach

- F267 For RCP3 we are proposing a normalisation approach for the grid performance measures (GP1 and GP2) and asset performance measures (AP1 and AP2) for events that are wholly beyond the reasonable control of Transpower.²⁸²
- F268 Where the event meets certain criteria, the Commission at its sole discretion, may agree to have the outage impact of this event excluded from the quality measures we set.

What the Verifier said

- F269 Transpower did not propose a normalisation methodology in its proposal so the Verifier did not have a view.

Approach raised in the Issues Paper

- F270 In our Issues paper, we proposed the idea of a normalisation for the reliability measures (GP1 and GP2) and sought feedback from stakeholders on how the measure could work.
- F271 We propose to extend normalisation to include the asset performance measures (AP1 and AP2).

Response in submissions

- F272 Mercury supported the introduction of a normalisation measure, and submitted that the normalisation reason, method, and impacts (incentive payments before and after normalisation) should be reported publicly.²⁸³ Transpower also supported a normalisation mechanism to apply to GP1 and GP2.²⁸⁴
- F273 NZIER (for MEUG) agreed with introducing a normalisation approach, subject to both defining the problem with current methods for dealing with abnormal events and applying a principles-based approach. NZIER stated that:²⁸⁵

The objective of the normalisation mechanism should be to make the revenue incentive more effective and efficient. This requires the design to focusing on the reliability improvements Transpower can make at lower cost than the benefit to customers and considering which parties are best placed to manage reliability risk.

²⁸² An example of an event qualifying for normalisation would be the Christchurch earthquake.

²⁸³ Above n 205, at 5.

²⁸⁴ Above n 71, at 15.

²⁸⁵ Above n 199, at 7.

Transpower’s response to our questions about normalisation – RFI032

F274 We sought further information from Transpower about what events it considered should be appropriately considered to be normalisation events. Transpower stated that:

We strongly support a mechanism to take into account uncertainties that are beyond our control and that affect a proportion of our performance results. As mentioned in section 6.3 of our submission on the Commission’s Issues Paper, there are causes of interruptions (such as wilful damage and extreme weather events) that are difficult to predict and expensive to mitigate across the entire grid, and the correlation between investment and impact on performance measures can be variable.

F275 Transpower also proposed a list of events that might qualify as normalisation events and we largely agree with this list. The proposed list is similar to the definition used by the Australian Energy Regulator (AER) in Australia with the addition of events that are applicable to New Zealand conditions, such as tsunami, landslide and volcanic activity.²⁸⁶

F276 Transpower also provided data and analysis about what it considered could be classified as normalisation events for the last 10 years and what constituted a reasonable measure of event severity. Transpower concluded that:

Our preliminary view on which type of scenario should be used for the proxy of severity is that it should be duration based, as none of our measures consider lost load, and that it should be 24 hours. This approximates to a 2.5 Beta and should reduce the volatility within our service measures with respect to major exogenous events.

Our view

F277 We have considered submitter views and the additional information from Transpower. We consider that it may be reasonable to normalise out the effect of certain events.

F278 We intend that the proposed normalisation applies to grid performance measures (GP1 and GP2) and asset performance measures (AP1 and AP2).

F279 We have used Transpower’s information as the basis for our definition of what event might qualify as a normalisation event in our decision and determination.

F280 Where the normalisation event meets certain criteria, we propose that the Commission, at its sole discretion, may agree to have the outage impact of this event excluded from the quality measures we set.

²⁸⁶ AER “Service target performance incentive scheme – Version 5 (corrected)” (October 2015), at Appendix G, available at: <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/service-target-performance-incentive-scheme-version-5-september-2015-amendment>.

- F281 We also agree with Transpower's preliminary view regarding normalisation event severity, and we propose to set a minimum 24-hour interruption duration as a normalisation event criterion.²⁸⁷
- F282 While we don't expect that Transpower will use normalisation to exclude expected reliability events, we have largely agreed with Transpower's list of events that meet the criteria.
- F283 For the avoidance of doubt, for a normalisation event to qualify for normalisation the Commission must be satisfied that the cause of the event is, despite the exercise of GEIP, wholly beyond the reasonable control of Transpower which may include the following, or similar events:
- F283.1 fire, lightning, explosion, flood, earthquake, tsunami, volcanic activity, landslide, storm, cyclone, action of the elements, riots, civil commotion, malicious damage, terrorism, natural disaster, sabotage, act of a public enemy, act of God, war (declared or undeclared), blockage, revolution, radioactive contamination, toxic or dangerous biological or chemical contamination or force of nature;
 - F283.2 action or inaction by a court, government agency (including denial, refusal or failure to grant any authorisation, despite timely best endeavour to obtain same);
 - F283.3 strikes, lockouts, industrial and/or labour disputes and/or difficulties, work bans, blockades or picketing;
 - F283.4 acts or omissions (other than failure to pay money) of a party other than Transpower, which party either is connected to or uses the high-voltage grid or is directly connected to or uses a system for the supply of electricity that in turn is connected to the high-voltage grid. Where those acts or omissions affect the ability of Transpower to perform its obligations under the service standard by virtue of that direct or indirect connection to or use of the National Grid; or
 - F283.5 acts or omissions of a third party which affect the ability of Transpower to perform its obligations by virtue of that direct or indirect connection to or use of the National Grid.²⁸⁸

²⁸⁷ Transpower's response to RFI032 – Interruption normalisation.

²⁸⁸ This list of normalisation events is similar to that proposed by Transpower in its 18 March 2019 RFI response to us. Transpower also noted that normalisation events should exclude events due automatic under frequency load shedding (**AUFLS**).

F284 In determining whether to approve a normalisation event being excluded, the Commission will consider the following:

F284.1 was the event unforeseeable and its impact extraordinary, uncontrollable and not manageable?

F284.2 does the event occur frequently? If so, how did the impact of the particular event differ?

F284.3 could Transpower, in practice, have prevented the impact (not necessarily the event itself)?

F284.4 could Transpower have effectively reduced the impact of the event by adopting better practices?

F285 We propose to retain the right to decline to approve the exclusion of a normalisation event where we consider that Transpower has provided insufficient evidence to demonstrate the event cause; or that the effect is reasonably outside of Transpower's control.

Our draft decision

F286 For the introduction of normalisation our draft decision is to:

F286.1 set a normalisation mechanism for the grid performance measures (GP1 and GP2) and asset performance measures (AP1 and AP2) for events that are wholly beyond the reasonable control of Transpower and meet the normalisation event criteria set out in the determination; and

F286.2 set a 24-hour outage duration as a normalisation event criterion.

Attachment F.6: Revenue at risk

High-level approach

F287 The level of revenue at risk acts as a limit to the amount of Transpower's revenue it can gain or lose under the revenue-linked grid output measures.

F288 Transpower has proposed a total revenue at risk, across service performance measures and asset health measures, of 2.8% of forecast revenue for RCP3. This is an increase from the RCP2 revenue at risk of 1.8%. In its proposal, Transpower stated that the increase in revenue at risk reflects the maturing of the incentive regime and compares to international context.²⁸⁹

²⁸⁹ Above n 210, at 23.

F289 Table F15 displays Transpower's proposed revenue at risk for RCP3 in comparison to RCP2.

Table F15 Transpower's proposed revenue at risk

	RCP2	RCP3
Service performance		
Annual revenue at risk	\$13.9m	\$17.9m
5-year revenue at risk	\$69.4m	\$89.5m
Percentage of forecast revenue	1.4%	2.0%
Asset health		
5-year revenue at risk	\$19.9m	\$36.7m
Percentage of forecast revenue	0.4%	0.8%
Total		
5-year revenue at risk	\$89.3m	\$126.2m
Percentage of forecast revenue	1.8%	2.8%

F290 If the revenue at risk is set too high there will be a greater incentive to increase quality above the level that customers are willing to pay (ie, where $WTP=MC$). This is because the rewards from the quality incentive scheme are more likely to outweigh the marginal costs of increasing quality (and hence end-use consumers will pay more).

F291 We have assumed that customers do not want to pay more for higher quality through the quality incentive scheme compared with the RCP2 scheme. Therefore, we propose maintaining the same approximate total revenue at risk for service performance measures as RCP2 (ie, 1.46%).

Reasons for addressing this issue

F292 We need to balance the level of revenue at risk for Transpower's grid output measures against the other incentives affecting Transpower. Increasing revenue at risk may provide an incentive to improve quality that customer may not necessarily be willing to pay for.

F293 However, if revenue at risk is set too low, combined with expected penalties from a potential breach, the incentive to reduce costs through the expenditure incentive mechanisms might outweigh the cost associated with maintaining quality (although this will be partially mitigated through the IRIS and capex incentive mechanisms).²⁹⁰

What the Verifier said

F294 The Verifier did not comment on Transpower's proposed revenue at risk.

Approach raised in the Issues paper

F295 In our Issues paper we sought stakeholders' views on whether it is appropriate to increase the revenue at risk faced by Transpower for RCP3.

Response in submissions

F296 NZIER (for MEUG) disagreed that revenue at risk should be increased, stating that:²⁹¹

The link between the increase in the incentive for service performance and asset health measures and the effect of the incentive on Transpower's capacity to improve performance is not clearly evidenced in the proposal.

F297 Mercury noted that the potential increase in revenue at risk highlights the need to link performance incentives to consumer benefits as directly as possible.²⁹²

F298 Meridian questioned the value of the revenue-linked performance measures at the level that the Commission and Transpower are prepared to put at risk. It doubted that this level provides a strong enough incentive to improve performance and suggested that only quality standards should apply to Transpower.²⁹³

Our view

F299 As discussed above, we are proposing not to link the asset health measures to revenue. Therefore, the total revenue at risk over the regulatory period would be 1.46% (before adjustments for time value of money and tax). This a reduction from Transpower's proposed 2.8% total revenue at risk (before adjustments).

²⁹⁰ A low revenue at risk may also not have any impact on the network owner's behaviour if it perceives the penalty or reward to be insignificant. This also depends on the strength of the expenditure incentive mechanisms and the level of targets and collars (as quality standards).

²⁹¹ Above n 199, at 2.

²⁹² Above n 205, at 3.

²⁹³ Above n 222, at 5-6.

- F300 The RCP2 asset health measure linking to revenue (0.4% in Table F15) was a result of reinstating part of the base capex allowance following our draft decision and putting measures around the volumetric outputs.²⁹⁴
- F301 Based on this revenue at risk, we have used this with Transpower's estimate of VoLL and economic value at risk for different POS sub-categories in the GP measures to calculate the incentive rates for the different service performance measures (GP and AP measures). We have applied a scaling factor to Transpower's proposed measures to reflect the lower revenue at risk. This is further discussed in Attachment F.7.
- F302 We have considered consistency with our recommendations for the DPP reset. It is likely that for the DPP there will be different revenues at risk depending on the EDB's relation to the VoLL measure. On average we expect that the revenue at risk would be approximately 1% of revenue for EDBs.

Alternatives considered

- F303 We have considered using Transpower's proposed revenue at risk for service performance measures of 1.8% (before adjustments). We do not consider that there is sufficient justification to increase from the RCP2 level of 1.4%. As previously noted in paragraph F291, if revenue at risk is too high (and hence the incentive rates are too high), there may be an incentive for Transpower to seek improvements to quality where the costs to end-use consumers outweighs the value placed on the benefit.

Our draft decision

- F304 Our draft decision is to set a total revenue at risk of 1.46% (before adjustments for time value of money and tax).

Attachment F.7: How we have set incentive rates for the service performance measures

High-level approach

- F305 For the quality incentive scheme applied to revenue-linked service performance measures, we are required to set incentive rates that apply to performance in relation to the target value. The incentive rates applied are interrelated with the revenue at risk – if we set higher incentive rates, the revenue at risk will increase (assuming no change in the setting of the target, cap or collar).

²⁹⁴ Above n 101, at [4.17].

F306 We have applied Transpower's analysis for setting incentive rates for the revenue-linked service performance measures, but have applied a scaling factor to result in approximately 1.46% revenue at risk over RCP3.

Transpower's proposed approach for setting incentive rates

F307 Transpower has allocated more of the incentive pool to the revenue-linked GP measures than the AP measures, reflecting the higher economic impact of interruptions. We consider that this is appropriate and in the interests of end-use consumers.

F308 For the reliability measures (GP1 and GP2), Transpower has set proposed incentive rates (and hence revenue at risk) proportionate to the economic cost of interruptions (ie, the VoLL).²⁹⁵ Transpower applied a VoLL of \$25,000 per MWh and applied a 33% incentive rate to take into account the proportion borne by Transpower under the incentive scheme.²⁹⁶

F309 Transpower has used a target ratio of 50 percent of VoLL to set the incentive strength (the \$ at risk) for each POS in the reliability measures. Transpower considered that this ratio is appropriate to avoid over-investment in the grid.²⁹⁷

F310 The MWh for each POS is calculated as the average load (MW) at each POS multiplied by the difference (in hours) between the GP1/GP2 target and collar values. The MWh for each POS is compared to Transpower's economic value at risk to calculate the \$/MWh. The \$/MWh for each POS is compared to the VoLL with the target of a 50% ratio.²⁹⁸ The incentive rate for GP1 and GP2 is calculated as the \$ at risk for each POS divided by the spread between the target and collar value.

F311 Transpower also applied a scaling factor to the grid performance measures to set the total revenue at risk for revenue-linked service performance measures (GP1, GP2, AP1, and AP2) at 2% (without the scaling adjustment the revenue at risk is approximately 1.8%).

²⁹⁵ VoLL is an estimate of the economic value, in dollars per MWh, that a consumer places on electricity they plan to consume but do not receive because of an interruption.

²⁹⁶ The \$25,000 MWh VoLL estimate used by Transpower is an average across different GXPs. VoLLs at different GXPs can vary significantly. For more information, see Transpower's VoLL study: <https://www.transpower.co.nz/sites/default/files/publications/resources/Value%20of%20Lost%20Load%20%28VoLL%29%20Study%20-%20June%202018.pdf>.

²⁹⁷ Above n 210, at 26.

²⁹⁸ That is, the \$ at risk for each POS subcategory are set to equal approximately 50% of VoLL (\$25,000 per MWh).

F312 Transpower has proposed to set the range of the caps and collars for reliability measures using one standard deviation for high economic consequence and generator sub-categories, and 1.5 standard deviations for the material economic consequence sub-categories. In setting the GP2 measures for the two N security POSs, the cap-collar range would be set such that the cap was zero (and the collar would be symmetric around the target).²⁹⁹ We consider that the cap-collar ranges are appropriate to provide greater incentives to maintain quality on POSs with greater economic consequence.

F313 Transpower's proposed AP1 economic value has been reduced from \$1,000,000 to \$500,000 following advice from Concept Consulting that the RCP2 HVDC availability incentive was too strong.³⁰⁰ For AP2, Transpower's proposed economic value has remained at \$1,000,000.

Our proposed setting of incentive rates

F314 We have followed Transpower's methodology to derive the incentive rates by comparing the impact of each POS sub-category to a target ratio of VoLL for the grid performance measures. This approach aims to set the incentive rates with regard to the impact of interruptions on customers at each POS. For the AP measures we have adjusted the targets, caps and collars which has adjusted the incentive rates from Transpower's proposal.

F315 We have adjusted Transpower's service performance incentive rate calculations by:

F315.1 Changing the incentive rate that Transpower bear under the incentive scheme from 33% to 26%. This is the incentive rate for the opex IRIS based on our draft decision WACC estimate. We have also equalised the base capex incentive rate to be consistent with the opex rate;

F315.2 Removing Transpower's scaling factor for the grid performance measures (which increased revenue at risk);

F315.3 Using the target of 50% of VoLL (after adjusting for the expenditure incentive rate) to calculate \$ at risk for each POS sub-category of the GP1 and GP2 measures;

F315.4 Applying a 20% discount factor across all revenue-linked service performance measures (GP1, GP2, AP1, and AP2) to equate to approximately the same revenue at risk as RCP2, ie, revenue at risk of 1.46%; and

²⁹⁹ Above n 210, at 26.

³⁰⁰ Above n 210, at 27.

F315.5 De-weighting the GP1 measure (number of interruptions) and increased the weighting of GP2 (duration of interruptions) as the frequency of interruptions is implicitly included in the duration incentive.³⁰¹

F316 This results in a total revenue at risk across revenue-linked service performance measures of 1.46%, which is a reduction from Transpower's proposal of 2.0% for service performance measures.

F317 We are interested in views on whether to more closely link incentive rates to the impact of interruptions and/or outages on customers (through VoLL). This would likely result in an increased revenue at risk for Transpower for the service performance measures from our proposed level of 1.46%.

F318 Table F16 summarises the service performance measures proposed by Transpower in its proposal. Table F17 summarises our proposed service performance measures and the associated incentive rates and revenues at risk after applying the scaling factor.

³⁰¹ As discussed in paragraphs F114 to F118.

Table F16 Transpower proposed service performance measures incentive summary

Measure and category	Cap	Target	Collar	Incentive rate	\$ at risk
GP1: number of interruptions (per annum)				\$ per event	
N-1 security high economic consequence	0	7	14	421,429	2,950,000
N-1 security material economic consequence	7	24	41	50,000	850,000
N security high economic consequence	4	6	8	325,000	650,000
N security material economic consequence	9	23	37	53,571	750,000
N-1 security generator	5	9	13	62,500	250,000
N security generator	6	12	18	41,667	250,000
GP2: average duration of interruption (min)				\$ per min	
N-1 security high economic consequence	30	92	154	47,581	2,950,000
N-1 security material economic consequence	36	61	86	34,000	850,000
N security high economic consequence	0	103	206	6311	650,000
N security material economic consequence	0	140	280	5,357	750,000
N-1 security generator	50	174	298	2,016	250,000
N security generator	11	93	175	3,049	250,000
AP1: HVDC availability (%)				\$ per 1%	
HVDC availability (non-Pole 2 years)	99.5%	98.5%	97.5%	500,000	500,000
HVDC availability (Pole 2 years)	98.8%	97.8%	96.8%	500,000	500,000
AP2 HVAC availability (%)				\$ per 1%	
HVAC availability (71 selected assets)	99.5%	98.9%	98.3%	1,666,667	1,000,000
Total revenue at risk					
Revenue at risk (%)					2.01%

Note: Revenue amounts are in nominal \$s and not referenced to any particular year

Table F17 Our proposed service performance measures incentive summary

Measure and category	Cap	Target	Collar	Incentive rate	\$ at risk
GP1: number of interruptions (per annum)				\$ per event	
N-1 security high economic consequence	0	7	14	183,333	1,466,667
N-1 security material economic consequence	7	24	41	21,630	389,333
N security high economic consequence	4	6	8	133,333	266,667
N security material economic consequence	9	23	37	21,000	336,000
N-1 security generator	5	9	13	33,333	133,333
N security generator	6	12	18	22,222	133,333
GP2: average duration of interruption (min)				\$ per min	
N-1 security high economic consequence	30	92	154	42,512	2,933,333
N-1 security material economic consequence	36	61	86	28,840	778,667
N security high economic consequence	0	103	206	5,178	533,333
N security material economic consequence	0	140	280	4,800	672,000
N-1 security generator	50	174	298	2,151	266,667
N security generator	11	93	175	3,252	266,667
AP1: HVDC availability (%)				\$ per 1%	
HVDC availability	99.75%	98.75%	97.75%	400,000	400,000
AP2 HVAC availability (%)				\$ per 1%	
HVAC availability (71 selected assets)	99.2%	99.0%	98.8%	4,000,000	800,000
Total revenue at risk					
Revenue at risk (%)					1.46%

Note: Revenue amounts are in nominal \$s and not referenced to any particular year

Attachment G Base capex

Purpose of this attachment

- G1 The purpose of this attachment is to set out our draft decisions relating to base capex for the IPP reset, and to explain our reasons for those draft decisions.

Base capex review and the Capex IMs

- G2 In assessing a base capex proposal by Transpower, we are guided by whether a proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier.³⁰²
- G3 We consider this concept to be consistent with the purpose of Part 4, which is a required consideration under the capex evaluation criteria.³⁰³
- G4 In applying this concept, we consider that a ‘prudent supplier’ is a supplier whose planning and performance standards reflect GEIP.
- G5 In evaluating the base capex expenditure proposal in Transpower’s proposal, we must apply the evaluation criteria in the Capex IM, being:
- G5.1 the general evaluation criteria set out in clause 6.1.1(2) of the Capex IM (general capex evaluation criteria); and
 - G5.2 the specific base capex evaluation criteria referred to in clause 6.1.1(3) of the Capex IM and specified in Schedule A of the Capex IM (base capex evaluation criteria).
- G6 These are together referred to as the capex evaluation criteria.
- G7 The general capex evaluation criteria are:
- G7.1 whether what is proposed is consistent with the Transpower IM Determination and the Capex IM;
 - G7.2 the extent to which what is proposed will promote the purpose of Part 4 of the Act; and

³⁰² Above n 65, at [A15].

³⁰³ Clause 6.1.1(2)(b) of the Capex IM and Chapter 3 of our Process paper.

- G7.3 whether the data, analysis, and assumptions underpinning what is proposed are fit for the purpose of the Commission exercising its powers under Part 4 of the Act, which includes consideration of the accuracy and reliability of data and the reasonableness of assumptions and other matters of judgement.
- G8 The base capex evaluation criteria are specified in Schedule A of the Capex IM. They include:
- G8.1 general factors we must have regard to when evaluating Transpower's proposal, such as reasonableness of key assumptions, overall deliverability of the proposed base capex during the regulatory period, and the extent to which grid output targets were met in the current and previous regulatory periods;
- G8.2 a non-exhaustive list of criteria we may use when evaluating each identified programme of work set out in the base capex proposal, such as reviewing Transpower's process used to determine each identified programme's reasonableness and cost effectiveness; and
- G8.3 a list of evaluation techniques we may employ, such as process benchmarking, and process or functional modelling.
- G9 The base capex evaluation criteria are not exhaustive, and the weighting of different criteria is at our discretion. Also, while Transpower is required to submit a base capex proposal, the final decisions on Transpower's base capex allowances ultimately rest with the Commission. We are not required to agree with Transpower about any aspect of the proposed expenditure allowances.

We used a Verifier to review Transpower's proposal

- G10 In our Process paper we explained that we considered it would be beneficial to use an independent verifier to verify Transpower's proposal in advance of submitting it to us.
- G11 In Chapter 2 we detail the verification process and how we have considered the recommendations of the Verifier across the base capex and opex expenditure programmes.

- G12 The Verifier reviewed 11 Identified Programmes and two non-Identified Programmes within the RCP3 base capex programme expenditure portfolio.³⁰⁴
- G13 Selection of the Identified Programmes was guided by criteria, in line with the Capex IM, and agreed by Transpower and us,³⁰⁵
- I. The top two portfolios by expenditure for the following asset categories across capex³⁰⁶
 - Grid Capex – Lines
 - Grid Capex – Substations
 - Grid Capex – HVDC
 - Grid Capex – Secondary assets
 - Non-network capex including ICT capex and corporate capex
 - II. All Enhancement and Development (E&D) expenditure.
 - III. Where the criteria in paragraphs (i to ii) do not provide 70% coverage of forecast capex for **RCP3**, the number of capex **portfolios** that are required to provide 70% coverage ranked from largest to smallest by forecast base capex spend for **RCP3**.
- G14 Verifier scrutiny of the Identified Programmes, the two non-Identified Programmes, and the ICT programme review at a consolidated level by the Verifier and Commission, increased the total expenditure that was reviewed to \$1,067.5m.
- G15 This is approximately 90% of the total base capex programme amount of \$1,216.4m which excludes the Transpower proposed \$14m adjustment for Price-Quality and grid-related ICT benefits.³⁰⁷
- G16 A summary comparison of each of the verified Identified and Non-identified Programmes is presented in Table G1, illustrating the expenditure differences between the RCP2 and RCP3 period forecasts and their variances.

³⁰⁴ As noted in the Verifier report the Identified Programmes are base capex projects or programmes of work forecast to be undertaken by Transpower in RCP3, which were selected by reference to categories or criteria agreed between the Commission and Transpower, prior to Transpower submitting its proposal. Non-identified programmes are those expenditure categories that were outside the agreed criteria for Identified Programmes in the Verifier TOR.

³⁰⁵ The Identified Programmes and their selection are discussed in the Verifier report (at 157-282).

³⁰⁶ Note that the Buildings and Grounds asset category has not been included. This is the only exception.

³⁰⁷ The Verifier noted that Transpower quantified “the revenue/price effects of re-calibrating its network risk tolerances, by reducing or increasing expenditure in certain programmes (eg, re-conductoring, ICT)” Verifier report (at 383-384).

Table G1 Base capex programmes reviewed by the Verifier and Commission

	Approved RCP2 expenditure (\$m)	Proposed RCP3 expenditure (\$m)	Variance (%)
Identified programmes			
Transmission Lines - Structures and Insulators	\$254.1	\$308.7	+21%
Transmission Lines - Conductors and Hardware	\$36.9	\$90.2	+145%
HVDC and Reactive Assets - HVDC assets	\$27.4	\$64.6	+135%
HVDC and Reactive Assets - Reactive assets	\$9.4	\$39.5	+321%
AC Substations - Power Transformers	\$93.0	\$60.1	-35%
AC Substations – 33kV Outdoor Indoor conversions	\$88.9	\$42.1	-53%
Secondary assets - SA Protection, Battery Systems and Revenue Meters	\$63.2	\$141.6	+124%
Secondary assets - SA Substation Management Systems	\$61.7	\$58.6	-5%
E&D	\$97.5	\$76.4	-22%
ICT - IT Telecoms, Network and Security Services	\$64.7	\$48.8	-25%
ICT - Transmission Systems	\$31.8	\$47.0	+48%
Non-identified programmes			
ICT - Asset Management Systems	\$23.3	\$18.6	-20%
AC Substations – Buildings and Grounds	\$32.4	\$39.5	+26%
Reviewed by Verifier and Commission at an ICT programme level			
ICT – Corporate Systems	\$19.0	\$12.6	-34%
ICT – Shared Services	\$30.7	\$19.2	-37%

Further analysis in this attachment

G17 As a summary of the analysis in this attachment, we have provided a high-level analysis guideline in Table G1 for each Identified and non-Identified Programme (and the expenditure that was not reviewed) discussing:

G17.1 where issues have been identified;

G17.2 what has been submitted on;

G17.3 where supporting information has been sought from Transpower;

- G17.4 further analysis carried out by us; and
- G17.5 a summary of proposed approvals reasoning for each of the base capex projects and programmes.
- G18 Each sub-section of Attachment G focuses on the analysis of the Verified Identified and non-Identified Programme, and contains:
- G18.1 a short summary of the Verifier's conclusions and key points;
- G18.2 our analysis of the Verification, and how the requirements of Clauses A1 and A2 of Schedule A of the Capex IM were met;
- G18.3 issues raised after the Verification and our analysis and how these were reflected in the Issues paper;
- G18.4 a summary of submissions relevant to the base capex Identified and non-Identified Programmes;
- G18.5 a summary of additional information sought from Transpower, why this information was sought, our analysis of this information and conclusions drawn from analysing this further information; and
- G18.6 our conclusions about whether the expenditure should be approved or not and why.
- G19 Attachment G.16 discusses the base capex projects and programmes that were not reviewed by either the Verifier or the Commission.
- G20 The Verifier identified particular areas of interest that we should focus our attentions on. We also wanted to explore some aspects of Transpower's expenditure proposal related to risk and how this was informing business cases that underpinned investment decision making.
- G21 In all of our subsequent analysis we were guided by our principle of proportionate scrutiny and expenditure materiality and tried to limit as much as possible the additional burden on Transpower.
- G22 For some, but not all, Identified and non-Identified Programmes, we carried out additional analysis beyond reviewing the Verifier report. For some expenditure programmes we have:
- G22.1 asked questions in the Issues paper seeking submitter views on aspects of Transpower's proposal;
- G22.2 sought further supporting information from Transpower using RFIs; and

G22.3 carried out analysis of the RFI information to decide next steps, and

G22.4 in the ICT capex programme, sought additional external expert advice.

Attachment G.1: Summary of base capex draft decisions

Table G2 Summary of base capex programme analysis

Programme and attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Verifier reviewed - Identified programmes				
Attachment G.2 - Transmission Lines - Structures and Insulators	No	No	No	<ul style="list-style-type: none"> • High level of rigour in the management of transmission line structures and insulators. • Improvement in asset health modelling has improved capex forecast reliability. • Efficiency improvements have also been evident over RCP2. • Clearly identified the need for programme of works – Transpower actively seeks ways to reduce costs with newer technologies. • Good evidence that building block costs based on feedback from project costs. • Developed asset management strategies and processes, asset health modelling and robust cost estimation - proposed expenditure is consistent with GEIP.
Attachment G.3 - Transmission Lines - Conductors and Hardware	No	No	No	<ul style="list-style-type: none"> • Many modelling and asset health practices are still in the development stage, but modelling conductor life expectancy is difficult. • Asset criticality and health model improvements still required – does not significantly impact RCP3 forecast but aiming for improvement in RCP4 proposal. • Current asset health model only a trigger for detailed condition assessment. • Good evidence that building block costs based on feedback from project costs. • Asset class strategy documents and processes well developed. • Due to advanced level of maturity in managing this asset fleet and demonstrated efficiencies over RCP2 – proposed expenditure is consistent with GEIP.

Programme and attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Attachment G.4 - HVDC and Reactive Assets - HVDC assets	Yes	Yes	Yes	<ul style="list-style-type: none"> • Pole 2 life-extension work expenditure prudent in minimising risk of asset failure due to delayed intervention. • HVDC different to most AC assets – interventions triggered by specialist condition assessments. However, recommendation to develop bespoke asset health model typically used in power stations. • Well-developed internal business case development processes evident and asset class strategy documentation and Transpower understanding of future costs based on historical costs. • Verifier initial view was that Pole 2 life-extension works could be Listed Project. • RFI information demonstrates detailed understanding of Pole 2 life-extension works – need, cost and timing. HVDC Pole 2 life-extension work at advanced level of planning so no advantage in using Listed Project mechanism. • Based on asset class strategy documentation, Transpower understanding of future costs based on historical costs, and supporting information – proposed expenditure is consistent with GEIP.
Attachment G.5 - HVDC and Reactive Assets - Reactive assets	Yes	No	Yes	<ul style="list-style-type: none"> • Range of asset complexity from capacitors to STATCOMs SVCs and synchronous condensers that need specialists to carry out condition assessments. • Asset health modelling development needed for capacitors. Present age-based replacement strategy not inconsistent with GEIP – improvement for RCP4 proposal. • Need for asset condition assessment and manufacturer cost estimates tested in RFI. Transpower information appears to confirm majority of need, cost and timing is certain apart from synchronous condenser refurbishment. • Transpower provided suitable explanation for synchronous condenser refurbishment need and cost uncertainty. • Reasonably satisfied with supporting information – while Verifier identified asset health modelling issues, Transpower provided explanations to RFI questions – proposed expenditure not unreasonable and is consistent with GEIP.

Programme and attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Attachment G.6 - AC Substations - Power Transformers	No	No	No	<ul style="list-style-type: none"> • Asset health and criticality modelling well developed – site-specific monetised risk-based options analysis tool – asset health models and criticality understanding informs refurbishment/replacement decisions. • Functionality and maturity of modelling will provide benefits during RCP3 and into RCP4 and RCP5. • Option taking and investment timing decisions robust – confidence that expenditure forecasts can be relied on. • Cost estimation seems robust and informed by historical project costs. • Asset health and criticality understanding means risk estimates can be made leading to investment/risk understanding (or price/quality). • Based on modelling maturity, monetised risk-based options analysis tool, and robust cost-estimation processes – proposed expenditure consistent with GEIP.
Attachment G.7 - AC Substations - 33kV Outdoor Indoor (ODID) conversions	No	No	Yes	<ul style="list-style-type: none"> • Key driver for investment is asset condition, with safety and reliability considerations used to justify moving switchgear indoors. • ODID project cost estimation an issue in the past but Transpower is using lessons learned to reduce expenditure forecast error. • Hazard control and safety considerations as an economic justification for investment were tested. • ODID investments improve reliability and reduce opex but these effects haven't been analysed. • Based on maturity of replacement programme, supported by the Asset Class Strategy, and cost-estimation processes – proposed expenditure consistent with GEIP.

Programme and attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Attachment G.8 - Secondary Assets - SA Protection, Battery Systems and Revenue Meters	Yes	No	Yes	<ul style="list-style-type: none"> • Age-based replacement strategy informed by spares availability and technical obsolescence – justifiable but recommended Transpower continue to support developments to extend asset life. • Transpower planning to develop risk-based framework for evaluation and cost-benefit analysis of protection scheme expenditure planning. Technology typically has 20-25-year lifespan – benefits of extending life by 5 years substantial. Should be RCP3 priority. • Verifier identified Transpower facing “bow-wave of replacements” from RCP4 to RCP5. Life-extension analysis will likely provide significant benefit – aiming for improvement into RCP4. • Extensive historical project cost information informs building block cost estimates and numerous relay manufacturers – asset costs market tested. • Protection relay duplication strategy tested. Appears to be sound economic justification based on risk analysis for examples provided. • Age-based replacement strategy supported by robust cost-estimation processes – proposed expenditure consistent with GEIP.
Attachment G.9 - Secondary Assets - SA Substation Management Systems	Yes	No	No	<ul style="list-style-type: none"> • No asset health and criticality models for these assets – asset replacement decisions based on age, manufacturer information and failure rate data. • Asset life extension may be possible for some assets by developing asset-centric health and criticality models. • Cost efficiencies seem dependent on bundling with other projects – not known if capex opex trade-offs have been made or tested for efficiency. • Transpower has committed to more detailed design upfront to inform business cases and improve expenditure forecasts – large cost variations in RCP2 project costs have been noted. • Based on present age-based replacement strategy, which is not considered unreasonable and improving cost-estimation processes – proposed expenditure consistent with GEIP.

Programme and attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Attachment G.10 - E&D	Yes	Yes	Yes	<ul style="list-style-type: none"> • Verifier positive about expenditure envelope approach taken by Transpower and considered scenario modelling an improvement on RCP2 method. • Still considerable uncertainty for many of the projects in the E&D portfolio around cost, timing, and preferred solution. • We consider that Transpower’s low expenditure scenario envelope amount should be approved (\$59m compared with proposal amount of \$76.4m). • We recognise the original intention to reduce uncertainty was that the base capex adjustment mechanism (BCAM) would be used. • However, we consider that the BCAM, as it currently stands, likely needs amending to appropriately balance the risks to consumers and Transpower.
Attachment G.11 - ICT Total programme and Attachment G.12 - ICT - IT Telecoms, Network and Security Services	Yes	No	Yes	<ul style="list-style-type: none"> • Verifier identified that forecasting based on lifecycle management and benefits-driven investment was a sound approach for IT Telecoms related projects. • Pro-active replacement or upgrade policy for lifecycle projects is likely to be good practice but no analysis to demonstrate this is the case. • Impact of communications and IT systems being unreliable difficult to ascertain. • Transpower has carried out condition assessments of substation infrastructure and network assets to support the programme forecast. • After EMCa expert review of ICT programme amend approval amount by \$32.6m. Approve \$113.6m in draft decision. EMCa identified issues with economic justifications of benefits-driven projects and maturity of business cases of lifecycle projects.

Programme and attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Attachment G.11 - ICT Total programme and Attachment G.13 - ICT - Transmission Systems	Yes	No	Yes	<ul style="list-style-type: none"> • Much of this program is to fund continuation of upgrades and enhancements that were part of RCP2. • Technical obsolescence and lack of vendor support was identified as a key driver. • SCADA/EMS investments can facilitate asset condition assessment, improve outage response times and better manage grid incidents – essential to reliable operation of a modern power transmission network – remote automatic monitoring and control now standard. • Robust identification of investment need and verification of economic and operational benefits of preferred options. • After EMCa expert review of ICT programme amend approval amount by \$32.6m. Approve \$113.6m in draft decision. EMCa identified issues with economic justifications of benefits-driven projects and maturity of business cases of lifecycle projects.
Verifier reviewed - Non-identified programmes				
Attachment G.11 - ICT Total programme and Attachment G.14 - ICT - Asset Management Systems	Yes	No	Yes	<ul style="list-style-type: none"> • Programme expenditure concerned with enhancing Transpower’s asset data management – strategy to move to a more data-centric decision-making organisation. • Goal to centralise network and asset data and have this data gated appropriately – data relied on by planners, asset managers and maintenance staff. • Verifier reviewed this programme to test whether benefits of the projects started in RCP2 (\$23.3m) were being realised. • Verifier concluded benefits demonstrable – saving in annual maintenance expenditure, improved operational decision making and a potential to reduce response times to outages. • After EMCa expert review of ICT programme amend approval amount by \$32.6m. Approve \$113.6m in draft decision. EMCa identified issues with economic justifications of benefits-driven projects and maturity of business cases of lifecycle projects.

Programme and attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Attachment G.15 - AC Substations - Buildings and Grounds	No	No	No	<ul style="list-style-type: none"> • Robust needs assessment including detailed modelling of each component for condition and expected asset life. Substation criticality and corrosion zone effects used as inputs to intervention decision making. • Sound policies and strategies in place to manage these assets which could easily be overlooked in electricity network management. • Investment decisions influenced by CBA to decide to refurbish or replace assets. • Work programme carried out by external service providers, selected following market testing to find preferred provider. Costs sufficiently market tested. • Based on expenditure in this category being well-targeted, prudent and efficient in maintaining safe and reliable operations in the substations – proposed expenditure consistent with GEIP.
Projects and programmes not reviewed				
Attachment G.16 - other projects and programmes not reviewed	N/A	N/A	N/A	<ul style="list-style-type: none"> • Smaller projects mainly in AC Substations, transmission lines and ICT programmes. • Verifier reviewed ICT base capex on a consolidated basis so all ICT projects effectively considered by Verifier. • Projects not reviewed due to materiality and application of our proportionate scrutiny principle.

Attachment G.2: Transmission Lines – Structures and insulators

- G23 This category of expenditure is related to transmission tower structures and poles, transmission tower painting, transmission tower foundations, insulators and fittings.
- G24 The transmission line towers and poles portfolio comprise steel lattice towers and wood, concrete and steel poles. Transpower stated in its Transmission Line Towers and Poles Asset Class Strategy document that there are “approximately 23,600 towers and 13,700 poles on our network.”³⁰⁸
- G25 The Verifier noted a high level of rigour in the management of transmission line structures and insulators evidenced by quality data, mature asset health modelling and a robust field condition monitoring program.
- G26 The Verifier noted that Transpower has demonstrated a willingness to consider new approaches and technologies, with increased corrosion zone modelling granularity and trialling of newer tower paint technologies to extend tower structure component life. However, the Verifier concluded that Transpower’s 8-yearly tower inspection and condition assessment cycle was sub-optimal and that this should be occurring earlier.
- G27 Some other key Verifier observations included that:
- G27.1 improvements in asset health modelling has improved capex forecast reliability in this asset class;
 - G27.2 efficiency improvements have been evident over the RCP2 and previous regulatory periods;
 - G27.3 in this asset class there is strong evidence that building block costs are based on feedback from actual project costs; and
 - G27.4 there was concern that future tower painting costs may be much higher than Transpower is predicting requiring either an advancement in painting technology to extend paint life or a review of resource requirements to meet future demand.
- G28 The Verifier concluded that based on the asset class strategy, condition assessments and the modelling outcomes, that the proposed expenditure for this category is consistent with GEIP.³⁰⁹

³⁰⁸ Transpower “Transmission Line Towers and Poles Asset Class Strategy document” (April 2018), at 1.

³⁰⁹ Above n 29, at 158-174.

- G29 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:
- G29.1 Transpower has identified the transmission towers and lines and the necessity to maintain these beyond RCP3 is a key risk for the RCP4 and RCP5 period and has been developing a long-term strategic view of this as one of its priorities;
 - G29.2 the Verifier carried out a comprehensive review of this expenditure program and even tested Transpower's long-term cost estimates heading into RCP4 and RCP5. Insulator replacements are largely volumetric based on asset condition and tower painting is also condition based and largely cyclical. Transpower is also using CBA to test life-extension coatings and also appears to be using CBA to test when replacement is more cost effective;
 - G29.3 Transpower has clearly identified the need for the programme of works and actively seek ways to reduce costs with newer technology, extend asset life with more refined modelling and are taking a longer-term view of resource need as it plans for RCP4 and RCP5 work. Additionally, to minimise planned outage durations Transpower is also trialling newer faster drying paints solutions particularly for use inside Minimum Approach Distance (**MAD**) zones; and
 - G29.4 Transpower was set clear initiatives about improving its cost-estimation systems in the RCP2 decision. These have been reviewed by the Verifier who concluded that Transpower has made significant progress. The TEES system has been developed by Transpower since RCP2 and the cost database is updated regularly with actual costs from projects and works programmes. The Verifier concluded that the TEES system is consistent with GEIP although we tested Transpower in several areas with respect to contingency amounts and how cost estimates can be made with greater accuracy.
- G30 We considered that following the Verifier report, and our review of the Verifier report and Transpower supporting information, that the Transmission Lines – Structure and Insulators programme is at a high level of maturity. The asset management strategy documents and processes give confidence that the expenditure forecast is consistent with GEIP.
- G31 Based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our draft decision is to approve the proposed Transmission Lines – Structure and Insulators programme expenditure of \$308.7m in RCP3.

Attachment G.3: Transmission Lines – Conductors and Hardware

G32 This category of expenditure is related to transmission line overhead conductor and associated connection hardware. Transpower noted in its Transmission Lines – Conductors and Hardware Asset Class Strategy that:³¹⁰

The performance of conductors is critical to ensuring public safety and maintaining reliability of supply to customers. Our asset management approach for conductors and insulators seeks to achieve a high level of reliability for this essential equipment, to mitigate safety hazards and to achieve least whole-of-life cost. There are approximately 11,600 route kilometres (17,200 circuit km), of transmission in service on the network. In total, this results in more than 65,000 km of phase conductor, and approximately 5,600 km of earthwire.

G33 The Verifier identified that many of the modelling and asset health practices are still in the development stage but conceded that modelling conductor life expectancy is difficult without carrying out focussed and detailed assessments of conductor condition.

G34 The Verifier also raised concerns about Transpower’s forecast peak expenditure estimates into future reset periods, disagreeing with Transpower about when they were likely to reduce.

G35 The Verifier concluded that based on the advanced level of maturity in managing this asset fleet, and the demonstration of efficiencies Transpower demonstrated in RCP2, that the proposed expenditure for RCP3 is consistent with GEIP.³¹¹

G36 Some other key Verifier observations included that:³¹²

G36.1 the approach to the management of the conductor and hardware asset fleet is at an advanced level of maturity based on its analysis of the asset class strategy, and Transpower’s strategy of using the asset health model to trigger detailed conductor condition assessments;

G36.2 the current asset health model developed in RCP2 is relatively new and does not use asset condition information in its base logic, apart from where this condition information is considered by a subject matter expert;

G36.3 asset criticality and the asset health model improvements are still required, however this does not have a significant impact on the current forecasts for RCP3;

³¹⁰ Transpower “Transmission Line Conductors and Hardware Asset Class Strategy document” (April 2018), at 1.

³¹¹ Above n 29, at 174-189.

³¹² Above n 29, at 186-187.

- G36.4 predicting the life expectancy for selected segments of conductors is currently difficult;
 - G36.5 the Verifier agrees with Transpower that the current pessimism in the asset health model is acceptable as the model is used only to trigger detailed condition assessment activities on assets predicted to require intervention;
 - G36.6 Transpower should identify a target for future reductions in conductor replacement costs to justify the budget for proactive investigations into delivery and scale efficiencies for reconductoring projects;
 - G36.7 Transpower has detailed condition assessment data for less than 30% of conductor assets;
 - G36.8 Transpower has explained that there are cost-estimation risks for large conductor replacement or removal works in RCP3 which may be significant. While some cost estimates have an accuracy of $\pm 30\%$, most of the cost estimates have an accuracy of $\pm 50\%$ at this stage in the planning process; and
 - G36.9 Transpower provided strong evidence that the building block costs are based on feedback from actual project costs; however, there was little evidence of a drive to improve efficiency in the delivery of the work. The Verifier recommended inclusion of strategy initiatives to include a summary of improvements in delivery efficiencies.
- G37 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:
- G37.1 we consider that Transpower has been prudent in the application of its policies and processes in this asset class, and that taking a long-term planning view of conductor replacement need is good practice, as this will impact on the investigation and preparatory work that needs to be carried out in RCP3. The Transmission Line – Conductor and Hardware policies and standards are well developed and detailed;
 - G37.2 Transpower has made significant progress in its understanding of transmission line asset criticality which models risk down to a transmission line span level of granularity;
 - G37.3 the transmission line asset health models are viewed as rudimentary and not suitable for investment decision making but this is largely because overhead line conductor condition is difficult to define accurately and requires field condition assessments to be carried out;

- G37.4 the asset class strategy documents for transmission lines are probably the most well developed and detailed in Transpower's fleet. These documents are of a high technical standard and set the benchmark for other asset class strategy documentation;
- G37.5 Transpower is actively pursuing methods to obtain better condition data and ensure that forecasting in this category is more accurate for RCP4 and RCP5;
- G37.6 Transpower takes a project-by-project view of the need in this program depending on a detailed assessment of conductor condition. Each investigation is project specific because overhead lines are installed in different areas with different rates of conductor corrosion. Asset health models alone are not sufficient to define need in this asset category as conditions vary so widely and there are a variety of conductor types with differing degradation properties. Assessment of conductor asset condition is a detailed investigation in itself; and
- G37.7 Transpower appears to have a good process for identifying suitable vendors and consultants to carry out planning and installation of reconductoring works using pre-qualification assessments. However, the Verifier noted that it was difficult to ascertain whether Transpower was trying to identify any delivery efficiencies.
- G38 We have been engaging with Transpower staff about how it intends to improve its transmission line conductor condition assessments in preparation for predicted replacement volumes in RCP4 and RCP5. Transpower appears to be taking a very pro-active approach to more efficiently assess conductor condition. At present there are limited techniques available, but this is identified as one of Transpower's key asset investigation priorities.
- G39 Based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our draft decision is to approve the proposed Transmission Lines – Conductors and Hardware programme expenditure of \$90.2m in RCP3.

Attachment G.4: HVDC and Reactive Assets - HVDC assets

- G40 The HVDC system is the DC transmission connection between the North and South Island AC power systems. Transpower described the HVDC assets as:³¹³

The HVDC system consists of 2 HVDC converter stations, overhead transmission lines, 2 cable stations, 3 undersea Cook Strait cables (38 km per cable), 2 electrode stations, sea and land electrodes, and communication systems connecting the system to control centres, harmonic filters, and other reactive power assets.

³¹³ Transpower "Portfolio Management Plan – HVDC Assets" (October 2018), at 4.

The majority of these assets can be divided into two categories based on their age: Pole 2 and associated AC and HVDC assets (commissioned in 1991), and Pole 3 assets (commissioned in 2013). Pole 3 assets are still in good condition. The Pole 2 control and protection system and some primary assets were also replaced as part of Pole 3 project (the Pole 2 control system upgrade project).

- G41 The Verifier, while agreeing that the expenditure is likely to be prudent to minimise the risk of asset failure due to delayed intervention, commented about the lack of asset health modelling and criticality strategies in this asset fleet.
- G42 The Verifier recommended that Transpower develop a bespoke asset health model based on asset criticality and condition modelling typically used in power stations, and that this should be a priority for Transpower during RCP3.
- G43 The Verifier concluded that based on asset class strategy documentation and that given Transpower appeared to have a good understanding of future costs based on historical costs down to item level of detail, that the proposed expenditure is consistent with GEIP.³¹⁴
- G44 Some other key Verifier observations included that:³¹⁵
- G44.1 the asset management approach for HVDC assets needs to be different to than for AC systems. Actual interventions are triggered by specialist condition assessments, failure modes and asset by asset strategies and the asset management approach is reliability based and consistent with the approach used in process facilities including power stations;
 - G44.2 bespoke HVDC asset health models should be developed which are consistent with the overarching asset management framework but should be based on asset criticality and condition models used typically in power station facilities. This should be a priority for RCP3; and
 - G44.3 a decision needs to be made about whether the Pole 2 life-extension works should be a Listed Project.
- G45 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:
- G45.1 Transpower has a high degree of expertise and well-developed processes in managing the HVDC assets. This is highly specialised equipment;

³¹⁴ Above n 29, at 189-200.

³¹⁵ Above n 29, at 186-187.

- G45.2 despite not having asset health models, equipment is replaced based on manufacturer advice and expert asset condition assessments;
- G45.3 Transpower appears to have well-developed internal business case development processes which includes internal challenges for project need and costs. Project need is signalled early by equipment manufacturers and this is followed up based on specialist condition assessments. This manufacturer driven process is probably prudent for an asset with limited published asset health data;
- G45.4 Transpower usually schedules HVDC maintenance work during the summer when peak loads are reduced and when the DC transfer is likely to be much lower. Transpower discuss the impact of the RCP3 HVDC work on the availability targets in its 2018 Asset Management Plan stating that:³¹⁶

In RCP3, the planned Pole 2 refurbishment work will affect the HVDC availability due to longer outages required for converter transformer refurbishments and primary asset replacement works. RCP3 availability targets are likely to be updated to reduce the availability target to 97.8 percent for years where more demanding HVDC work is being carried out (i.e. converter transformer work). We are currently working through all the responses to finalise the service performance measures and targets.

- G45.5 cost modelling for the HVDC works seems to be robust (at a +/-20% accuracy range) based on historical costs: and
- G45.6 the Verifier suggested that the Pole 2 life-extension works could be a Listed Project presumably on the basis that the forecast amount required for these works and need date was uncertain at the time of the RCP3 submission.
- G46 We considered that there could be uncertainty regarding Pole 2 life-extension project costs and indeed whether the expert condition assessments Transpower stated are usually carried out to define project need, had been carried out.
- G47 Transpower's proposal material was unclear on this issue and its Portfolio Management Plan – HVDC assets Transpower stated that:³¹⁷

Our access to accurate cost information is restricted due to unique nature of the asset. Transpower doesn't hold an accurate cost library for HVDC assets. Where possible we base our estimates on available historical cost estimates, quotes or cost information of similar AC assets.

³¹⁶ Transpower "Asset Management Plan" (October 2018), at 371.

³¹⁷ Above n 313, at 23-24.

There are only a limited number of HVDC suppliers, which restricts our bargaining power. The global HVDC market is becoming less competitive with a significant amount of new larger HVDC projects tying up resources. This is a significant risk as we may be required to pay a premium to obtain HVDC services in the future. We may also experience long lead times as the suppliers commit to larger projects overseas.

We are expecting to conduct a significant amount of refurbishment work within RCP 3. Successful commissioning of this work will depend on the availability of specialised technical resources (i.e. engineering knowledge), outage availability, and timely manufacturer support). If we experience delays this could lead to reprioritisation of the plan and deferral of some work in to RCP 4.

- G48 We sought additional information from Transpower in an RFI about what the HVDC expenditure forecast would look like with the Pole 2 life extensions works removed in preparation for a possible decision to exclude this expenditure from the RCP3 draft decision.
- G49 Not including the HVDC Pole 2 life-extension works would require Transpower to use the Listed Project mechanism (at any time) and firm up its project need dates and cost estimates.
- G50 In our Issues paper we also sought submitter views on whether the HVDC Pole 2 life-extension works should be considered a Listed Project, in line the Verifier recommendation, asking:

Transpower has signalled that in the HVDC and Reactive Assets – HVDC assets capex program that there are uncertainties in accessing accurate cost estimates and resource availability which may result in deferral of works into RCP4. Should this capex program, which is largely focussed on Pole 2 life-extension works, be considered as a listed project and, if so, why?

Issues paper consultation submissions

- G51 There were two submissions on the HVDC Listed Project question from Meridian and Transpower.
- G52 Meridian was supportive of using the Listed Project mechanism stating that:³¹⁸
- it should be considered as a listed project as this would potentially enable the uncertainties around cost estimates to be resolved ahead of the project proceeding. Meridian pays for roughly 70% of HVDC costs and we would appreciate the opportunity to have further input via the listed project mechanism.
- G53 Transpower also submitted on this and indicated that it considered it had sufficient certainty of scope, timing and costing for the HVDC Pole 2 mid-life-extension refurbishment, and that advanced planning had already been carried out for this portfolio of work.

³¹⁸ Above n 222, at 6.

G54 Additionally, Transpower considered that its ongoing condition testing and monitoring regime for these assets enable its asset management team to make well-informed maintenance and renewal decisions.

G55 Transpower further stated that:³¹⁹

The Pole 2 mid-life refurbishment involves around 50 projects grouped together as a programme of work. Options analysis and planning has to be done sequentially as we do not have the capacity to do all the work at once, as would be required for a listed project. We also need to consider limited specialist supplier resources.

G56 We also noted that the Verifier, in its summary of issues that the Commission may wish to progress, identified that during the development of Transpower's proposal various submitters to Transpower consultations expressed support for the Pole 2 life-extension works being a Listed Project.³²⁰

Transpower response to our RFI and Issues paper

G57 Transpower responded to our RFI and provided the expenditure forecast information we requested. In addition, and as part of its submission, Transpower provided more detailed information about the HVDC programme of works.³²¹

G58 Transpower has provided considerably more detailed information on the Pole 2 life-extension programme than was submitted in support of its proposal and asked also that this information not be published, presumably because of sensitive manufacturer cost information. Key additional supporting information includes that:

G58.1 the original design life of Pole 2 is 35 years but Transpower considered life-extension works will defer the need for Pole 2 replacement by 15 years. Transpower has not provided any CBA on the likely cost savings that result from a 15-year deferral, but these are likely to be significant;

G58.2 delaying investment into RCP4 would mean pushing some equipment beyond its design life which will increase unplanned outage risk which could significantly impact the market due to HVDC unavailability;

³¹⁹ Above n 71, at 20-21.

³²⁰ These submitters included Contact, Genesis, Mercury and Fonterra. See the Verifier report (above n 29, at 387).

³²¹ Transpower "HVDC Assets Pole 2 Plan Reference Document – Asset Status 2018" (March 2018).

- G58.3 there are 47 individual Pole 2 life-extension works projects spread out over each year of RCP3. Most of these individual projects are discussed in the supporting information. Transpower stated this work has been planned in a way to cause the least impact on its customers (an outage of Pole 2 will have market implications);
- G58.4 it is more prudent and efficient to break the projects up into multiple phases and commission these as they are completed rather than as one major project; and
- G58.5 some of the Pole 2 life-extension work has already been completed in RCP2 and this proposal is a continuation of these works.

Further analysis

- G59 We have reviewed the additional supporting information from Transpower and have noted the Issues paper submission from Meridian. The Verifier view was that the HVDC Pole 2 life-extension works could be regarded as a Listed Project on the basis that there appeared to be uncertainty surrounding the timing of the projects.
- G60 However, the Transpower supporting information appears to confirm that its project plans for the various work in the Pole 2 life-extension are well-advanced; so much so that Transpower understands the likely outage implications in each year of RCP3 and the likely impact this will have on its HVDC availability targets.
- G61 Additionally, the supporting information also demonstrates that Transpower seems to have already tested the market for project and manufacturer costs.
- G62 We consider that, while Transpower does not have a traditional asset health modelling for these assets, and probably could develop a more systematic approach to this in line with the Verifier recommendations, it has very detailed real-time condition monitoring and controls in place.
- G63 While Meridian suggested that the Pole 2 life-extension works should be a Listed Project, Transpower disagreed and made a compelling case for this programme of works being considered as base capex, due to the advanced nature of its planning and cost estimation.
- G64 In conclusion, and based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, we recommend that:
- G64.1 our draft decision is to approve the proposed HVDC and Reactive Assets - HVDC programme expenditure of \$64.6m in RCP3;

- G64.2 require, in line with the Verifier's recommendation, Transpower to develop bespoke HVDC asset health models which are based on asset criticality and condition models typically used in power station facilities;
- G64.3 implement a process to test progress of the Verifier's recommendations by:
- G64.3.1 incorporating reporting requirements in the IPP determination to provide transparency on progress for interested persons; and
 - G64.3.2 introducing a limited scope, mid-period expert review after year two of RCP3 to provide expert insight into Transpower's progress, with details of the review process to be specified in the IPP determination.

Attachment G.5: HVDC and Reactive Assets - Reactive assets

- G65 Reactive power assets are required to maintain network voltage profiles and voltage stability, and to minimise unnecessary network reactive power flows. This asset class contains a combination of static reactive sources such as capacitors and reactors, and more complicated dynamic sources like synchronous condensers, STATCOMs and SVCs.
- G66 The Verifier, while concluding that the majority of the expenditure was likely to be prudent, identified that apart from the capacitor banks, all other reactive plant did not use asset health modelling for expenditure planning, mainly because these assets were part of a highly specialised asset population.
- G67 The Verifier concluded that based on Transpower's strategy in this asset class to replace assets based on age-based end-of-life estimates, which was not unreasonable, that this expenditure was consistent with GEIP.³²²
- G68 Some other key Verifier observations included that:³²³
- G68.1 Transpower has a key strategy for reactive plant to retain ongoing access to essential professional, technician and trades skills, in particular, for the maintenance and support of the synchronous condensers;

³²² Above n 29, at 200-211.

³²³ Above n 29, at 186-187.

- G68.2 similar to synchronous condensers, Transpower's intent is to increase its in-house power electronics engineering expertise (for SVC and STATCOM maintenance which has similar skill-set requirements to HVDC). There is a significant risk that attrition of skilled personnel will lead to future difficulties with maintenance and support of the control equipment;
 - G68.3 due to lack of historical failure data and other data quality issues, condition assessment of all the capacitor banks is planned for RCP3. This improvement will further inform future expenditure plans;
 - G68.4 business case development is undertaken using a multi-disciplinary approach tailored to the size and complexity of the job. Due to the unique nature of the asset fleet, a single business case is developed for each project; and
 - G68.5 nationwide condition assessment projects are planned for RCP3 to further develop the failure rate model and to better understand the condition of the capacitor bank fleet.
- G69 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:
- G69.1 this expenditure category has a range of different asset complexities from STATCOMs which are like HVDC assets in their requirement for specialist maintenance competencies and manufacturer signalled replacement/refurbishment timings, to capacitor bank cans that are ubiquitous throughout the network and can be almost run to failure at a capacitor can level;
 - G69.2 Transpower has a range of strategies to manage these assets but with some asset types there are no asset health models (capacitors and reactors) and replacement with the more technical assets like SVCs and STATCOMs is only really certain once focussed condition assessment is carried out;
 - G69.3 similar to the HVDC programme, specialist knowledge is needed to understand whether to carry out replacement or refurbishment works for the synchronous condenser, STATCOM and SVC assets; and

- G69.4 the Verifier's view was that most of the projects in this category are customised and hence there are few building block costs for Transpower to use in its estimates. For the STATCOM, SVC and RPC assets this is a similar situation to the HVDC asset class. However, for other aspects of this programme such as the capacitor replacements and synchronous condenser maintenance work, which are regular and almost annual occurrences, Transpower should have building block costs that are constantly updated from project work.
- G70 We sought additional information from Transpower in an RFI about what aspect of the HVDC and Reactive Assets – Reactive Assets expenditure forecast has yet to be confirmed with an asset condition assessment and/or a manufacturer cost estimate. Additionally, we requested that these proposed works be expressed separately from the other expenditure forecast items in this asset category if this was the case.
- G71 In our Issues paper we also sought submitter views on whether aspects of the HVDC and Reactive Assets – Reactive Assets projects should be approved using a different approvals mechanism to remove any project need and cost uncertainties. However, no parties expressed a view about this.

Transpower response to our RFIs

- G72 Transpower responded to our RFI requests to provide additional expenditure forecast information in addition to a breakdown of expenditure related to the expenditure on assets where condition assessments have yet to be carried out.
- G73 Transpower stated that there are three key expenditure strategies in this Identified Programme, and the RCP3 annual expenditure information for each is summarised in Table G3. The three strategies are:
- G73.1 **Strategy 1:** Replace capacitor cans or full banks and reactors when they reach replacement criteria and undertake refurbishment work on reactors that do not warrant full replacement: Undertake a mix of individual capacitor can replacements, reactor refurbishments and full capacitor bank replacements based on knowledge of asset condition, risk, cost and future needs;
- G73.2 **Strategy 2:** Half-life refurbishments: Undertake half-life refurbishments on our SVCs and STATCOMs to ensure that the main plant can achieve reliable operation until the end of its engineering life; and
- G73.3 **Strategy 3:** Undertake life-extending major overhauls on a periodic basis: Undertake major overhauls to extend the life of major equipment such as the synchronous condenser main units, typically at 15-20 year intervals, or based on condition.

Table G3 Summary of Reactive Assets expenditure in RCP3 (\$000s)

Strategies	Expenditure	2020/21	2021/22	2022/23	2023/24	2024/25	RCP3 total
Strategy 1	Certain to occur	475	714	272	1,429	2,134	5,024
	Asset condition based	-	-	-	458	-	458
Strategy 2	Certain to occur	3,885	6,212	2,499	3,889	-	16,485
	Asset condition based	129	411	266	-	-	806
Strategy 3	Certain to occur	4,096	441	2,188	3,321	110	10,155
	Asset condition based	144	503	1,161	1,930	942	4,681
Total	Certain to occur	8,456	7,367	4,959	8,639	2,244	31,664
	Asset condition based	273	914	1,427	2,389	942	5,945

- G74 In addition, Transpower provided more detailed information about what expenditure was dependent on vendor cost estimates. We were keen to test the certainty of the forecast expenditure in this Identified Programme given the Verifier's conclusions that there were no asset health models for the majority of the reactive asset types and that a lot of costs were reliant on vendor estimates.
- G75 The Transpower supporting information has demonstrated that for what is described as Strategy 1 and 2 asset types (eg, capacitors, reactors, SVCs and STATCOMs), only a small proportion (approximately 6%) of the proposed expenditure is dependent on future asset condition assessments. However, for the Strategy 3 asset type this rises to 32%.
- G76 The Strategy 3 assets are related to life-extension works for assets such as synchronous condensers. Transpower has a dedicated Asset Class Strategy (**ACS**) for synchronous condensers given their importance for HVDC operation. Without the condensers at Haywards the HVDC wouldn't be able to operate.

G77 In its synchronous condenser ACS Transpower provide some reasoning why the Strategy 3 asset class has 40% of expenditure yet to be confirmed with a full asset condition assessment:

During routine annual maintenance, it is not possible to fully inspect the machines. The major overhauls conducted at typically 15-year intervals provide an opportunity to undertake these inspections and assess the condition of the stator and rotor.

During one of the overhauls of the SC7 to SC10 machines, an emerging defect was identified in the rotor poles of one machine. An insulation packer, fitted between the rotor pole coil and the head of the pole piece, was found to have migrated from its correct position. This defect could have progressed to a severe failure. The risk has subsequently been mitigated in all the machines, but the identification of this defect confirms the value of periodic major overhauls.

G78 We are reasonably satisfied with Transpower's supporting information and consider that, while the Verifier has rightly identified asset health modelling issues in this Identified Programme, Transpower has provided reasonable explanations to the Commission's questions in its proposal and RFI supporting information.

G79 In conclusion, and based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material our draft decision is to approve the proposed HVDC and Reactive Assets – Reactive Assets programme expenditure of \$39.5m in RCP3.

G80 We also will be requiring, in line with the Verifier's recommendations, Transpower to further develop its asset health modelling for the assets in this Identified Programme. We will implement a process to test progress of the Verifier's recommendations by:

G80.1 incorporating reporting requirements in the IPP determination to provide transparency on progress for interested persons; and

G80.2 introducing a limited scope, mid-period, expert review after year two of RCP3 to provide expert insight into Transpower's progress, with details of the review process to be specified in the IPP determination.

Attachment G.6: AC Substations - Power transformers

G81 Power transformers are used to transform voltages across the grid, from generation to the POS, to facilitate efficient bulk AC power transfer over long distances. Transpower stated that this asset class includes:

...major power transformers operating at system voltages of 11 kV and above. It includes supply and interconnector transformers in the main AC transmission network, converter transformers in the HVDC system, and the transformers that connect reactive power equipment to the grid. The scope also includes small auxiliary power transformers such as earthing and local service transformers, although major power transformers are the main focus of this document.

There are about 360 major power transformers in service, with a mix of three-phase types, and mostly older banks of three single-phase units.

G82 The Verifier noted that the health and criticality modelling in this asset category was the most mature in Transpower's asset fleet. Transpower has developed a site-specific monetised risk-based options analysis tool, with asset health models and a criticality understanding informing refurbishment/replacement decisions.

G83 The Verifier concluded that based on the modelling maturity and the monetised risk-based options analysis tool that this expenditure is consistent with GEIP.³²⁴

G84 Some other key Verifier observations included that:³²⁵

G84.1 there were no issues found with the asset health model developed for power transformers that would have a significant impact on the accuracy of the input volumes forecasted for RCP3;

G84.2 Transpower has forecasted a reduction in capital expenditure from \$113m in RCP2 to \$66m in RCP3 due to undertaking more life extensions and less transformer replacements;

G84.3 overall the functionality and maturity of asset modelling for power transformers has already provided benefits to be achieved during RCP3. Further refinements of failure probability and risk assessments will continue to provide benefits into RCP4 and RCP5;

G84.4 our analysis of the age of transformers suggests the costs of replacement in RCP6 may be up to \$150m. We recommend that Transpower considers the deliverability of this level of transformer replacement during RCP3 to better inform forecasts for RCP4 and RCP5; and

³²⁴ Above n 29, at 212-223.

³²⁵ Above n 29, at 186-187.

- G84.5 the biggest risks to the transformer portfolio are due to external factors and transformer major failure events. The most significant external factor is customer decision making - uncertainties exist around customer decisions especially at N security sites.
- G85 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out its own review concluding that:
- G85.1 Transpower has demonstrated in this asset category that a monetised risk-based analysis strategy is not only analytically possible but also provides real benefits by allowing refurbishment/replacement decisions to be made on a monetary basis and judged against risk;
- G85.2 with a monetised risk-based analysis tool, and a mature asset health modelling process, options to refurbish or replace a transformer asset or transformer equipment can be tested over the medium to long term allowing net present value (**NPV**) based CBA to occur. This ensures that Transpower's option taking and investment timing decisions are more robust and that the Commission can have more confidence that the expenditure forecasts can be relied on; and
- G85.3 cost modelling in this asset class is based on the TEES framework. Transpower has 360 power transformers in its fleet and decades of project cost information to use to populate its TEES cost-estimation model.
- G86 We consider that the asset health and criticality understanding in this asset category is the most developed in Transpower's asset fleet. Transpower has demonstrated that risk estimates can be used to make investment/risk trade-offs which means that it should eventually be able to do this across the asset fleet. This would be a considerable analytical development.
- G87 Based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our draft decision is to approve the proposed AC Substations – Power transformers programme expenditure of \$60.1m in RCP3.

Attachment G.7: AC Substations - Outdoor Indoor (ODID) Conversions

- G88 Transpower state that "Outdoor 33 kV switchyards provide an interface point between our high-voltage transmission network and medium voltage distribution customers. Outdoor 33 kV switchyards consist of multiple asset types such as structures, buswork, disconnectors, circuit breakers, and instrument transformers."
- G89 Locating 33kV switchyards outdoors is a legacy design strategy from the 1950s onwards. Outdoor switchyards at this voltage are generally considered to be less safe, less reliable and less economic than their indoor counterparts.

- G90 The Verifier identified that this programme (since 2008) of asset replacement has been driven by design-related safety and reliability issues rather than asset condition concerns. For these reasons the Verifier concluded that asset health models for the remaining outdoor 33kV switchyards forecast for replacement are unnecessary.
- G91 The Verifier concluded that based on the maturity of this replacement programme, the improved processes surrounding cost estimation for each ODID project, supported by the Asset Class Strategy, that this expenditure programme is consistent with GEIP.³²⁶
- G92 Some other key Verifier observations included that:³²⁷
- G92.1 there are no specific strategies (or asset health modelling) defined for the outdoor 33 kV switchyards asset class;
 - G92.2 asset investments decisions relate to the prioritisation of the outdoor-to-indoor conversions; and
 - G92.3 most of the remaining outdoor switchgear will be replaced in RCP3, hence no improvement to asset health modelling is required or planned in RCP3;
- G93 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:
- G93.1 there are no specific asset health models for this asset class, but these switchyards are vulnerable to outages and there are safety considerations. Transpower's ODID Asset Class strategy is clear about its goals to use safety considerations to justify the programme. Transpower stated that there have been four fatalities in these 33kV OD yards in 35 years and numerous harm incidents. Some of these switchyards are a known hazard in the industry;
 - G93.2 asset age and site assessment of asset condition appeared to be the original trigger for ODID conversion prioritisation and driver for the programme investigations which started back in the mid-2000s. Transpower Asset Class Strategy discusses this at length. We consider that given the stated safety issues (see page 5 of the Transpower OD 33kV Switchyards Asset Class Strategy - ACS002) that Transpower has been prudent is carrying out this work;

³²⁶ Above n 29, at 222-229.

³²⁷ Above n 29, at 222-229.

- G93.3 in this asset class the alternatives are to keep the outdoor switchyard and change the structures so there are more clearances and safety margins, refurbish the switchyards but keep the arrangement as it is at the moment, or move the switchyards indoors. The last option appears to be Transpower's preferred solution for all sites. It is difficult to judge how these options have been considered and how the alternatives were accounted for in Transpower's analysis without an example project justification being supplied;
- G93.4 Transpower has made it clear in its 33kV ODID Asset Strategy document that reliability is likely to improve as a result of the conversions. Figure 4 in the ACS document show that forced outage rates related to this equipment peaked in 2011 and is trending downwards since then as the conversions take effect. The key drivers for investment are asset condition, with safety and reliability considerations being used to justify moving the switchgear indoors;
- G93.5 the Verifier noted that ODID project cost estimation has been an issue in the past but that Transpower is using lessons learned from past forecast estimate errors;
- G93.6 Transpower under-estimated the allowance needed for these projects over the RCP2 period. The Verifier identified reasons why this was the case such as the customer feeder connection costs being higher than expected. Transpower has reflected on the cost inaccuracy issues and has performed a more bottom-up site-specific approach for the RCP3 cost estimates. This is a prudent approach as each substation site will likely require a bespoke solution that a building block costing approach may not adequately capture; and
- G93.7 while the Verifier has not made mention of this, indoor switchgear will have less maintenance opex associated with it. Following the indoor conversions, the buswork will be indoors and circuit breakers and associated equipment are all enclosed in a managed environment. Indoor switchgear is also more reliable and is not exposed to outages due to environmental factors such as storm damage or bird strikes into the switchyard. These effects have not been quantified though.

G94 While we are proposing to recommend that we approve this programme expenditure we were interested to test how Transpower is using hazard control and safety considerations as an economic justification for investment. We asked Transpower in an RFI to explain this by asking:

We are interested to see an example of how Transpower has factored in safety exposures in its consequence modelling and how Transpower includes this in any cost-benefit analysis that justifies investment.

G95 Transpower responded by stating that it models both the risk of proximity to live equipment, a major factor in previous fatalities and injuries with many of the older outdoor 33kV switchyards, and from catastrophic circuit breaker failure, which is a known risk for older equipment with known type-issues, to define hazard event probabilities.

G96 Transpower then calculates hazard-related economic consequence for each outdoor 33kV switchyard and ODID programme prioritisation, by multiplying the identified hazard risk event probabilities by the consequence, in this case an estimate of the cost per death to society.

G97 We consider that hazard control in network investment decision making is not being approached in a systematic way in the electricity industry and welcome Transpower attempts to frame the problem analytically. Doing so would enable risk across a network to be identified, quantified, prioritised and mitigated to the extent that this is reasonably practicable and economic to do so.

G98 At present network hazards are largely dealt with by following asset and network design standards. However, there are situations where bespoke risk calculations should be carried out such as when an asset has been identified as having a type issue that presents a risk to public or staff safety, or where an asset is proximal to a high-density public area such as overhead conductor near a school or central business district (**CBD**) for example. In our view, it should be consistent with GEIP for network companies to carry out specific risk calculations to ensure that they have adequate design strategies in place that mitigate hazard risk to a practicable level.

G99 In summary and based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our draft decision is to approve the proposed AC Substations – Outdoor Indoor conversions programme expenditure of \$42.1m in RCP3.

Attachment G.8: Secondary assets - SA Protection, Battery Systems and Revenue Meters

G100 This asset class includes network and asset protection schemes, station DC systems and revenue metering. Transpower described these assets and their function as:³²⁸

Protection schemes are used throughout the grid to rapidly detect and initiate isolation of electrical faults, protect primary equipment, and ensure the safety of employees, service providers and the public. Special Protection Schemes (SPS) are used to enable greater power flow in the existing primary equipment

Station DC systems are required to provide power to protection schemes, circuit breaker trip and close coils, control and metering.

Revenue meters supply electricity volume information used for wholesale market reconciliation and billing.

G101 There is considerable expenditure uplift in this asset category, \$141.6m in RCP3, when compared with RCP2 (\$63.2m).

G102 The Verifier identified that while many secondary asset types, such as protection assets, can be justifiably replaced due to obsolescence and spares unavailability, it was recommended that Transpower continue to support developments to extend reliable operation of some of the fleet. For example, revision of the duplicate line protection replacement interval had revised down the RCP3 forecast by \$35m.

G103 However, given the criticality of protection and DC systems to support this, a conservative replacement strategy was not an unreasonable one. The Verifier also identified that Transpower's cost-estimation processes have matured in this asset class which has improved expenditure forecast accuracy. Informed by these considerations the Verifier concluded that this expenditure programme is consistent with GEIP;³²⁹

G104 Some other key Verifier observations included that:³³⁰

G104.1 an issue generally internationally with an age-based replacement strategy is that protection relay failure rate data is limited. This makes determining an asset health model difficult;

³²⁸ Transpower "Portfolio Management Plan – Protection , Station DC Systems & Revenue Metering" (October 2018).

³²⁹ Above n 29, at 229-237.

³³⁰ Above n 29, at 228-238.

- G104.2 Transpower is planning in RCP3 to develop a risk-based framework for evaluation and cost-benefit analysis of protection scheme capital expenditure planning, including implementing and enhancing criticality-adjusted replacement strategies for protection schemes. With the relatively short life of current secondary system technology (20-25 years), the benefits of extending life by just 5 years is substantial and hence this should be a priority in RCP3;
- G104.3 while extending the replacement age for all protection relays may not be optimum, an extension of 5 years for these short life assets means that capital replacement costs are reduced by 25%. With respect to the proposed \$141.6m RCP3 expenditure, this would equate to a reduction of \$35.4m; and
- G104.4 analysis based on current life expectancies of modern protection relays suggests that the long run average cost in this program is likely to be \$120m for each subsequent reset period. It confirms Transpower is running into a “bow-wave of replacements” from RCP3 to RCP5 that should then reduce. Life-extension analysis will likely provide significant benefit.
- G105 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:
- G105.1 protection relays and the supporting equipment in high-voltage (**HV**) transmission systems (and distribution networks for that matter) are not optional. They protect equipment from damage arising from faults and also ensure safe operation of the network when faults occur in the proximity of human life. There are no serious alternatives to protection. It is only a matter of degree. What functionality of protection is installed and what level of redundancy are the discretionary aspects of modern protection systems;
- G105.2 the level of protection redundancy used by Transpower is a question though. Transpower policy seems to be to duplicate many line and busbar protection schemes and we have not seen any evidence of risk-based analysis underpinning these duplicate scheme investment decisions. We sought evidence in an RFI that Transpower is taking a risk-based approach in its duplicate protection scheme investment decision making;
- G105.3 Transpower's historical policies and strategies in this asset class have been age based informed by spares availability and technical obsolescence. The Verifier noted that Transpower is starting to take a risk-based approach to this asset class, particularly in the replacement of protection relays. The Verifier recommended that Transpower should continue to work with OEMs to obtain failure rate data to support developments to extend the life of existing relay fleet; and

G105.4 Transpower has decades of project cost information to inform its building block estimates. There are numerous manufacturers that supply protection relays, so OEM costs can be compared and tested. The Verifier view was that Transpower has appropriate cost forecasting in this programme.³³¹

Our analysis

G106 In our Issues paper we signalled to submitters that we intended to look more closely examine the expenditure in this asset category stating that:

(We are) specifically seeking evidence of business cases and justifications to support expenditure programs such as duplicate bus zone protection. While the Verifier identified that in many cases replacement was necessary due to obsolescence and spares unavailability, there was likely to be value in life extension for some assets. We consider that the Verifier did not fully explain why there was such a significant expenditure uplift in this category, so we will be testing this with Transpower.

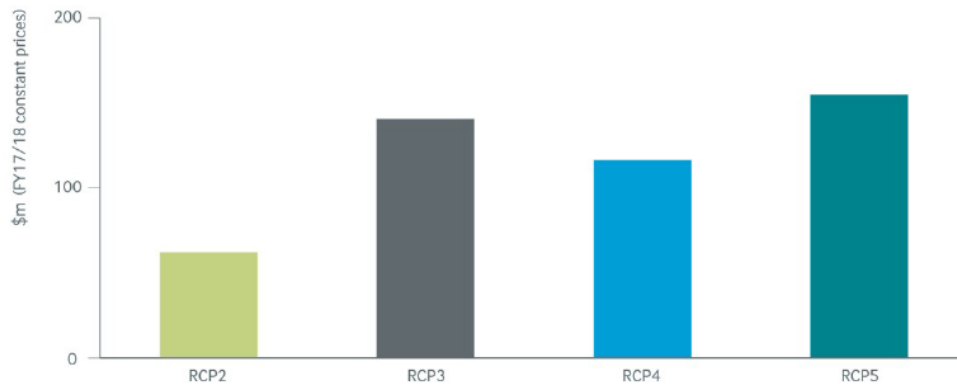
G107 We sought additional information from Transpower in an RFI about how it had justified its duplicate protection schemes and whether this was risk-based, and also what plans it had to extend the replacement age of relays as per the Verifier suggestions.

G108 We were guided by the Verifier analysis that indicated that Transpower was about to face a “bow-wave” of replacements in this asset category (see Figure G1). Transpower’s Asset Management Plan illustrates the Verifier conclusion and Transpower stated that the RCP3 expenditure uplift is largely due a “general wave of replacements coming due as they reach end-of-life. For example, the expenditure on lifecycle replacement of revenue meters in RCP3 is \$53.7m”.³³²

³³¹ OEM – Original Equipment Manufacturer

³³² Above n 316, at 394.

Figure G1 Transpower estimate of SA Protection, Station DC systems and Revenue Metering capex for RCP2 to RCP5³³³



G109 Transpower responded to our RFI questions on 8 March 2019 stating that:

G109.1 duplicate protection schemes for assets at 220kV and above are a requirement of the Electricity Industry Participation Code 2010;³³⁴

G109.2 duplicate protection schemes at the 110kV and 66kV sites are tested economically when the existing protection schemes are investigated for renewals;

G109.3 Transpower has also approved extending the life of all duplicated protection schemes for lines (110kV and 66kV), transformers and the majority of feeders;

G109.4 there are no plans to extend the life of non-duplicated protection schemes at this stage; and

G109.5 obsolescence is a key issue to consider in extending life beyond 25 years, and we are leading among other businesses with our decision to extend protection device life.

G110 We considered that Transpower hadn't adequately answered the Commissions questions. While the Code specifies that duplicate schemes are a requirement for the protection of 220kV assets, the Transpower supporting information indicates that there are duplicate schemes at 110kV, 66kV, and even at a feeder level. No example analysis was presented to demonstrate that the duplication is economic to install.

³³³ Above n 316, at 394.

³³⁴ Clause 4(4)(b) of Technical Code A – Assets of Schedule 8.3 of the Code.

- G111 Duplication of protection schemes will add considerable cost and complexity at the substation sites where they are installed. Transpower further stated in its RFI that:

Economic analysis involves reviewing the cost of implementing the duplicated protection versus the benefit gained of having the duplicated protection. The benefits are calculated by looking at a scenario where a fault occurs on the asset being protected and at the same asset where the protection does not operate. The probability of protection not operating is significantly lower when the protection is duplicated. The cost of load that would have been saved if duplicated protection is available is then calculated based on the VoLL (Value of Lost Load) x average load x average duration of outage.

- G112 Transpower's 8 March 2019 RFI response to us also indicates that it will only revise the life of duplicated protection schemes in line with the Verifier suggestions, stating that:

The revised life for duplicated protection schemes is used within our asset health models and our plan for RCP3. We will continue to monitor the reliability of these duplicated protection schemes that have been extended to 25 years to see if further life extension can be justified. There are no plans to extend the life of non-duplicated protection schemes at this stage.

- G113 There is no reason given by Transpower about why non-duplicated protection schemes do not qualify for asset health modelling.

- G114 We sought further information from Transpower in an additional RFI about duplicate protection schemes at voltages below 220kV. Specifically, we requested that economic analysis examples be provided at sites with network voltages below 220kV. We indicated that the analysis should demonstrate that duplicated protection scheme cost needs to be exceeded by the cost of the risk of the fault occurring coincident with protection maloperation.

- G115 Transpower provided information in two separate RFI's on 12 April 2019 (RFI0043) and 29 April 2019 (RFI059). RFI043 and RFI059 provides examples where duplicate protection schemes were considered at 110kV and 66kV and demonstrates that Transpower are making these duplicate protection decisions, at network voltages lower than 220kV, based on sound economic analysis. For duplicate protection schemes at a feeder level these decisions are made for other technical reasons or are customer-driven.

- G116 For this reset we have accepted the age-based replacement strategy that Transpower has used to forecast expenditure in this programme because it is not inconsistent with GEIP. However, we need to indicate that we expect Transpower to follow through with its plans to develop a risk-based CBA framework for the evaluation of protection scheme capital expenditure planning, and to make this one of its priorities during RCP3.

- G117 Further, Transpower’s 8 March 2019 RFI response indicates that this risk-based framework will be selectively applied with no reason given why this is apart from a reference to asset obsolescence.
- G118 In conclusion, and based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material and RFI responses, our draft decision is to approve the proposed Secondary Assets – SA Substation Management Systems programme expenditure of \$58.6m in RCP3.
- G119 We also will be requiring, in line with the Verifier’s recommendations, that Transpower develop a risk-based CBA framework for the evaluation of protection scheme capital expenditure planning in this Identified Programme. We will implement a process to test progress of the Verifier’s recommendations by:
- G119.1 incorporating reporting requirements in the IPP determination to provide transparency on progress for interested persons; and
 - G119.2 introducing a limited scope, mid-period, expert review after year two of RCP3 to provide expert insight into Transpower’s progress, with details of the review process to be specified in the IPP determination.

Attachment G.9: AC Substations - Secondary assets - SA Substation Management Systems (SMS)

- G120 This asset class includes assets that the remote control and monitoring of substation primary assets. Transpower described these assets and their function as:³³⁵

The term SMS refers to telemetry systems based on computers and Local Area Networks (LANs) that have been specifically designed to operate in electricity utility environments.

The scope of this strategy covers legacy Remote Terminal Units (RTUs), SMS, Input/Output (I/O) modules, Human Machine Interfaces (HMIs) and time synchronisation clocks—known as GPS clocks in our asset information system. We have SMS at 42 sites while the remaining 126 sites have legacy RTUs.

- G121 The Verifier observed that there are no asset specific health and criticality models for these assets. Presently asset replacement decisions rely on manufacturer information and real-world failure rate data, with criticality linked to the relevant substation criticality ranking.

³³⁵ Transpower “Substation Management Systems – Asset Class Strategy” (November 2017).

G122 The Verifier recommended that asset life-extension may be possible by developing asset-centric health and criticality models. However, it concluded that given the age-based replacement strategy was not considered unreasonable, and that cost-estimation processes are improving due to earlier detailed designs, that this expenditure programme was consistent with GEIP.³³⁶

G123 Some other key Verifier observations included that:³³⁷

G123.1 Transpower's main programme of work is focussed on phasing out legacy serial-based Remote Terminal Units and Input/output modules and replacing these with new Ethernet-capable Substation Management Platform systems;

G123.2 due to the systems consisting of modular electronic components there is a view that there is no meaningful way of determining the health of the units than by age. Hence, there is a reliance on manufacturer recommendations, measured Mean Time Between Failures (**MTBF**) statistics;

G123.3 improvement in data accuracy is a priority for improvement and with the relatively short life of SMS Assets, the benefits of extending asset life is substantial and hence this should be a priority in RCP3 to consider developing further the asset health and criticality models for SMS assets; and

G123.4 while the programme to install the modern SMS platforms could be deferred, it would not allow Transpower to develop the digital systems and improved knowledge of the health of substation assets, network performance, which should lead to further optimisation of capex and opex expenditure of substation assets into the future.

G124 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G124.1 Transpower's has historically used an age-based replacement strategy for these assets. While the Verifier noted that this is not an invalid approach, it also commented that there is value in developing this modelling;

G124.2 project cost efficiencies appear dependent on bundling with other projects but there is no discussion on whether the capex opex trade-off has been made or tested for efficiency;

³³⁶ Above n 29, at 238-247.

³³⁷ Above n 29, at 238-247.

- G124.3 Transpower uses the site criticality rating as a proxy for the criticality of the site SMS equipment. This is probably not an unreasonable assumption; however, it is based on a site wide event. Secondary support assets like SMS also perform critical functions and if they fail could have a significant impact on power system operation and reliability;
- G124.4 reliance on manufacturer data is a good starting point for investigations into replacement but shouldn't be used as the investment decision maker. It is unclear if Transpower plans to follow the Verifier's findings to carry out SMS component reliability modelling; and
- G124.5 Transpower has committed to more detailed design upfront to inform business cases and improve expenditure forecasts. Transpower has found that since RCP2 forecasts were developed that there were considerable cost variations in actual project costs so better pre-project design processes are needed.³³⁸
- G125 The Verifier identified that there may be significant value in improving asset condition data accuracy for some assets in this asset class and that it should be a priority for Transpower to carry out this work during RCP3.
- G126 We consider that this should be completed and will be part of a package of recommendations we make in this decision to encourage Transpower to continue with its asset health and criticality modelling beyond just doing so for the primary assets.
- G127 The Verifier concluded in its review that a replacement strategy based on manufacturer recommendations wasn't incompatible with a prudent renewals strategy and was not inconsistent with GEIP.
- G128 In conclusion, and based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our draft decision is to approve the proposed Secondary Assets – SA Substation Management Systems programme expenditure of \$58.6m in RCP3.

³³⁸ Transpower "Portfolio Management Plan – Secondary Assets Substation Management Systems" (October 2018), at 35.

G129 We also will be requiring, in line with the Verifier's recommendations, that Transpower implements asset life-extension modelling by developing selected asset-centric health and criticality models in this Identified Programme. We will implement a process to test progress of the Verifier's recommendations by:

G129.1 incorporating reporting requirements in the IPP determination to provide transparency on progress for interested persons; and

G129.2 introducing a limited scope, mid-period, expert review after year two of RCP3 to provide expert insight into Transpower's progress, with details of the review process to be specified in the IPP determination.

Attachment G.10: Enhancement and Development

G130 This base capex category is concerned with capex investment in the network which leads to an enhancement in the grid but where the project cost estimate is forecast to be below the Major Capex Project threshold of \$20m.

G131 The Verifier described E&D capex projects as investments that:³³⁹

G131.1 increase or decrease the capability of the grid;

G131.2 ensure grid capability matches generation, demand, security, reliability and market requirements;

G131.3 meet system need by providing system capacity, reliability and security required to meet future customer and grid requirements; and

G131.4 are externally driven, such as customer developments and new connections, and any changing economic conditions and statutory requirements.

G132 Transpower is seeking \$76.4m in the E&D portfolio after identifying a range of possible E&D projects in its ongoing transmission planning work. It has taken a scenario approach assigning likelihood estimates and high-level costs for each of the projects.

G133 Transpower has categorised these projects as being Extremely Likely, Highly Likely and Likely to occur over the RCP3 period. There is also an estimated approval amount for projects where the system need has yet to be identified.

³³⁹ Above n 29, at 248-259.

- G134 Because the potential expenditure is in respect of both identified projects which may or may not proceed in RCP3 and is in respect of not yet identified projects that may proceed in RCP3, there is significant uncertainty around the forecast E&D amount that could be incurred during RCP3.
- G135 To deal with this uncertainty, Transpower has modelled high and low expenditure scenarios for capex that could be incurred and commissioned in RCP3 (\$93m and \$59m respectively), then chosen what it considers to be a mid-point 'baseline' as the proposed E&D amount (\$76.4m).
- G136 Transpower has taken this approach in response to approvals issues in the E&D portfolio during the RCP2 reset process. This resulted in the Commission introducing as part of the 2017/18 Capex IM review, the base capex allowance adjustment mechanism (**BCAM**). The main policy reason for introducing this mechanism is to reduce the risk of overestimating uncertain E&D base capex.³⁴⁰

Analysis

The Capex IM base capex allowance adjustment mechanism

- G137 In the 2017/18 Capex IM Review we introduced an "option for an expenditure adjustment mechanism for base capex E&D projects".³⁴¹
- G138 This adjustment mechanism was introduced to allow Transpower to recover costs associated with E&D projects that could not be easily forecast at the time of the RCP proposal submission and approvals process, but where a reasonable amount of base capex could be estimated based on an expenditure trigger. The expenditure could objectively provide automatic approval to include that estimated amount in the base capex allowance for RCP3 once trigger conditions are satisfied.
- G139 The BCAM was introduced to reduce the risk that Transpower would over-estimate uncertain E&D projects in its base capex proposals because "E&D projects are often dependent on demand growth and other drivers which can be difficult to forecast with any certainty".³⁴²

³⁴⁰ Above n 65, at [68.4].

³⁴¹ Above n 65, at [X23.1].

³⁴² Above n 65, at [179].

- G140 The adjustment is intended to be an automatic mechanism that updates the standard incentive rate base capex allowance. The intent, as outlined in our Capex IM review reasons paper, was that there would be a baseline level of E&D expenditure approved in the IPP with any additional amounts included in the base capex allowance when the pre-specified trigger occurs.³⁴³
- G141 We listed a number of criteria that may trigger a base capex allowance adjustment such as demand changes, new generation or any other relevant drivers. While Transpower at the time was strongly against the adjustment mechanism, suggesting that it would reduce the fungibility of the base capex allowance, we reasoned that the mechanism enables an increase in the base capex allowance based on one or more defined trigger points in order that uncertainties can be reduced. The additional base capex would be fungible with other base capex once the trigger conditions are satisfied. Fungibility of the allowance is merely deferred until the uncertainty is sufficiently removed.

Verifier assessment of RCP3 E&D expenditure and the BCAM

- G142 The Verifier was generally positive about the expenditure envelope approach taken by Transpower and considered scenario modelling was an improvement on the RCP2 forecasting method because it provided a good basis for considering uncertainties.
- G143 Some other key Verifier observations included that the Verifier:³⁴⁴
- G143.1 was satisfied that the list of projects used in developing the high and low scenarios are reasonable and relevant for the RCP3 forecast;
 - G143.2 accepted as reasonable a nominal 10% adjustment for potential savings through emerging technologies and deferred investment;
 - G143.3 noted the base capex allowance adjustment mechanism proposed by the Commerce Commission in the amended Capex IM of 25 May 2018; and
 - G143.4 did not consider that any of the E&D projects identified by Transpower would satisfy the criteria under the Capex IM base capex allowance adjustment mechanism.

³⁴³ The Transpower capex input methodology review - Decisions and reasons paper noted that “any increase in the level of relevant drivers of base capex E&D that meets a pre-specified level during the RCP will result in an addition to the base capex allowance. The amount of additional revenue will also be specified prior to the commencement of an RCP” (above n 65, at [182]).

³⁴⁴ Above n 29, at 248-259.

Our initial view of Transpower's RCP3 E&D expenditure analysis

- G144 Transpower decided to carry out project likelihood scenario modelling for this portfolio seeking an expenditure envelope, rather than work to use the base capex allowance adjustment mechanism for projects later in the period with cost and timing uncertainties, and for projects that may not yet be proposed.
- G145 While the Verifier did not conclude that Transpower's expenditure envelope approach was an unreasonable one, and stated that aspects of it were sound, we consider that there are two risks involved in approving an expenditure envelope in this category:
- G145.1 there is a risk to consumers that the E&D expenditure proposal amount is too high, and because base capex is essentially a fungible pool, this may lead to inefficiencies across the base capex programme; and
- G145.2 there is a risk to Transpower that the E&D expenditure proposal amount is too low, and because base capex is essentially a fungible pool, this may lead to base capex from other projects and programmes being used instead to fund E&D. This will impact on other project and programme deliverability and increase asset failure risk overall.
- G146 While the E&D funding amount Transpower is seeking approval for is low materiality when compared to other expenditure categories in this proposal (\$76.4m versus \$1,202m of base capex allowance proposed), this may not be the case for future proposals.
- G147 Transpower stated in its proposal material that as the need date approaches for each project in the E&D portfolio, it will carry out in-depth investigations, such as costings, consideration of alternatives etc. In its Transmission Planning Report Chapter 4, which discusses the E&D portfolio Transpower stated that:³⁴⁵

As the Need date of the issue advances and/or uncertainty surrounding the issue begins to resolve, we revisit the options to resolve the System Need through the OAA. We carry out a multidisciplinary investigation to develop in-depth understanding of relevant options to resolve the Need, this includes consideration of transmission alternatives where appropriate. The investigation presents a long-list of potential investment options, reduces this to a short list of options based on predefined criteria, and assesses economic justification before choosing a 'preferred' solution. The preferred solution is progressed to detailed design, where cost accuracy is developed further. After detailed design is complete final approval for investment is sought and the project handed over to delivery groups.

The E&D System Needs presented to size the E&D portfolio baseline represent a range of System Needs at various stages of the E&D planning process.

³⁴⁵ Transpower "Transmission Planning Report" (October 2018), at 24-25.

G148 There is still considerable uncertainty for many of the projects in the E&D portfolio around cost, timing, and the actual preferred solution; short listing to test the most economical solution has not yet been carried out. In some cases, Transpower is almost certain of the project need and preferred solution, but admits that:³⁴⁶

for other projects where there is an uncertainty of the driver, need date, scope or credible solution, we generally have only high-level information available.

Issues paper submissions about RCP3 E&D expenditure

G149 We tested this idea in the Issues paper consultation. Transpower was the only party which submitted on this issue, stating that:

G149.1 for near-term projects (2-3 years out), it has sufficient certainty on costs and the triggers have either already been met or it is confident they will be met. This removes the need for the base capex allowance adjustment mechanism, or plays into the “base plus” approach;

G149.2 its proposed approach to E&D forecasting was intended to address the issue with forecasting under uncertainty and appropriately balance the risk between customers and Transpower. It is open to other solutions that may achieve the same outcome; and

G149.3 prior to a different approach being decided, it would like to ensure that the base capex allowance adjustment mechanism achieves similar (or better) outcomes for its customers than its proposed scenario-based E&D forecasting approach.

Our view of Transpower’s RCP3 E&D expenditure analysis

G150 Our draft decision is that Transpower’s “low scenario” envelope expenditure amount should be approved in the base capex allowance being \$59m, compared with Transpower’s proposal amount of \$76.4m.

G151 We will also explore improving the workability of the BCAM through an amendment to the Capex IM and will then consider whether any additional E&D expenditure should be applied under the revised mechanism.

G152 We recognised that there is considerable uncertainty in this category of expenditure. Transpower’s Transmission Planning Report (**TPR**) contains numerous E&D project possibilities to solve identified network capacity problems in a 10-year forward-looking horizon, with a small number of these projects actually being progressed to the detailed design stage.

³⁴⁶ Above n 345, at 24-25.

- G153 The decision to progress these potential projects is in many cases outside of Transpower's control. They are usually externally driven by factors such as new generation, major new demand increases, or EDB decisions about their supply arrangements, for example.
- G154 We originally envisaged that Transpower would include a BCAM as part of its RCP3 proposal, to seek approval for E&D projects later in the period that were less certain using a pre-defined trigger. However, Transpower opted to not include the BCAM as part of its proposal stating that:
- We did not find it possible to identify E&D projects with sufficient certainty to a level of detail that would allow the base capex allowance adjustment mechanism to be used.³⁴⁷
- G155 When the BCAM was introduced as part of the 2017/18 Capex IM review, it was envisaged that:
- to the extent that information on the relevant levels is not available for certain E&D projects or programmes at the time of reset of the individual price-quality path, the option of the adjustment for those projects or programmes will not be included in the IPP determination.³⁴⁸
- G156 However, after further analysis, we consider that the BCAM, as it currently stands, likely needs amending to appropriately balance the risks to consumers and Transpower that the ultimately approved E&D amount, after application of the BCAM, is too high or too low.
- G157 On the one hand, the BCAM should reduce risks to Transpower in respect of those projects for which the driver, need, scope or solution is not able to be well defined at the time of an RCP proposal submission.
- G158 On the other hand, because the BCAM is intended to be an objectively triggered mechanism based on pre-set and measurable criteria, the criteria for triggering additional allowances should provide appropriate safeguards to:
- G158.1 ensure that any increase in the base capex allowance benefits consumers;
and
- G158.2 is backed up by appropriate compliance reporting requirements to demonstrate that those criteria have been met.
- G159 For instance, the BCAM adjustment should not relate to any of the E&D projects already provided for in the originally approved base capex allowance.

³⁴⁷ Above n 71, at section 8.1.1.

³⁴⁸ Commerce Commission "Transpower capex input methodology review: Companion paper to final amendment determination" (25 May 2018), at 11.

G160 We welcome views from stakeholders on how the BCAM should be amended and what safeguards we should include. We intend to publish a draft amendment to the Capex IM with our proposed amendments to the BCAM after we have received submissions on this paper.

Attachment G.11: ICT capex - total programme

NB: this section is an ICT base capex total programme view and links to Attachments G.12, G.13, and G.14 which specifically discuss the verified ICT Identified and non-Identified Programmes.

Verifier assessment of ICT programme capex

G161 Transpower has categorised the ICT programme expenditure into four broad project types:

G161.1 Lifecycle projects – where the asset capability is still required for ongoing business operation. The asset has to be replaced because hardware or software vendor support is no longer available (65% of ICT capex programme).

G161.2 Risk mitigation projects – to reduce threat or minimise the impact of a risk (9% of ICT capex programme).

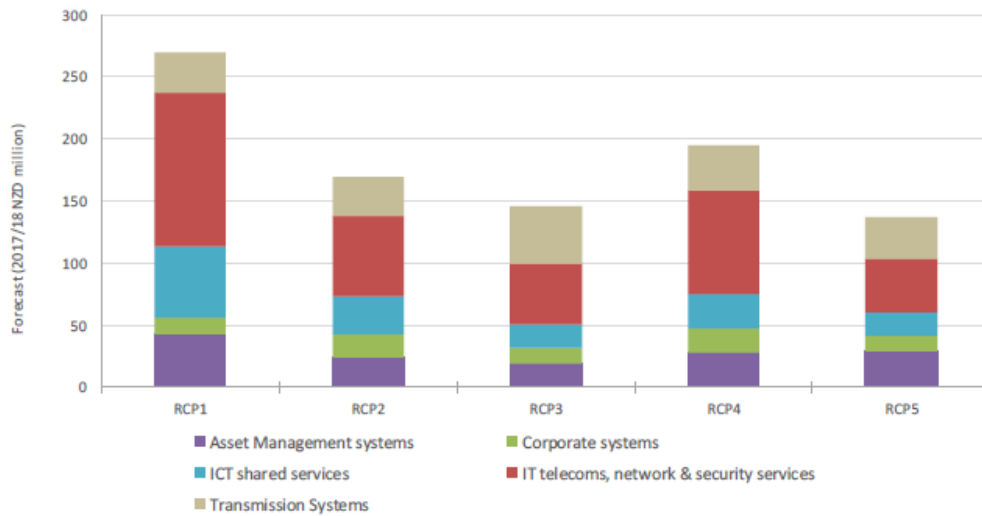
G161.3 Compliance projects – considered to be ‘must-do’ to meet regulatory obligations either adopted by Transpower or prescribed (1% of ICT capex programme).

G161.4 Benefits-driven projects – that provide operational savings and capex deferral (25% of ICT capex programme).

G162 The Verifier summarised the total ICT capex programme as comprising 170 lifecycle projects (\$94.8m), 29 risk mitigation projects (\$13m), 5 compliance projects (\$1.6m), and 62 benefits-driven projects (\$36.7m).³⁴⁹

G163 The total proposed programme is \$146.1m in RCP3 compared with \$169.5m in RCP2. Figure G2 illustrates the proposed RCP3 ICT capex when compared with previous periods and Transpower’s prediction for RCP4 and RCP5.

³⁴⁹ Above n 29, at Table 73.

Figure G2 Total ICT capex from RCP1 to RCP5³⁵⁰

G164 The Verifier reviewed 3 of the categories of expenditure in the ICT expenditure programme namely ICT - Transmission Systems (\$47.0m), ICT - IT Telecoms, Network and Security Services (\$48.8m) and the ICT - Asset Management Systems (\$18.6m). The Verifier did not review ICT - Corporate Systems (\$12.6m) and ICT - Shared Services (\$19.2m) categories of expenditure.³⁵¹

G165 The Verifier noted that, following its draft report findings to Transpower about the benefits-driven ICT projects, Transpower provided additional justification and areas of the business that would benefit from these projects. The Verifier tested Transpower about how it quantified these benefits and was satisfied that it had established suitable procedures to identify them.

G166 A summary of the Verifier review about this is provided in its report but we note that there is no critical comment about whether these projects are prudent in themselves, stating only that.³⁵²

We accept the inherent difficulties in accurately detailing benefits for ICT solutions in the latter part of a regulatory period, given uncertainty about the final preferred solution.

³⁵⁰ Above n 29, at 261.

³⁵¹ Above n 27, at 120.

³⁵² Above n 29, at 269.

G167 The Verifier further concluded that:³⁵³

Transpower has provided a high-level analysis of the anticipated benefits for the \$36.7 million in benefits-driven projects proposed in RCP3, forecasting savings of \$71.5 million in deferred capex, reductions of \$7 million in Base Capex and \$15.4 million in opex. We accept that this analysis provides the Commerce Commission with a view of the relative merit and high-level justification for the proposed ICT Base Capex, and that the approach Transpower has used is in line with GEIP.

We have not tested any supporting information in relation to the lifecycle replacement of assets or risk mitigation projects, but we are satisfied that the overall approach that Transpower applies in challenging any asset upgrade or replacement is in line with GEIP and should ensure that replacement through lifecycle issues or identified risks, such as cyber-security, are fully scrutinised before being added to the RCP3 portfolio.

G168 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G168.1 the Verifier had limited ICT capex expertise and the Commission has engaged an expert in this area to review the ICT capex;

G168.2 the bulk of the ICT program is lifecycle expenditure (about 2/3). The remainder is mostly benefits driven and after our review the benefits appear to be explained and justified only at a high level. In some cases, the project or programme benefits don't appear to exceed the costs; and

G168.3 there are two possible issues with the Verifier report in this category. The first is that the Verifier did not verify the lifecycle projects, which is about 2/3 of the ICT capex program (about \$100m). The second issue is that it did not explicitly conclude that the benefits-driven expenditure was consistent with GEIP. The Verifier only considered the "approach Transpower has used" to identify the benefits is in line with GEIP. This is not the same.

Our initial analysis and RFI request

G169 The Verifier does usefully summarise the various capex and opex benefits and where they accrue based on Transpower supporting information. However, it is difficult to ascertain if these claimed benefits will occur. We tested the Verifier about this at the workshop, but we weren't convinced that Transpower had sufficiently justified how it arrived at the identified benefits.

³⁵³ Above n 29, at 269.

G170 To further explore the benefits-driven ICT projects we sought the documents that the Verifier had relied on to come to its conclusions, and sought additional supporting information in an RFI, specifically asking Transpower to:

G170.1 provide more detailed description and justification for the capex and opex benefits, and cost deferral amounts stated in its supporting information provided to date;

G170.2 provide any analysis that extends beyond RCP3 that demonstrates how the benefits-driven programmes are economic, particularly given that, in some supporting information provided to date, the costs appear to be greater than the benefits; and

G170.3 provide information that quantifies what effect it will have on each Identified Programme capex and opex expenditure amount in the proposal if the benefits-driven capex projects do not proceed.

Transpower additional information and RFI response

G171 Transpower provided a response to the RFI with supporting information on 8 March 2019, in addition to the information the Verifier relied on to reach its opinion.³⁵⁴

G172 Regarding the benefits-driven projects in this base capex category, Transpower indicated that the ratio of lifecycle projects versus benefits-driven projects has been based on external advice by its ICT advisor Gartner. The Gartner recommendation was that:³⁵⁵

....for an organisation like Transpower, a prudent ratio for ICT investment mix would be 33% for benefits-driven (“grow and transform” in Gartner parlance) and 65% other (“run”).

We believe that our current RCP3 ICT proposal with 25% benefits-driven projects is both prudent and conservative relative to the industry.

G173 We tested Transpower on the benefits for some projects that did not appear to exceed the costs over RCP3. Transpower provided further information suggesting that many of these projects would provide benefits into RCP4 in both the capex and opex expenditure programmes.

³⁵⁴ Transpower’s response to RFI034 – ICT benefits driven projects.

³⁵⁵ Above n 354, at 2.

- G174 We also asked Transpower to provide more explanation surrounding its significant capex deferral estimates as a result of expenditure in the Asset Management Systems (AMS) (an estimated \$11.5m of Grid Capex deferral) and IT Telecoms, Network and Security Services (an estimated \$60m of ICT capex deferral) base capex programmes.
- G175 It appears that Transpower's capex deferrals are not actual benefits, rather these are project capex amounts that are able to be deferred into RCP4 due to investment in RCP3.
- G176 In the IT Telecoms, Network and Security Services expenditure category Transpower is spending \$7.8m during RCP3 to defer \$60m of ICT expenditure into RCP4. The deferral benefit is the difference in NPV terms between the \$60m spent in RCP3 vs the \$60m in RCP3 versus the \$7.8m cost. Preliminary analysis suggests that the benefit of deferring the \$60m expenditure for 5 years is about \$15m which exceeds the cost of \$7.8m.³⁵⁶ This seems to be an economic investment if the benefits do transpire.
- G177 Information provided by Transpower in support of the AMS expenditure category, indicates that without this expenditure, grid capex would increase above the presently forecast levels, confirming the fact that benefits appear not to have been double counted. Transpower stated that:³⁵⁷

Cancellation of benefits-driven projects in the Grid Capex Deferral category (\$3.4m) will mean that our capex will likely increase by an estimated \$11.5m over RCP3 and into RCP4. These projects relate to the enhancement of our asset health management, grid capability offer and variable line rating implementations.

- G178 In this case it seems reasonable to carry out a direct comparison of the \$3.4m AMS expenditure to avoid spending \$11.5m in capex in network assets. Transpower stated that:³⁵⁸

These are projects with benefits that enable the deferral of grid capex expenditure into RCP4. The benefits are already included in the RCP3 proposal. Benefits are realised through cost avoidance of asset upgrades and replacements through more effective and efficient use of grid assets. Being able to identify extra capacity due to variations enables us to run assets harder, reducing some of the constraints and releasing extra capacity to the grid.

³⁵⁶ Assuming the project started in year 3 of the regulatory period with costs were spread evenly over the last 3 years of the period.

³⁵⁷ Above n 354, at 7.

³⁵⁸ Transpower's response to RFI028 - ICT Capex Forecast and Benefits.

G179 However, Transpower provided no more detail about which asset upgrade or asset replacement projects would be deferred only to summarise that:

G179.1 cancellation of the ICT capex deferral amount of \$7.8m will mean the RCP3 capex amount will increase by \$60m; and

G179.2 cancellation of benefits-driven projects in the grid capex deferral amount of \$3.4m will increase grid capex by \$11.5m over RCP3 and into RCP4.

External advice from EMCa

G180 To contextualise the ICT capex expenditure; ICT capex is not like other grid asset capex because many of the assets involved depreciate at much faster rates and expected asset lives are generally less than 10 years. This means ICT capex re-investments are necessary more frequently.

G181 If we consider ICT expenditure as ‘totex’ (ICT capex and ICT opex combined) then it totals \$342m (\$2017/2018) spread across RCP3. This compares to the total RCP3 expenditure proposed by Transpower (opex and base capex) of approximately \$2.5b. Expressed as totex, the ICT expenditure comprises 13% of Transpower’s proposal in RCP3.

G182 We engaged specialist ICT consultants, EMCa, to undertake a review of the ICT programme (both opex and capex) then propose any areas where a detailed analysis may be necessary. We wanted to test whether:³⁵⁹

G182.1 the proposed ICT expenditure is comparable to Australian transmission providers (TNSPs), both at an aggregate level and at a functional disaggregated level;

G182.2 the business cases for lifecycle and benefits-driven ICT expenditure, in particular, are sufficiently robust;

G182.3 the staff costs in connection with the proposed ICT capex and ICT opex, which are separately proposed by Transpower under Business Support opex, are also comparable with the level of expenditure on ICT staff costs of the TNSPs; and

G182.4 the expenditure proposed by Transpower adequately provides for the cybersecurity activities or assets in RCP3 that EMCa considers would meet GEIP.

³⁵⁹ EMCa – Energy Market Consulting associates is a consulting group specialising in the policy, strategy, implementation and operation of energy markets and related network management, access and regulatory arrangements – www.emca.com.au.

- G183 In the ICT capex category EMCa specifically reviewed the lifecycle, benefits-driven, and cybersecurity ICT capex. EMCa also reviewed Transpower's proposal information and supporting documents to assess Transpower's approach to capex investment, its investment governance framework and forecasting methodologies.
- G184 In its review EMCa sought additional information from Transpower regarding individual projects in each of the three capex areas (lifecycle, benefits-driven, and cybersecurity), to test how Transpower applied its governance frameworks and methodologies.
- G185 EMCa made a number of key observations in its review and provided recommendations for improvements that may be made by Transpower in the ICT capex category, in preparation for the RCP4 proposal. EMCa concluded that it couldn't be satisfied that the proposed ICT capex amount of \$146.1m was fully prudent and efficient, and recommended that the Commission adjust its approval amount by \$32.6m.
- G186 EMCa reviewed the governance, ICT programme management and the application of these frameworks in practice and made some key observations that we think Transpower should consider for improvement in preparation for RCP4. These include that:³⁶⁰
- G186.1 there is limited evidence of risk-based investment development and management in this portfolio;
 - G186.2 further work is needed to develop internal challenge processes for the benefits-driven projects;
 - G186.3 there appears to be limited links to historical investment plans, actual expenditure (including expenditure variances), and performance outcomes in key documents in this expenditure programme;
 - G186.4 documentation that demonstrate expenditure justifications appear preliminary and are generally insufficient to meet the prudent and efficient test;
 - G186.5 options analysis and project cost estimate challenge processes appear limited – this is probably a reflection of the fact that many of the ICT projects appear to be at the project concept stage rather than at the project approvals stage; and

³⁶⁰ We are intending to publish EMCa's report in the near future.

G186.6 the use of the Internal Rate of Return (**IRR**) method (an IRR of 8% is used by Transpower) to justify projects is questionable as is the use of an IRR figure of 8%. EMCa consider that Transpower should be using NPV analysis for ICT capex projects, where a range of options, more accurate cost estimates and sensitivity analyses are considered to determine the least-cost solution for lifecycle projects, or the greatest benefit for benefits-driven projects.

G187 EMCa also reviewed the lifecycle, benefits-driven and cybersecurity capex programmes making further observations and recommendations, namely that:

G187.1 it was difficult to conclude that all the lifecycle-driven projects were prudent and efficient - while the lifecycle planning strategy appeared aligned with GEIP, EMCa identified that Transpower hadn't developed business cases for expenditure (even for projects needed in FY 2020/2021). in conjunction with concept stage cost estimates, EMCa concluded that only 85% of proposed expenditure was likely to be prudent and efficient;

G187.2 in the benefits-driven category, EMCa tested a range of projects and concluded that the information Transpower provided about claimed benefits was inconsistent, that the sources of the benefits were unclear, and that these projects appeared to be uneconomic. EMCa concluded that it could only be satisfied that only 50% of this expenditure was prudent and efficient based on the material it had reviewed. However, EMCa concluded that for some of the benefits-driven projects, improved information including NPV analysis may demonstrate these to be economically justifiable. Other points include that:

G187.2.1 Transpower's own information demonstrates that the certainty rating for the benefits-driven projects is generally low; and

G187.2.2 notwithstanding the use of an IRR method to justify projects, if it is used it should probably be set at 15% to account for project cost and benefit uncertainty;

G187.3 the EMCa review of Transpower's cybersecurity programme didn't consider the expenditure was unreasonable but did recommend that Transpower consider aligning itself with international standards in this area stating that:

In March 2018 US-CERT release an advisory describing Russian Cyber-attacks on energy and other infrastructure sectors. This has caused the Boards of most critical infrastructure organisations, globally, to assess their Cyber security posture. These organisations have found that they generally complied with their respective Government regulatory and compliance directives however; the majority of these government directives were created 5 to 10 years ago and fell well short of the risks created by the current Cyber Attacks that have occurred.

G188 In summary, after the Verifier report, our review of the ICT capex programme, and the EMCa expert review, our draft decision is to:

G188.1 agree with EMCa and approve 85% of the proposed ICT capex programme lifecycle projects on the basis that Transpower cost estimates are only at the concept design stage and business cases are insufficient. However, we will consider further information from Transpower about these projects before our final decision.

G188.2 agree with EMCa and approve 50% of the proposed ICT capex programme benefits-driven projects on the basis that the information on benefits was inconsistent, that the sources of the benefits were unclear, and that these projects appeared to be uneconomic. However, we will consider further information from Transpower about these projects before our final decision.

G189 This results in us adjusting down the proposed ICT programme capex of \$146.1m by \$32.6m and approving \$113.6m at the draft decision stage.

Attachment G.12: ICT capex - IT Telecoms, Network and Security Services

NB: this section links to Attachment G.11 for an ICT base capex total programme view.

G190 This asset class includes a range of diverse communications and IT equipment such as fibre and radio communications equipment, IT network infrastructure, asset monitoring and control services and IT security.

G191 The Verifier accepted that Transpower's approach to forecasting based on lifecycle management and benefits-driven investment was a sound approach for IT telecoms related projects.

G192 Transpower had also carried out condition assessments of substation infrastructure and network assets to support the program forecast. The Verifier concluded that this expenditure programme was consistent with GEIP.³⁶¹

G193 The Verifier also observed that:

G193.1 Transpower will focus on delivering new fibre solutions, provided a benefit can be identified within 8 to 10 years;

G193.2 further drivers for RCP3 are delivering cybersecurity solutions to manage the evolving threat landscape; and

³⁶¹ Above n 29, at 269-274.

G193.3 the small investment in reconfiguring the TransGO network is considered prudent and efficient in deferring more expensive upgrade work to RCP4.³⁶²

G194 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G194.1 ICT programs are now necessary for ongoing transmission business operation so taking a pro-active replacement or upgrade policy for lifecycle projects is likely to be good practice although there is no analysis to demonstrate that this is the case;

G194.2 it is probably very difficult to calculate the impact of lost functionality in this expenditure programme. The functions that these investments perform are now probably considered to be so essential that justifying their existing is probably considered to be a superfluous exercise. However, given the short life expectancy of some of these assets there may be a point where investing in primary assets or employing staff is more cost effective than IT solutions. It is difficult to know where this trade-off exists though; and

G194.3 in general, it is difficult to ascertain whether a pro-active asset replacement or upgrade strategy is appropriate in the ICT asset class on a project-by-project basis. Certainly, cybersecurity threats have the potential to disrupt network assets and lead to outages which can then be economically quantified, but the impact on communications and IT systems not being reliable is far more difficult to ascertain. Transpower has not calculated this impact especially for its lifecycle replacement program.

G195 We requested additional information from Transpower and sought answers in an RFI about the benefits-driven projects. Additionally, further expert external advice was sought about the ICT programme as a whole which has resulted in an expenditure allowance adjustment at an ICT programme level.

G196 Based on the Verifier report, our review of the Verifier report, Transpower's supporting material and the EMCa review:

G196.1 we agree that that the ICT capex - IT Telecoms, Network and Security Services proposed expenditure of \$48.8m appears to be prudent and consistent with GEIP; however

³⁶² Transpower stated that "The TransGO network is a high capacity, fibre optic national communications network that allows telecommunication between all our sites and locations that support grid operations, critical switching and the grid protection functions." Above n 27, at 121.

G196.2 following the EMCa review of the ICT program expenditure in total, particularly the benefits-driven ICT base capex projects, our draft decision is to adjust the ICT programme expenditure approval amount to \$113.6m.

Attachment G.13: ICT capex - Transmission Systems

NB: this section links to Attachment G.11 for an ICT base capex total programme view

G197 This ICT expenditure relates to tools to maximise grid utilisation, maintain and improve network and primary asset control, and to monitor of network and asset status.

G198 The Verifier identified that much of this program is to fund continuation of upgrades and enhancements that were part of RCP2. The largest activity is the replacement of the SCADA/EMS assets.³⁶³ Asset replacement due to technical obsolescence and lack of vendor support was identified a key driver in this expenditure category.

G199 The Verifier was satisfied that there was sufficient rigour around the identification of investment need, the resulting benefits, and the processes surrounding selection of preferred solutions to consider that this expenditure programme was consistent with GEIP.³⁶⁴

G200 The Verifier also observed that:

G200.1 the implications of Transpower's strategies identified in its Transmission Tomorrow document are that it intends to increase its use of digital devices to provide smarter power system control and improved analytics, performance measurement for management and control of assets;

G200.2 there is a drive to improve SCADA/EMS capability to include spatial, weather and lightning information for better market and system operation;

G200.3 these investments could improve asset condition assessment, outage responses and better manage grid incidents and provide a range of operational improvements such as outage planning and increase automation possibilities;

G200.4 much of the capex programme in RCP3 is a continuation of upgrades and enhancements started in RCP2;

³⁶³ SCADA – Supervisory Control and Data Acquisition. EMS – Energy Management System.

³⁶⁴ Above n 29, at 274-282.

- G200.5 the largest activity in RCP3 is the replacement of the existing SCADA/EMS assets with many of the core components with asset lives 5 years or less (this means the expenditure in this asset class appears financially as pseudo-opex);
- G200.6 the system improvements identified by Transpower are typical of the enhancements that an electricity utility will periodically make to its SCADA, operational, planning and modelling capabilities;
- G200.7 Transpower has provided sufficient information for us to be satisfied that there is a tight rigour to the identification of a need, justification for investigation into a solution, and verification of the economic and operational benefits of the preferred option;
- G200.8 technical obsolescence is typically the major driver in renewing software and hardware associated with transmission systems, particularly where vendors will no longer provide support; and
- G200.9 it is satisfied that the proposed staged programme of software and process updates for outage management, field communications and power system modelling is appropriate and prudent.
- G201 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:
- G201.1 these assets are essential to the reliable operation of the modern network which uses a lot of remote automatic monitoring and control;
- G201.2 Transpower stated it is moving to a more "lifecycle, benefits-driven leading" strategy. We are exploring these benefits-driven projects in more detail given the short life of the core components of many of these assets and that they will have a similar consumer impact as opex; and
- G201.3 SCADA and EMS platforms perform important network support roles in the control of the network by ensuring that the network operators have sufficient information to manage power flows during normal operation, under faulted conditions and for outage management.
- G202 We requested additional information from Transpower and sought answers in an RFI about the benefits-driven ICT projects. Additionally, further expert external advice was sought about the ICT programme as a whole which has resulted in an expenditure allowance adjustment at an ICT programme level.

G203 Based on the Verifier report, our review of the Verifier report, Transpower's supporting material and the EMCa review:

G203.1 we agree that that the ICT capex – Transmission Systems proposed expenditure of \$47m appears to be prudent and consistent with GEIP; however

G203.2 following the EMCa review of the ICT program expenditure in total, particularly the benefits-driven ICT base capex projects, our draft decision is to adjust the ICT programme expenditure approval amount to \$113.6m.

Attachment G.14: ICT capex - Asset Management Systems

NB: this section links to Attachment G.11 for an ICT base capex total programme view

G204 This expenditure programme includes ICT solutions and software tools to assist with strategic and tactical planning, assets works planning and delivery, asset risk and performance management, and asset data information systems.

G205 The Verifier included this expenditure programme in its review to test whether the benefits of the projects started in RCP2 (\$23.3m) were being realised.

G206 While about 65% of the programme expenditure was identified as being benefits driven, the Verifier was satisfied these were sufficiently demonstrable such as:

G206.1 saving in annual maintenance expenditure;

G206.2 improved operational decision making; and

G206.3 a potential to reduce response times to outages.

G207 The Verifier concluded that:³⁶⁵

We are satisfied that the post-implementation benefit analysis for Maximo demonstrated significant annual savings in maintenance expenditure and has provided a platform for improved asset performance and operational decision making, together with reduced response times to outages.

Transpower has provided qualitative analysis of benefits to support the planned RCP3 expenditure of asset management systems. Transpower has undertaken preliminary assessments against several capabilities (the most significant being asset criticality & risk management, asset health & performance management and asset strategic & tactical planning), which will support the ongoing development of asset health modelling, a key initiative going forward.

³⁶⁵ Above n 29, at 296.

- G208 On these bases the Verifier concluded that this expenditure programme was prudent and consistent with GEIP.
- G209 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:
- G209.1 this programme is mainly about enhancing Transpower's data management systems which is an area the Commission has been encouraging Transpower to focus on for two resets. Transpower appears to have a solid cultural strategy to move to a more data-centric decision-making organisation. Data management packages like Maximo reduce risk by centralising data sources across the organisation and feed into the asset health and criticality frameworks;
- G209.2 Transpower has linked the Maximo process to many benefits in the organisation such as asset condition knowledge, which assists with performance analysis and criticality assessments. Transpower appears to have made considerable gains in its understanding of asset management through this program of works;
- G209.3 the Maximo network and asset data management package will touch most aspects of the engineering decision making within Transpower. Maximo will provide that 'one source of truth' that was not evident before at Transpower and will be relied on by planners, asset managers and maintenance staff as well as those in systems operations;
- G209.4 Transpower made a commitment to the Maximo asset management system package about 10 years ago. The driver for this was system was to centralise network and asset data in one place and have this data gated appropriately so that it could be relied on by planners, asset managers and maintenance staff. This has provided considerable benefits according to the Verifier who sought to test the program as a non-Identified Programme because Transpower had indicated it was a key ICT deliverable in RCP2; and
- G209.5 with better asset management data systems, decision making about whether to replace or refurbish assets can be made on the basis of risk and risk outcomes. Transpower indicate that this expenditure on Maximo should assist in this process as decision makers have more confidence in the systems and data in the systems. This can only be beneficial for internal challenge processes which may have been more subjective in the past.
- G210 We requested additional information from Transpower and sought answers in an RFI about the benefits-driven ICT projects. Additionally, further expert external advice was sought about the ICT programme as a whole which has resulted in an expenditure allowance adjustment at an ICT programme level.

G211 Based on the Verifier report, our review of the Verifier report, Transpower's supporting material and the EMCa review:

G211.1 we agree that that the ICT capex – Asset Management Systems proposed expenditure of \$18.6m appears to be prudent and consistent with GEIP; however

G211.2 following the EMCa review of the ICT program expenditure in total, particularly the benefits-driven ICT base capex projects, our draft decision is to adjust the ICT programme expenditure approval amount to \$113.6m.

Attachment G.15: ACS Buildings and Grounds

G212 This asset class includes buildings and grounds assets that house primary and secondary asset grid equipment and systems. It includes buildings, site infrastructure, building services and access ways to our building sites, Transpower described these assets further as:³⁶⁶

Site infrastructure includes such items as switchyard aggregate, roads, cable duct covers, water, sewerage, drainage and waste water systems, pest control, switchyard security, boundary fencing and gates. These make up a significant portion of the buildings and grounds portfolio both in terms of volume and cost. The building services include assets such as access security systems, fire protection, heating, ventilation, and air conditioning systems (HVAC), which are all required for the ongoing operations of our equipment. Access ways cover roads and carparking locations.

G213 The Verifier noted the level of rigour and detail Transpower applies to its buildings and grounds assets including detailed modelling of each component for condition and expected asset life. Substation criticality and corrosion zone effects are used as inputs into the intervention decision-making estimates.

G214 The Verifier was satisfied that the expenditure in this category as well-targeted, prudent and efficient in maintaining safe and reliable operations in the substations. For these reasons the Verifier considered that this expenditure programme was consistent with GEIP.³⁶⁷

G215 The Verifier also observed that:

G215.1 Transpower uses SPM Assets software as the asset planning model for ACS Buildings and Grounds assets, except for outdoor security fencing, and applies the 5-step condition scoring system defined by the International Infrastructure Management Manual (**IIMM**);

³⁶⁶ Above n 316, at section 4.4.

³⁶⁷ Above n 29, at 283-290.

- G215.2 Transpower has forecast that by the end of RCP3, all projects deferred from RCP2 will be completed; and
- G215.3 the relatively large expenditure in RCP1 was due to seismic upgrading of essential substation buildings following the 2011 Christchurch earthquake and the subsequent revisions of building codes with regards seismic resilience requirements.
- G216 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:
- G216.1 this base capex programme was fully verified by the Verifier despite being a non-identified programme;
- G216.2 Transpower has sound policies and strategies in place to manage these assets which are often overlooked in the management of electricity networks. Seismic risk issues have been attended to since the Christchurch earthquakes and a continuing HILP program has been systematically identifying substation HILP risks such as fire and weather-related issues. Transpower has also taken a long-term view of asset management in this asset class with RCP3 focussing on resolving many fencing and roofing issues, with RCP4 more focussed on the remaining seismic issues identified since 2011;
- G216.3 Transpower investment in this asset category appears to be strongly influenced by CBA and uses this to regularly make decisions on whether to refurbish assets or replace them;
- G216.4 there are not many alternative options in this asset class. The decision making is mostly defined the optimum time to make refurbishment or replacement decisions;
- G216.5 this asset class is one area that could easily be overlooked by asset owners but can have a major impact on system reliability and safety. The substation grounds house the primary asset substation equipment and the buildings house the control, protection and communications equipment. Largely this equipment is quite reliable but is exposed to major HILP like events such as fire, earthquake and extreme weather events. Expenditure planning involves understanding these exposures and mitigating them to extent that is both practicable and economically reasonable. Transpower has demonstrated a clear understanding of these unlikely event exposures and the need to maintain building and ground security integrity; and

G216.6 the Verifier did not comment on the unit rate cost aspect of the programme. It is difficult to determine if the unit rates and costs used by Transpower are reasonable. However most of this work programme will be carried out by Transpower external service providers, that have been selected after testing the market to find a preferred provider.

G217 Based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our draft decision is to approve the proposed ACS Buildings and Grounds programme expenditure of \$39.5m in RCP3.

Attachment G.16: Other projects and programmes

G218 The Verifier reviewed approximately 90% of the base capex in Transpower's proposal once the ICT total programme review is included. A number of smaller projects were not reviewed by the Verifier as these did not meet the definition of Identified Programme. These comprised eight projects and totalled \$149.2m over RCP3.³⁶⁸

G219 The non-reviewed projects were in the Transmission Lines, AC Substations and business support capex categories.

G220 These were not reviewed due to either their materiality being low or due to application of our proportionate scrutiny principle being applied. We decided to focus our attentions on the material issues that were identified by the Verifier rather than carrying out an additional review of projects or programmes that had not been tested during the verification process.

G221 The full list of the base capex projects and programmes in Transpower's proposal, historically, and also Transpower's early view of that expenditure might be into RCP4 and RCP5, can be found in its RT01 Expenditure Forecasts spreadsheet.³⁶⁹

G222 Our draft decision is to approve these small projects and programmes.

³⁶⁸ The Verifier also added two non-identified programmes to its review, namely the ACS Buildings and Grounds and the ICT Asset Management Systems programmes.

³⁶⁹ Transpower "RCP3 Regulatory Template (RT01): Expenditure Forecasts" (November 2018), available at: https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/RT01%20Expenditure%20Forecasts.xlsx.

Attachment H Cost estimation

Purpose of this attachment

H1 The purpose of this attachment is to describe the technical processes used by Transpower to estimate input costs for capex and some opex, and our evaluation of those processes for setting the input costs used in our draft decisions.

Why we are interested in Transpower's cost-estimation processes

H2 In assessing Transpower's base capex proposal, we are guided by whether the proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier.³⁷⁰

H3 We consider this concept to be consistent with the Part 4 purpose, which is a required consideration under the capex evaluation criteria.³⁷¹

H4 In applying this concept, we consider that a 'prudent supplier' is a supplier whose planning and performance standards reflect GEIP.

H5 In our assessment of Transpower's proposed base capex (Attachment G) and opex (Attachment I) the focus is on expenditure prudence.

H6 In our Issues paper we defined the scope, practical application and other relevant considerations of our approach to testing the proposal's cost efficiency.³⁷²

H7 Practically we consider that proposed forecast expenditures should:

H7.1 be provided in a least-cost manner having regard to conditions in relevant markets for labour, capital and materials;

H7.2 be underpinned by robust cost-estimation and forecasting methodologies;

H7.3 include the incorporation of reported actual costs into the development of forecasts; and

H7.4 have regard to any efficiency incentives applying under the Part 4 regulatory framework.

³⁷⁰ Above n 65, at [A15].

³⁷¹ Clause 6.1.1(2)(b) of the Capex IM.

³⁷² Above n 31, at 69.

- H8 Other relevant considerations include:
- H8.1 whether and how contingency amounts are included in the expenditure forecasts to account for uncertainty and is there sufficient reasoning to explain uncertainty;
 - H8.2 are the forecasting methodologies consistent and clearly outlined (eg, base-step and trend for opex, bottom up for base capex);
 - H8.3 what is the confidence level of the expenditure forecasts (eg, P10, P50 or P90)
 - H8.4 has the market been or will it be tested (ie, can a third party deliver the project more efficiently); and
 - H8.5 have capex/opex trade-offs been considered.

Our focus in RCP2 about cost estimation and the Verifier's view of progress

- H9 In our RCP2 decision we identified a number of improvement initiatives that Transpower should make to its cost-estimation processes including that:
- H9.1 it develops a programme for updating and reviewing its cost-estimation system, TEES;³⁷³
 - H9.2 it carries out regular audits to ensure the programme is being met and the processes are being complied with;
 - H9.3 it provides annual reports on the progress against the development programme; and
 - H9.4 it provides annual reports on the variances between project business case stages, and the final business case and actual project cost.
- H10 These improvement initiatives were suggested for a variety of reasons, namely that:
- H10.1 there was little confidence in the outputs of Transpower's cost-estimation models;
 - H10.2 there was insufficient evidence to show that Transpower was using the cost-estimation models for the majority of its projects;
 - H10.3 there did not appear to be a consistent approach to reviewing actual costs and recalibrating the cost-estimation models; and

³⁷³ TEES - Transpower's Enterprise Estimating System.

H10.4 the majority of proposed RCP2 expenditure was based on preliminary level business cases.

H11 The Verifier assessed Transpower's approach to cost estimation and development of the cost-estimation process during RCP2 and concluded:³⁷⁴

The level of detail Transpower uses for non-volumetric estimates based on high level building blocks is like that we have noted used by other electricity utilities... for developing budget and feasibility costs. Consequently, we are satisfied that the high-level building block costs approached used by Transpower is consistent with GEIP.

This approach of building an estimating database is consistent with general industry practice, with unit rates regularly updated and building blocks added as project/tender/procurement costs are captured. Transpower has advised that all cost reviews and unit rate adjustments, and the source of the data, are documented and auditable. We are satisfied that the continual updating process used by the Estimating Team should ensure unit rates for primary electrical equipment and the associated labour content that Transpower are using for generating capital estimates reflect market costs and are fit-for-purpose.

We accept that the TEES system has been developed since the start of RCP2 in line with the Commission's suggested initiatives and that the system cost database is regularly updated with actual cost data. We are satisfied that the TEES system is consistent with GEIP for estimating systems used by utilities for developing capital expenditure and major project estimates.

H12 During RCP2, Transpower appears to have made a number of improvements to TEES including:

H12.1 the creation of building blocks suitable for volumetric project estimates;

H12.2 successfully interfacing TEES with the Financial Management Information System (FMIS) which has allowed the volumetric building blocks in TEES to be linked with FMIS;

H12.3 setting-up auditable processes for updating unit costs;

H12.4 introducing work breakdown structures as standardised project costs collection tools; and

H12.5 linking cost escalation factors to NZIER rates.³⁷⁵

H13 Our view is that Transpower's processes and tools are capable of providing reasonable cost estimates following these improvements.

³⁷⁴ Above n 29, at 139-140.

³⁷⁵ Above n 29, at 136.

Our evaluation of Transpower's proposal cost-estimation process

- H14 Transpower is continuing to develop the use of the enterprise system TEES for estimating the costs of all capex forecasts.³⁷⁶
- H15 Cost estimation involves defining the work packages of the project and the cost of each of the work packages. Both these items are contained in TEES as building blocks and unit rates.
- H16 Transpower has established building blocks for most work packages and new building blocks are added as project/tender/procurement activities are captured. These define standardised work packages. Unit rates reflect the most recent project costs and are periodically updated via an auditable process.
- H17 Transpower also assesses the efficiency of its cost estimating process by comparing the cost estimates in the delivery business cases with the actual cost of delivered projects. Transpower uses this comparison as a tool to increase the accuracy of the estimates in the delivery business cases.³⁷⁷ We are satisfied that this process would help improve the cost estimation at that stage of a project.
- H18 For the RCP3 base capex proposal, Transpower has used two methods for estimating costs depending on whether the proposed project is volumetric or non-volumetric.
- H18.1 Volumetric project costs have been estimated using building block unit costs. Building block costs are average rates derived from actual project costs. The actual cost of individual projects may vary but overall for volumetric work the cost of the overall programme that we approve is expected to be close to the forecast.
- H18.2 Non-volumetric project cost estimates are estimated using 'high-level building blocks' and an assumed scope of work. In these projects there can be significant differences between the initial cost estimate at the proposal stage and actual cost following commissioning.

³⁷⁶ Enterprise systems are large-scale computer application software packages that support business processes, information flow and data analytics.

³⁷⁷ A delivery business case for a project is produced for Transpower's management sign-off prior to inviting tenders for the construction phase of the project.

Our concerns with non-volumetric project cost estimation

- H19 Cost estimates, especially for non-volumetric major projects, are only as good as the scope of the projects at the time of the estimation. Most non-volumetric projects have two cost components:
- H19.1 a standard scope cost estimate which is applicable to all similar projects; and
 - H19.2 a project specific scope of work that require more focussed investigations and site visits to quantify costs.³⁷⁸
- H20 When assessing such cost estimates in expenditure proposals we receive and approve, we largely depend on the project specific scopes defined by Transpower and its consultants.
- H21 Project costs are estimated at many phases of a project's development cycle. For any project, the initial cost estimates are the least accurate and cost estimates become more accurate as the project develops and its scope is better defined.
- H22 The forecasts in RCP proposals are often based on the scope of works defined at the pre-feasibility or preliminary study phase of a project.³⁷⁹ Cost estimates derived at this phase have estimating accuracies of between 20% and 30%. Such inaccuracies can result in windfall gains or losses for non-volumetric projects.
- H23 We need to build confidence that the capex allowances we set are reasonable estimates of the cost of the proposed projects and programmes:
- H23.1 for volumetric programmes the estimating errors are expected to balance out. But there can be economies of scale and economies of scope that may not be accounted for in the proposal,³⁸⁰ and
 - H23.2 for individual projects, which are expected to increase from RCP4 onwards, the chances of cost estimating inaccuracies may be high and could result in windfall gains or losses via the capex incentive mechanism.
- H24 We have noted some previous project examples where the approved amount and the forecast end costs (**FEC**) are significantly different.

³⁷⁸ Project specific scope includes site constraints of doing the work, access to the transmission lines, the number of major road or rail crossings.

³⁷⁹ The estimates for major capex proposals submitted for our approval are also done at the pre-feasibility or preliminary study phase. The estimates for listed projects are at the 'detailed study' phase at the time of our approval.

³⁸⁰ Volumetric programmes are programmes where large quantities of the same assets are replaced, for example circuit breaker replacements.

- H25 For example, the FEC and the approved amount for three recent transmission line re-conducting projects are shown below. As can be seen, two of them have significant variations between the approved cost and the FEC:³⁸¹
- H25.1 Bunnythorpe Haywards – FEC \$74.8m (approved major capex projects (MCPs) \$160m);
- H25.2 Central Park – Wilton B line – FEC \$7.9m (approved LP \$11.6m); and
- H25.3 Oteranga Bay – Haywards – FEC \$23.6m (approved LP \$23.5m).
- H26 To try and address this we propose to introduce an RCP3 initiative to understand the evolution of the scope of projects through their development phases and have greater confidence in Transpower’s estimation of non-volumetric project costs.
- H27 This will help us improve our assessments of major capex projects, base capex listed projects, and the RCP4 base capex proposal.

Our proposed initiatives for RCP3

- H28 Our proposal is to introduce a reporting requirement for Transpower to report on the variances between cost estimates in a proposal, those in the delivery business case and actual costs of the commissioned projects.
- H29 As noted above, Transpower already compares the cost estimates in its delivery business cases with the actual costs of projects for its internal continuous improvement.³⁸² Our proposal is to extend this comparison to include the cost estimates in the proposals sent to the Commission for approval.
- H30 The proposed reporting requirement would enable us to better understand:
- H30.1 the level of accuracy and confidence level of cost estimates in the proposals we assess;
- H30.2 how the efficiencies of scale are captured in the base capex forecast; and
- H30.3 how the efficiencies of scope are captured in the base capex forecasts.

³⁸¹ The FECs are from Transpower’s RCP3 Regulatory Template (RT01) (above n 369). The approved allowances are from the Commission’s decision and reasons papers for the respective projects, available at: <https://comcom.govt.nz/regulated-industries/electricity-lines/electricity-transmission/transpower-capital-investment-proposals>.

³⁸² This also means that the information we are seeking is already available in TEES and in Transpower’s regular analysis of its cost estimation system.

- H31 Specifically, we propose to introduce a new reporting obligation on Transpower to provide the Commission with a report:
- H31.1 on the variance between the high-level building block cost estimates in Transpower's capex proposals to the Commission and the project cost estimates in the delivery business cases;
 - H31.2 on the variance between the high-level building block cost estimates in the delivery business case and the actual project costs; and
 - H31.3 for each of paragraphs H31.1 and H31.2 above, include an explanation of reasons for variances greater than +/- 30% between the high-level building block estimates or the total estimates.³⁸³
- H32 We propose that Transpower provides a report:
- H32.1 within 80 working days after the end of the last disclosure year of a regulatory period, for:
 - H32.1.1 all base capex programmes valued greater than \$20 million.³⁸⁴ For RCP2, the programmes include transformer replacements, indoor switchgear, transmission line poles, transmission line conductor replacements, transmission line grillage, transmission line insulators and indoor-outdoor conversions;
 - H32.2 annually, within 80 working days after the end of each disclosure year for:³⁸⁵
 - H32.2.1 all completed base capex projects greater than \$5 million, including listed projects approved in RCP2; and
 - H32.2.2 all completed major capex projects regardless of when they were approved.
- H33 Aspects of the report would be confidential for commercial reasons and would not be published. However, we propose to work with Transpower to ensure that relevant parts of the report could be disclosed to interested parties. Our objective would be to ensure that sufficient information is readily available to interested persons to assess whether the Part 4 purpose is being met.

³⁸³ 30% reflects the upper bound of the accuracy of cost estimates in the proposal.

³⁸⁴ We selected \$20 million because this is the threshold between major and base capex expenditure.

³⁸⁵ The reporting period of 80 working days would end in mid-October each year.

- H34 Since the report would be an output from Transpower's cost estimating tool 'TEES' (Transpower's Enterprise Estimating System), we do not consider the report would need to be audited.
- H35 We will be seeking this report under the s53ZD provisions instead of s53N because this information is not strictly monitoring compliance with the RCP3 price-quality path. Rather, it is intended to assist us in our cost-estimation considerations for future resets, eg, RCP4. We plan to finalise the details of the report when we issue the 53ZD notice.
- H36 The s53ZD notice would be set to cover reporting on the 2020/21, 2021/22, 2022/23 and 2023/24 disclosure years so we can use the information for capex approvals during RCP3 and to assist in the evaluation of the RCP4 proposal.
- H37 We will issue a separate s53ZD notice to cover 2019/20, which is in RCP2, because Transpower plans to complete three transmission line reconductoring projects in 2019/20.

Attachment I Opex

Purpose of this attachment

- I1 The purpose of this attachment is to set out our draft decisions relating to opex for the IPP reset, and to explain our reasons for those draft decisions.

Operating expenditure overview

RCP3 proposed opex versus approved opex for RCP2

- I2 Transpower has proposed total opex for RCP3 of \$1,342.9m in 2017/18 dollars. This is shown in Table I1 below, alongside the RCP2 opex.³⁸⁶
- I3 Key contributors to the proposed opex increase in RCP3 are increases of \$55.0m in predictive maintenance, \$15.9m in insurance costs, and \$6.9m in AM&O. These were partially offset by a reduction in Business support opex of \$10.8m and an adjustment of (\$29.1m) in Transpower's maintenance forecast to mitigate the risk that delivery constraints will make the proposed scope of work unachievable.³⁸⁷

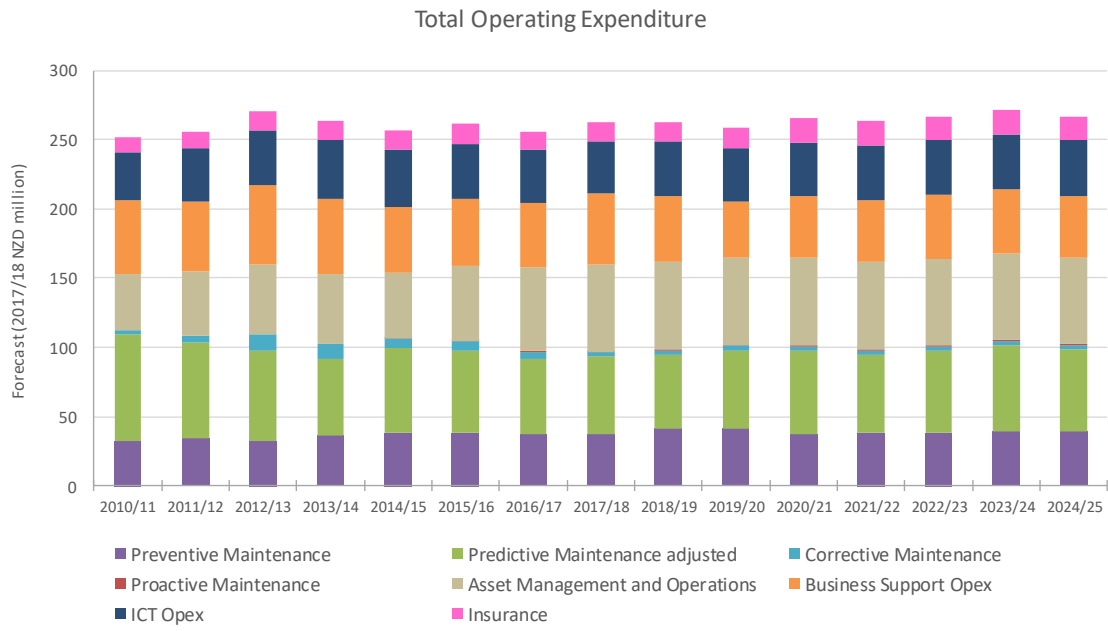
Opex trends since RCP1

- I4 Figure I1 shows annual opex for periods RCP1 to RCP3 (reflecting reported and forecast data) broken down by major expenditure category.

³⁸⁶ Above n 27, at 98.

³⁸⁷ Notwithstanding Transpower's proposed reduction in opex for deliverability constraints, in the price-quality analysis of the RCP3 baseline maintenance forecast Transpower concluded the intended programme outcomes could still be delivered if expected efficiency gains are achieved and are reinvested in the maintenance programme. Should this not occur, it will be necessary to re-prioritise work. See Transpower's proposal (above n 27, at 98).

Figure I1 Annual opex for RCP1 to RCP3³⁸⁸



³⁸⁸ Includes the deliverability adjustment offset against the predictive maintenance opex.

Table I1 Summary of operating expenditure

	RCP2 expenditure (\$m)	RCP3 proposal expenditure (\$m)	RCP3 proposed approval (\$m)	Variance (RCP2 to proposal)	Variance (RCP2 to draft decision)	% Approved	Identified programm e?
Network opex							
Preventive maintenance	\$194.0	\$198.8	\$198.8	2.5%	2.5%	100%	Yes
Predictive maintenance	\$280.9	\$335.9	\$322.7	19.6%	14.9%	96.1%	Yes
Corrective maintenance	\$24.4	\$15.0	\$15.0	-38.6%	-38.6%	100%	No
Proactive maintenance	\$2.7	\$2.5	\$2.5	-8.1%	-8.1%	100%	No
Maintenance deliverability adjustment	–	-\$29.1	-\$29.1	N/A	–	100%	No
Total network opex	\$502.0	\$523.0	\$509.8	4.2%	1.6%	97.5%	
Non-network opex							
Asset management and operations	\$302.6	\$309.5	\$309.2 ³⁸⁹	2.3%	2.2%	99.9%	Yes
Business support	\$237.3	\$226.5	\$220.6	-4.6%	-7.0%	97.4%	Yes
ICT opex	\$191.6	\$195.9	\$195.9	2.3%	2.3%	100%	No
Insurance	\$72.1	\$88.0	\$68.1 ³⁹⁰	22.0%	-5.5%	77.4%	No
Total non-network opex	\$803.6	\$819.8	\$793.8	2.0%	-1.2%	96.8%	
Total RCP3 Opex	\$1305.6	\$1,342.9	\$1,303.6	2.9%	-0.2%	97.1%	

³⁸⁹ This adjustment is due to the treatment of Energy Complaints Scheme levies as a pass-through cost.

³⁹⁰ Note that this adjustment is partially due to the treatment of Fire and Emergency New Zealand levies as a recoverable cost.

- 15 The key features of the annual expenditure profile since 2010/11 are:
- 15.1 Reasonably consistent contributions to total annual opex from maintenance (around 40%) and AM&O (since start of RCP2) (around 23%); and
- 15.2 Variable costs for insurance over time, reflecting external insurance market conditions.

Transpower's RCP3 opex forecasting methodologies

- 16 Transpower has developed base-step-trend opex forecasts for each of the expenditure categories (excluding insurance and preventive maintenance). It described this in its proposal as follows:³⁹¹

For most of our opex forecasts we have adopted a base-step-trend framework. Base-step-trend forecasting is generally appropriate for expenditure that is recurring and assumes that historical 'revealed' expenditure provides a suitable starting point for a forecast requirement. The base-step trend approach involves the following main components.

- Base year – identifying an efficient base year, typically the most recent year for which actual opex data is available. This includes assessing the extent to which the base year is relatively efficient.
- Base amount – following an assessment of the base year, the base amount is identified by adjusting the base year expenditure for any atypical cost items.
- Step changes – required to meet the needs of the network or to allow for external requirements, and which are not already captured within the scope of the base amount.
- Trends – these reflect expected changes in cost due to output growth. It can also include adjustments for ongoing productivity and/or cost efficiency.

- 17 Base-step-trend forecasting is discussed in more detail in Attachment I.1.
- 18 Transpower has taken the following approach to forecasting the base amount:³⁹²
- 18.1 Forecasts were based on actual costs incurred in 2017/18, which are the most recently audited costs and are considered to embed efficiency gains made since our decision on the final RCP2 IPP;
- 18.2 Non-recurring costs for efficiency initiatives have been removed from the base-year business support costs, as these initiatives are self-funding via the incentive arrangements; and

³⁹¹ Above n 27, at 59.

³⁹² Above n 29, at 302-303.

- I8.3 Prospective efficiency gains have been excluded from the forecast to incentivise Transpower identifying and pursuing gains at any time through the regulatory cycle.³⁹³
- I9 Step and trend factors are discussed under the relevant headings.
- I10 Transpower's insurance opex forecast has been developed based on actuarial and broker forecasts of premiums over RCP3.
- I11 For preventive maintenance, Transpower has generated standard jobs for the routine maintenance activities and used work volumes generated by Maximo³⁹⁴ to calculate an aggregated [quantity] x [standard job cost] forecast.

Significance of the base year, base amounts, step and trend

- I12 We briefly explain the significance of the base year, base amount, steps and trend factors.
- I13 As described above, Transpower has built most of its opex forecast by choosing a base year and, where the base year is atypical, removing or adding in costs to compensate for any atypical amounts in the base year. The base amount of expenditure is expected to continue to be required in future, subject to any ongoing change attributable to trends over time (for example, ongoing change in productivity or expected changes in input costs) and step changes for new costs.
- I14 The significance of the base year is that it will largely determine the level of expenditure that is projected forward into the next RCP. The regulatory theory is that Transpower will become more efficient over time (due to appropriate incentives), so the most recent available year is generally preferred as a base year. Using an earlier year would potentially exclude any additional efficiency gains from the forecast and (all else being equal) result in an expenditure allowance that is higher than required.
- I15 A potential complication to this approach is that the base year may not accurately reflect the baseline level of activity, due to atypical expenditure and year to year variability. To compensate for this, adjustments are made to the base year, by removing or adding in 'expenditure', to arrive at the base amount. This helps ensure that the base amount accurately reflects both the current level efficiency (due to the base year) and the recurring level of activity (due to the adjustments). It is the base amount that will be trended forward.

³⁹³ Transpower has set out a number of steps it has taken in order to innovate and drive efficiency gains, in support of its view that the base year is efficient.

³⁹⁴ Maximo is Transpower's operational asset register and maintenance management tool.

- I16 Trend factors, as noted above, represent changes in efficiency or productivity that can be expected. Applying a trend factor results in increasing or decreasing expenditure allowances in consecutive years (ignoring any step changes).
- I17 Step changes enable amounts of expenditure that are not within the baseline to be included – for example, to fund new requirements.

Significance of the Incremental Rolling Incentive Scheme

- I18 In analysing the results of the base-step-trend approach, we also consider the interaction between opex and the IRIS.
- I19 IRIS provides a constant strength incentive for Transpower to realise efficiency gains. The IRIS mechanism results in Transpower retaining 26% of the benefit of any underspend of its opex allowance, or bearing 26% of any overspend. The IRIS mechanism returns (or passes on) the remainder to Transpower's customers by decreasing (or increasing) the revenue Transpower can earn in subsequent periods, and hence the prices that customers will pay.
- I20 For permanent gains (eg, an amount of expenditure that will not be spent because Transpower found a more cost-effective way to deliver the work) this will result in Transpower retaining 26% of the NPV of the total amount that will not be spent (the NPV calculation takes into account that this will be saved *every year in perpetuity*).
- I21 For temporary gains (eg, an amount of expenditure that can be deferred until later) the net benefit is the timing advantage (ie, the NPV of the amount deferred, less the NPV of the later spend) and Transpower will retain 26% of this difference.
- I22 This has the following implications for the base year, base-year amount, trend, and steps:
- I22.1 Making adjustments to the base year for one-off items ensures that these are not built into the forecast. If these were included in the forecast, it would result in Transpower being rewarded (through IRIS) as it would appear to save this expenditure in the subsequent period (as the forecast is too high).³⁹⁵
- I22.2 Applying a trend factor can compensate for growth (or decrease) in the cost of inputs and ensure this is correctly treated under IRIS.

³⁹⁵ We are continuing to evaluate Transpower's proposed calculation of a forecast amount of the IRIS baseline adjustment term for inclusion in the RCP3 price path and will consult separately with interested persons on the results of our analysis. We note that the estimated annual revenues shown in this paper include Transpower's estimate of this recoverable cost in its \$103 million of IRIS recoverable costs. Our own estimate may materially change from Transpower's estimate.

- I22.3 Step changes for additional work requirements ensure that these additional expenses are correctly treated.

Opex review of Transpower's proposal

Opex review and the Capex Input Methodologies

- I23 There is no IM that sets out rules about how we should determine or evaluate forecast opex in an IPP. However, we consider the criteria to be applied should not be materially different to the criteria that apply to base capex, particularly given the need to direct capex expenditure towards achieving cost-effective and efficient solutions, and the potential cost trade-offs between capex and opex that this implies.
- I24 Therefore, consistent with our approach to assessing base capex, in assessing opex we will be guided by:
- I24.1 the extent to which the opex that Transpower proposes will promote the purpose of Part 4 of the Act; and
- I24.2 where they can be usefully applied to opex, the base capex evaluation criteria.³⁹⁶
- I25 In considering the extent to which Transpower's opex proposal will promote the Part 4 purpose, we will be guided by whether Transpower's proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier (ie, where a 'prudent supplier' is a hypothetical transmission business facing the same circumstances as Transpower whose planning and performance standards reflect GEIP).³⁹⁷

³⁹⁶ Schedule A of the Capex IM.

³⁹⁷ 'Good electricity industry practice' is defined in Part 1 of the Code as: **good electricity industry practice** in relation to transmission, means the exercise of that degree of skill, diligence, prudence, foresight and economic management, as determined by reference to good international practice, which would reasonably be expected from a skilled and experienced **asset** owner engaged in the management of a transmission network under conditions comparable to those applicable to the **grid** consistent with applicable law, safety and environmental protection. The determination is to take into account factors such as the relative size, duty, age and technological status of the relevant transmission network and the applicable law [bold terms in original].

We used a Verifier to review Transpower's proposal

- I26 In our Process paper we considered it would be beneficial to use an independent verifier to verify Transpower's proposal in advance of submitting it to the Commission. We considered that a verification process would:
- I26.1 help improve our decision making by testing, in advance of us receiving the proposal, the policies, planning standards and assumptions that underpin Transpower's forecast information on proposed capex, opex, and demand;
 - I26.2 enable us to better focus our review of Transpower's proposal on areas where forecast expenditures and/or associated grid output measures are less likely to meet the expenditure outcome, consistent with the proportionate scrutiny principle;
 - I26.3 provide useful insights to Transpower in terms of potential operational improvements it could make;
 - I26.4 help to mitigate the risk of any potential incentives on Transpower to provide overly generous estimates of forecast expenditure; and
 - I26.5 result in better scrutiny of Transpower's investment plans prior to these being submitted to the Commission, which may result in a more appropriate level of forecast expenditure in the proposal.
- I27 We consider that the independent verification process has been useful and effective for us, for Transpower, and for consumers. Verification has:
- I27.1 provided many of the benefits we identified in our Process paper;
 - I27.2 identified key areas for us to focus on in our review of Transpower's opex proposal; and
 - I27.3 identified issues we may want Transpower to focus on as it continues to improve its asset management and planning processes.
- I28 Chapter 2 discusses the verification process in more detail, including our assessment of the Verifier's conclusions, and how we tested the verification against the purpose of Part 4 of the Act, and against the base capex evaluation criteria from the Capex IM, where it could usefully be applied.³⁹⁸

³⁹⁸ As signalled in our Process paper.

Limitations in Verifier expertise

- I29 With one exception, the Verifier did not identify that it was limited or unable to adequately comment on, analyse or review any of the material related to each identified or non-Identified Programme in the opex proposal.
- I30 The exception related to the step change in insurance costs. Although the Verifier commented on the prudence of the insurance costs, it considered that expert actuarial advice was necessary to assess the efficiency of the opex.
- I31 As discussed in Chapter 2, we engaged EMCa to test the ICT capex and opex programmes as a whole. In their report, EMCa has provided their assessment of Information Services and Technology (IST) staffing costs within business support and a high-level overview of ICT expenditure trends in Australia, which is discussed in the relevant sections.

Sub-attachments

- I32 The sub-attachments (apart from Attachment I.1 which is a summary of the opex) are focussed on each of the opex Identified and non-Identified Programmes, and contain the following:
- I32.1 a short summary of Verifier conclusions and key points;
 - I32.2 our analysis of the verification following our review of verification, and how the requirements of the Capex IM (clauses A1 and A2 of Schedule A) were met, if applicable and appropriate;
 - I32.3 issues raised after the verification and our analysis and how these were reflected in the Issues paper;
 - I32.4 a summary of submissions relevant to the opex Identified and non-Identified Programmes;
 - I32.5 a summary of additional information sought from Transpower, why this information was sought, our analysis of this information and conclusions drawn from analysing this further information; and
 - I32.6 our conclusions about whether to approve the proposed expenditure for our draft decision, and if not, how much to approve.
- I33 For some, but not all, Identified and non-Identified Programmes, we have carried out additional analysis beyond reviewing the Verifier report. For some expenditure programmes we:
- I33.1 asked questions in the Issues paper seeking submitter views on aspects of Transpower's proposal;

- I33.2 sought further supporting information from Transpower; and
 - I33.3 carried out analysis of this information to decide next steps.
- I34 We have provided a guide for interested persons in Table I2 that points to the part of this attachment linked to each Identified and non-Identified Programme, to highlight:
- I34.1 where issues have been identified;
 - I34.2 what has been submitted on by interested persons; and
 - I34.3 where supporting information has been sought from Transpower and further analysis has carried out by us.

Table I2 Summary of opex programme analysis

Programme and Attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Draft decision Reasoning
Verifier reviewed – Identified programmes				
Preventive maintenance (Attachment I.2)	Yes	No	Yes	<ul style="list-style-type: none"> Increasing opex despite decreasing work volume, when compared to RCP2. Transition to reliability-informed maintenance approach expected to reduce maintenance within this category. We accept Transpower’s forecast for our draft decision. We are satisfied with Transpower’s explanation that the increase is due to additional management costs due to health and safety requirements and increased complexity of work.
Predictive maintenance (Attachment I.2)	Yes	No	Yes	<ul style="list-style-type: none"> Our (re)assessment of the proposed steps Consideration of Transpower’s historic ability to deliver and Transpower’s experience with service provider market Included a forecasting adjustment to allow for Transpower’s tendency to forecast work and then defer it under efficient deferral. No trend factor. Attachment I.2 outlines our changes to expenditure allowed for the draft decision, compared to Transpower’s proposal.
Asset Management and Operations (Attachment I.3)	Yes	Yes	Yes	<ul style="list-style-type: none"> Maintaining same level of activity as RCP2 is consistent with the underlying drivers including capex planning and investigations. However, reservations around the efficiency of the base year. Downwards trend factor includes productivity gains. We accept the proposed expenditure for our draft decision.

Programme and Attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Draft decision Reasoning
Business Support (Attachment I.5)	Yes	No	Yes	<ul style="list-style-type: none"> • Adjustments bring high base year beneath expenditure of previous years. • Small productivity increase included in trend. • Only step change relates to RCP4 proposal costs (reasonable given that RCP3 proposal costs adjusted out from base year). • Total forecast is a decrease from previous RCPs and consistent with future RCP forecast. • EMCa review suggests expenditure within IST to be high. • We accept the proposed expenditure for our draft decision, with the exception of -\$5.9m.
Verifier reviewed – Non-identified programmes				
ICT opex (Attachment I.4)	Yes	No	Yes	<ul style="list-style-type: none"> • Base year lowest of RCP. • No trend factors. • We agree with the verifier’s finding that steps are well defined and linked to corporate strategy. • Total forecast is consistent with previous RCPs and forecasts for future RCPs. • We accept the proposed expenditure for our draft decision.

Programme and Attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Draft decision Reasoning
Insurance (Attachment I.6)	Yes	No	Yes	<ul style="list-style-type: none"> • Consistency of proposal with expert forecasts. • Uncertainty around future funding approach for Fire Emergency New Zealand suggests the FENZ levy is better treated as a recoverable cost. • We accept the proposed expenditure for our draft decision, with the exception of: <ul style="list-style-type: none"> - \$4.1m in FENZ levies (to become a new recoverable cost) - \$15.8m due to concerns relating to overprovision of self-insurance (see comments in Attachment I.6).
Corrective maintenance (Attachment I.2)	No	No	No	<ul style="list-style-type: none"> • Relatively low materiality of the portfolios. • Difficulties in predicting expenditure within these portfolios precisely. • Proportionate scrutiny applied. • We accept the proposed expenditure for our draft decision.
Proactive maintenance (Attachment I.2)	No	No	No	

High-level challenge

- I35 The Verifier commented that Transpower's approach to forecasting opex requirements at a category or programme level did not incorporate efficiencies that were attainable across the scope of the entire, aggregated, portfolio. While Transpower's approach was seen as valid, the Verifier indicated that a top-down challenge was necessary (see Verifier comment in Attachment I.1).
- I36 To address this concern, we have looked at, or sought additional information about, expenditure at a wider level, where appropriate. Specifically, we have:
- I36.1 requested additional information regarding total expenditure within AM&O (ie, AM&O totex) in order to better understand the drivers and patterns of expenditure;
 - I36.2 engaged expert advice to consider ICT expenditure across both opex and capex, and sought additional information (from Transpower) to identify ICT staff costs within business support opex; and
 - I36.3 considered the possibility that maintenance opex includes work that may not be needed.
- I37 Due to the substitutability of opex amongst its sub-categories,³⁹⁹ Transpower may reallocate opex to attempt to achieve efficiencies. As discussed at paragraphs I18 to I22, underspent and overspent opex will produce IRIS incentive amounts.
- I38 IRIS applies at an aggregate opex level, and the incentive amounts will show Transpower's performance relative to its forecast. While this will not necessarily correspond to efficiencies (eg, any temporary deferral would initially appear as an underspend), we consider that annual disclosure of this information, alongside an explanation by Transpower, would help provide interested persons with better information to inform their views (ie, for the purposes of s 53A).
- I39 We therefore have put in place an annual reporting requirement for RCP3 that requires Transpower to publish and explain the IRIS incentive adjustments it receives (or incurs), which would be an indicator of Transpower's direction of travel on opex efficiency.⁴⁰⁰

³⁹⁹ Transpower's opex is fungible across the opex categories and is effectively a single pool of expenditure.

⁴⁰⁰ In response to our Issues paper, Meridian submitted that greater visibility of the effectiveness of the efficiency incentives was needed, to help inform the Commission's reset of the IPP, and so that interested persons could better understand and contribute to the IPP reset. We agree that this is important and consider these reporting requirements will help achieve these goals (above n 222, at 2-5).

I40 We note that Transpower has set out steps it has taken in order to innovate and find efficiencies in its submission on our Issues paper:⁴⁰¹

Given the factors above, we consider that an appropriate approach to assessing whether we respond to incentives and achieve efficiencies is to look at what we have been doing to innovate and drive costs out of our business. We established a Transformation team and Project Management Office, and engaged independent consultants Third Horizon, to support a benchmarked efficiency programme and track improvements. We have clear evidence of:

- sustained focus on cost containment and budget control,
- major change programmes directed at enhancing effectiveness and efficiency and identifying and executing specific cost reduction initiatives,
- significant and sustained efforts to secure the best pricing from our suppliers and service providers,
- strategic shifts in our in-house resourcing to ensure value for money, and
- integration of cost management objectives into our strategies and decision-making tools.

Exclusion of costs of moving to a new Transmission Pricing Model

I41 We understand that changes may occur to the TPM that could result in some incremental cost during RCP3. There is a range of possible costs that could arise, however we consider that in any event they will be beneath the threshold for major capex. Any associated costs may be capex, opex, or a combination of both.

I42 Due to the uncertainty in timing and quantum there are difficulties with including this as part of our RCP3 draft decision, which will not be resolved before our final decision, and we have not included any estimate of these costs within our forecast. We expect that once a change has been made, the Electricity Authority would make a request, under s 54V, that we reconsider our IPP determination.

I43 This approach will enable us to adjust the price path to take into account these additional costs, as well as ensure their correct treatment under the IRIS mechanism, or base capex incentive (depending on whether costs are opex, capex, or both).

Fines and other pecuniary penalties

I44 Given recent breaches of quality standards by electricity lines companies, we propose to make a clarification to the definition of 'operating cost' in the IMs to avoid any doubt regarding the exclusion of Court-imposed penalties from opex. This would also apply to any other body with a statutory power to impose such sanctions.

⁴⁰¹ Above n 71, at 4.

- I45 The amendment in the IMs would apply to Transpower in the event that such penalties were imposed at any future time. This amendment is discussed in the accompanying paper on draft IM amendments.⁴⁰²
- I46 If penalty costs were able to be included in Transpower's forecast opex allowance, 26% of the cost would be passed through to consumers via the IRIS mechanism. This would be a perverse outcome; pecuniary penalties and fines are intended to penalise lines companies, including Transpower, for conduct contravening standards that apply to them. We do not consider that there is a sound policy argument for these costs to be shared with consumers.

Attachment I.1: Further detail on base-step-trend forecasting methodology

Verifier's description of base-step-trend

- I47 The Verifier described base-step-trend forecasting, and made the following comments, which we consider helpful to reproduce:⁴⁰³

The base-step-trend forecasting approach is common practice for electricity utilities in Australia in forecasting opex as part of regulatory proposals to the AER, with the regulator typically focusing on the following aspects:

- determining the base year and its suitability, including its efficiency;
- removing one-off costs from the base year and including adjustments, where appropriate, to reflect non-recurrent costs;
- identifying any step changes, where appropriate, to reflect changes in scope resulting from factors outside of the network's control; and
- applying a trend factor (escalation) over the regulatory control period to account for:
 - output drivers: network and customer growth
 - efficiency drivers: technical efficiencies, economies of scale
 - real cost escalation: labour, materials and contractor costs.

In an Australian context, it is usual practice for the base-step-trend forecasting methodology to be applied to the total opex forecast, which results in a relatively pure 'top down' forecast compared to an aggregation of 'ground up' individual expenditure programme forecasts. In contrast, we note that Transpower (and other NZ electricity utilities) tend to apply the methodology at the operating and maintenance programme/category level, with the total opex forecast being an aggregate of these individual programme/category costs each estimated using the base-step-trend methodology.

⁴⁰² Above n 38.

⁴⁰³ Above n 29, at 303-304.

We consider either approach is valid, but the different basis of the resulting forecasts requires a somewhat different interpretation. Hence, the ground-up base-step-trend forecasts generated using the NZ approach have not been subject to the same top down discipline applied under the Australian approach. The risk with this approach is that the aggregation of several ground-up expenditure forecasts may result in a total opex forecast that is too high because the scope for efficiencies across expenditure programs is not considered. This suggests that some form of top-down challenge must be applied to Transpower's RCP3 opex forecasts to test the prudence and efficiency of the ground-up forecasts.

Transpower's selection of 2017/18 as the base year for RCP3 forecasts

Transpower has selected 2017/18 as the base year for its RCP3 opex forecasts. This will be the most recent financial year for statutory reporting purposes prior to Transpower's submittal of its RCP3 proposal to the Commerce Commission in December 2018.

The key requirement for the base year when applying the base-step-trend forecasting methodology is that the year is not atypical compared to Transpower's historical annual business-as-usual opex profile. This means that any large one-off (non-recurring) expenditure items should be removed from the base year. From a regulatory perspective, it is also important that the base year is efficient.

Significance of base year choice

- 148 As well as the importance of taking account of atypical amounts, we agree with the Verifier's comments that the efficiency of the base year is important from a regulatory perspective. Efficiencies achieved within this period will be shared with consumers in the current period, and any inefficiencies within the base year will be built into the forecast for the next period (subject to these being removed by a trend factor).
- 149 We note that maintenance expenditure in the 2016/17 disclosure year was lower than the 2017/18 base year, and on its face this appears to be a more 'efficient' level of expenditure.
- 150 However, we note the following:
- 150.1 In principle, we set expenditure allowances for Transpower which are intended to be fungible between opex categories, and between years, in order to allow Transpower more flexibility to find efficiency gains. Given this approach, it would be inappropriate to assume that lower expenditure in any year reflects a more efficient level of baseline expenditure;
 - 150.2 It is unclear to what extent any difference is due to non-recurrent factors that would be subject to an adjustment to the base expenditure;
 - 150.3 Transpower's maintenance opex is outsourced to service providers, which adds a further potential level of variability, due to contractor capacity; and

- I50.4 In any case, the IRIS mechanism would compensate for a base year that is lower due to temporary gains, by allowing a higher incentive amount (through the baseline adjustment term), which would offset the difference from the lower base amount.
- I51 In the context of the entire RCP, and without adjusting for any expected step changes or one-off irregularities in expenditure, 2017/18 is:
- I51.1 0.6% (\$0.6m) lower maintenance opex than the RCP average; and
- I51.2 0.7% (\$2m) higher total opex than the RCP average.
- I52 In this context, we consider the high-level base-year differences to be less material than scrutinising the base-year efficiency at an individual level.

Attachment I.2: Further details on Maintenance opex

- I53 Maintenance opex maintains the grid assets to meet safety, asset reliability and operational requirements. Maintenance opex comprises 39% of Transpower's proposed opex.
- I54 Since RCP1, Transpower has been evolving its maintenance asset practice and it described this evolution as follows:⁴⁰⁴
- I54.1 In RCP1, maintenance was largely time based and Transpower relied on the knowledge of service providers to direct maintenance work. Most maintenance was preventive with reactive management of defects and failures;
- I54.2 In RCP2, Transpower has been implementing a risk-based approach on selected asset types. The first stage of this initiative was to review the scope and frequency of routine (preventive) maintenance work. The risk-based approach often allows for reduction in scope of frequency and results in efficiency gains; and
- I54.3 In RCP3, Transpower plans to continue to roll out risk informed maintenance. Risk informed maintenance is expected to increase condition based predictive maintenance and reduced preventive maintenance. This is expected to result in a shift of expenditure from preventive maintenance to predictive maintenance.
- I55 For RCP3, Transpower has classified maintenance opex into four portfolios. Table I3 shows Transpower's RCP3 forecasts for these portfolios.

⁴⁰⁴ Above n 27, at 97.

Table I3 Summary of Maintenance expenditure in the proposal

	20/21	21/22	22/23	23/24	24/25	RCP3 total
Predictive maintenance	68.1	64.2	66.8	70.3	66.5	335.9
Preventive maintenance	38.6	39.3	39.7	40.4	40.8	198.8
Corrective maintenance	3.0	3.0	3.0	3.0	3.0	15.0
Proactive maintenance	0.5	0.5	0.5	0.5	0.5	2.5
Deliverability adjustment	(5.9)	(5.4)	(5.8)	(6.3)	(5.7)	(29.1)
Maintenance total	104.3	101.5	104.2	107.9	105.1	523.0

I56 In its RCP3 proposal, Transpower provided a comparison of previous opex – RCP1 to present – by the above portfolios. Because the comparison is a back-cast and therefore approximate, we have used it as a guide to inform our draft decision rather than as input into detailed analysis.

Reasons for addressing this issue

I57 Figure I2 shows Transpower’s annual and expected trend in maintenance opex and Figure I3 shows the historical and forecast maintenance opex by portfolio. For RCP3 and later, Transpower forecasts an increase in maintenance opex compared to RCP2.

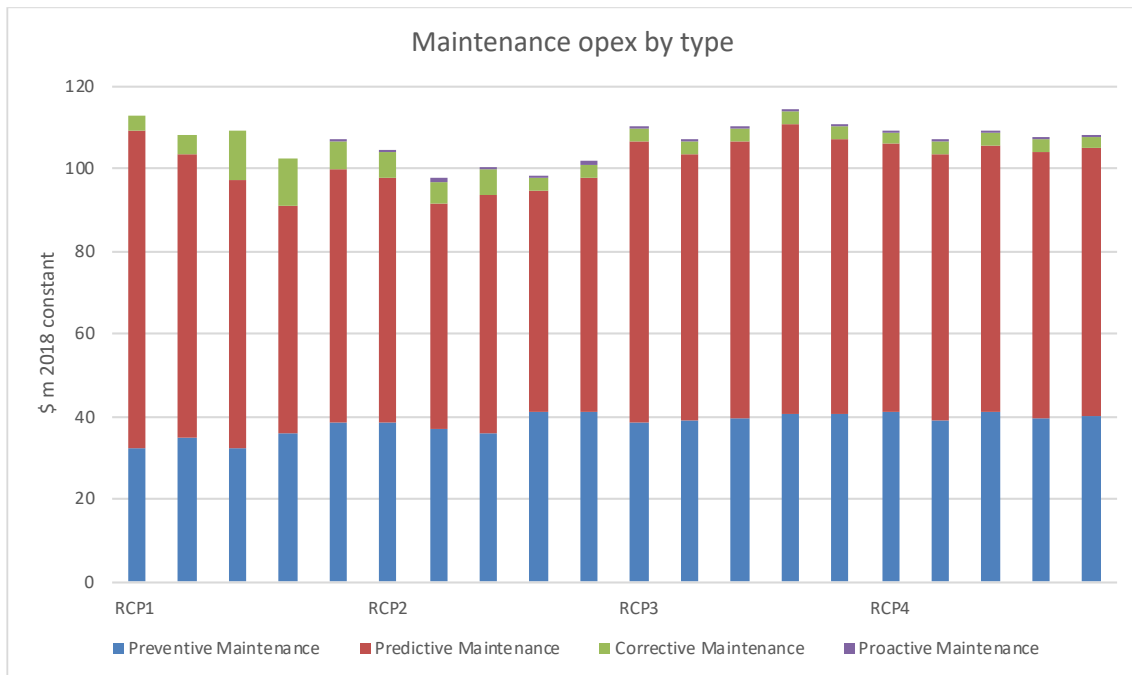
Figure I2 Forecast and historic maintenance opex⁴⁰⁵

Figure 53: Historical and forecast maintenance opex

⁴⁰⁵ Above n 27, at 107.

I58 The increase in the unadjusted maintenance expenditure in RCP3 is forecast to be \$50.1m, or approximately 10%, higher than that spent in RCP2, excluding the deliverability adjustment of \$29.1m proposed by Transpower. The increase in RCP3 maintenance is largely due to the step change from the 2017/18 base-year predictive maintenance and is considered by the Verifier to be work that has been previously deferred and is now necessary to support RCP4 and RCP5 activities.⁴⁰⁶

Figure I3 Historical and forecast maintenance opex



Deliverability adjustment

I59 Transpower has applied a deliverability adjustment of \$29.1m. Transpower noted that a "... deliverability adjustment recognises that over a typical period there are likely to be constraints or specific circumstances such that we do not complete all specified work. Therefore, we have not allocated the deliverability adjustment to any particular maintenance category or project."⁴⁰⁷ In its submission in response to our Issues paper, Transpower explained the intention further, as striking a balance between two constraints – resource available to deliver work, and funding (opex allowance) available to fund the work). This approach was taken in order to manage two opposing risks, over-funding due to under-delivery, and under-delivery.⁴⁰⁸

⁴⁰⁶ Above n 29, at 371.

⁴⁰⁷ Above n 29, at 307.

⁴⁰⁸ Above n 71, at 27.

I60 We challenged Transpower to provide further detail on how the deliverability adjustment might apply, and asked it to provide this in its submission on our Issues paper. Transpower explained that it expects the deliverability adjustment would likely be applied to predictive maintenance and preventive maintenance, and said:⁴⁰⁹

We expect the majority of the deliverability adjustment to be applied to predictive maintenance. We expect to mature our tools and processes, resulting in opportunities for improved cost-risk trade-offs allowing us to defer work (while managing risk to acceptable levels).

Transmission lines were identified as an area where forecast work volumes increase to a level that we consider will exceed service provider capacity to deliver. We are in the very early stages of identifying opportunities for improvements in predicting and planning for our ageing conductor fleet. We aim to be able to reduce the resource requirements of the work and mitigate potential resource constraints.

I61 We also asked Transpower to provide additional detail on how it may achieve efficiency gains that would enable it to undertake the necessary works. This was said to be a combination of gains that free resource capacity, gains that save costs and free up funding, and gains that are a combination of both.⁴¹⁰ It said:⁴¹¹

The key improvement processes we can point to now, and which are likely to have a bearing on deliverability, are as follows.

- Enhanced work packaging and optimisation. This can result in improved resource utilisation.
- Enhanced tools for understanding the resource demands of our work programme. This can help identify and address pinch points earlier.
- Our efforts to ensure service providers have sustainable contracts that provide appropriate incentives to invest in required capacity and capability (balanced against other commercial objectives). This helps balance cost and flexibility.
- Our move to working with project need windows in our core planning systems, rather than point estimates of the optimal need date. This better communicates the scope for delivery optimisation.
- Enhanced outage planning, which reduces programme disruption and churn.

⁴⁰⁹ Above n 71, at 44-45.

⁴¹⁰ Above n 71, at 27. Transpower also provided examples of how it considers it may continue to unlock these efficiencies (above n 71, at 28 and attachment D).

⁴¹¹ Above n 71, at 42.

I62 We consider that the maintenance deliverability adjustment compensates for the reduction in output due to potential resource constraints and accept Transpower's deliverability adjustment. Previous experience has shown that it is challenging to ramp up the resource to deliver additional work. We expected Transpower to start to ramp up its delivery in RCP2 and increase the likelihood of delivering the additional opex forecast during RCP3.

Predictive maintenance

I63 Predictive maintenance is performed to address defects identified during preventive maintenance or by the monitoring systems. Transpower stated that:

I63.1 it rectifies approximately 15,000 defects per year under Predictive maintenance; and

I63.2 there is some low impact outstanding additional work that may require intervention in a later period.⁴¹²

I64 As Transpower implements its risk-based approach to grid maintenance the amount of predictive maintenance is expected to increase and the amount of preventive maintenance decrease.

I65 Transpower uses the spend ratio between the predictive portfolio spend and total maintenance to assess the efficacy of its maintenance programme. Transpower's target ratio for transmission lines is 55%, and is 40% for substations. Currently the spend ratio for lines is close to the best practice target (the current ratio for substations is 27%).⁴¹³

Relevant considerations

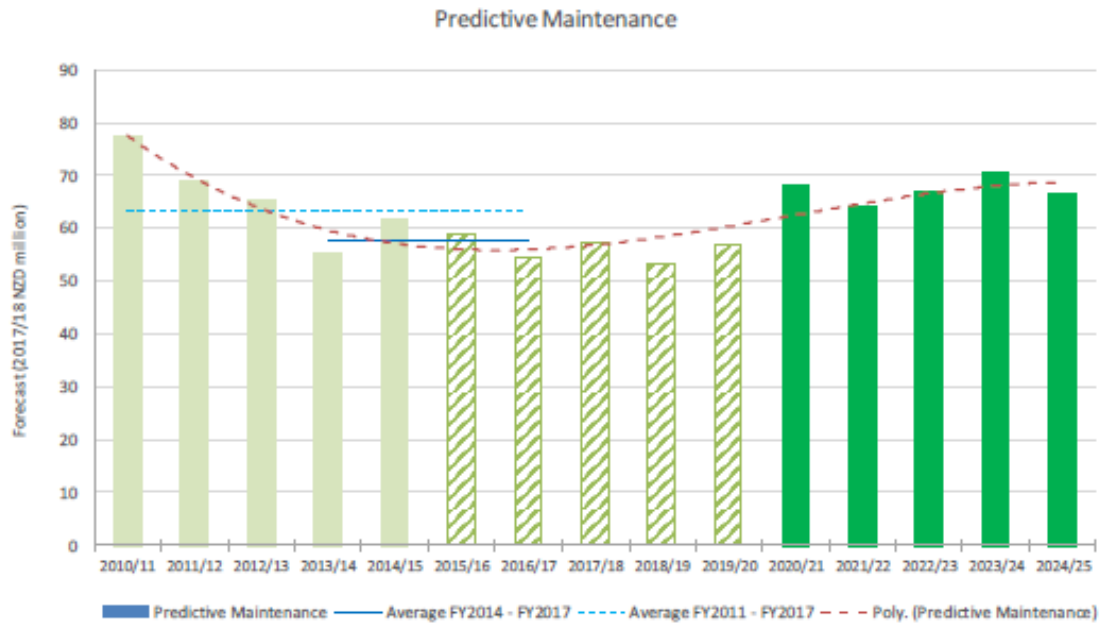
I66 The forecast for predictive maintenance is based on the base-step-trend approach. (\$268.5m based on 2017/18 expenditure plus a \$67.4m step change).⁴¹⁴

I67 Figure I4 shows the historical and forecast predictive maintenance. The increase for RCP3 is due to the additional forecast work included in the step change.

⁴¹² Transpower "Maintenance Opex Overview" (September 2018) at 10.

⁴¹³ Transpower "Maintenance Planning Framework" (September 2018) at 10.

⁴¹⁴ Above n 27, at 102.

Figure I4 Historical and forecast predictive maintenance⁴¹⁵

I68 The Verifier:

- I68.1 assessed that the 4% increase in predictive maintenance is consistent with Transpower's strategic focus on higher predictive maintenance where best value is achieved by predicting and trading-off maintenance against capital renewals, service levels, cost, risk and safety;⁴¹⁶
- I68.2 concluded that the adjusted base year of 2017/18 is reasonable. The Verifier based this decision on the average predictive maintenance between 2013/14 and 2016/17 and noted that the average is comparable with the expenditure in the base year of 2017/18;⁴¹⁷
- I68.3 agreed with Transpower that the projected increased impact of predictive maintenance is savings totalling \$2m per annum for the reintroduction of live-line work in RCP3;⁴¹⁸
- I68.4 was not able to verify that \$26m of the step increase is consistent with GEIP but concluded that it was prudent;^{419, 420} and

⁴¹⁵ Above n 29, at 318.

⁴¹⁶ Above n 29, at 321.

⁴¹⁷ Above n 29, at 320.

⁴¹⁸ Above n 29, at 322.

- 168.5 noted Transpower has advised that there is no trend applied to the RCP3 predictive maintenance forecasts and accepts the underlying trend in RCP2 and RCP3 does not support any trend in expenditure.⁴²¹
- 169 We agree with the Verifier that an increase in predictive maintenance is consistent with Transpower's maintenance strategy, but consider that there should be a corresponding reduction in preventive maintenance. We discuss this further under the section on preventive maintenance.
- 170 We agree with the Verifier's reasoning that 2017/18 is an appropriate base year because it represents the latest audited maintenance costs that has incurred, and it should include any efficiency improvements realised so far in RCP2.⁴²²
- 171 We have re-assessed the step component of the predictive maintenance forecast. Our assessment is summarised in Table I4 below.⁴²³

Table I4 Summary of the step components of predictive maintenance

Drivers	Transpower Forecast (\$m)	Commission accepts for draft decision (\$m)	Comments
Asset health – additional opex to manage older assets⁴²⁴	10.4	5.2	The Verifier could not verify that this \$5.2m step change as being consistent with GEIP but was satisfied it is prudent. Refer to paragraph I71 for more detail.
Maintenance of conductor hardware	9.5	9.5	Project is to replace degraded vibration dampers and spacers. Replacement is necessary to avoid degradation in conductor condition but is partly a result of deferred maintenance. Our draft decision is based on verification assessment that this expenditure forecast meets GEIP.

⁴¹⁹ Note that the values of the step are different in the Verifier report (\$62.2m) and Transpower's proposal (\$60.1m plus \$7.3m). The difference was due to an increase of \$5.2m in opex to manage older assets. However, Transpower has since returned to its lower figure.

⁴²⁰ Above n 29, at 325.

⁴²¹ Above n 29, at 322.

⁴²² Above n 29, at 322.

⁴²³ Above n 27, at 102.

⁴²⁴ In Transpower's proposal this amount is \$10.4m and in response to our RFI, Transpower modified this to \$5.2m (same as in the Verifier report).

Drivers	Transpower Forecast (\$m)	Commission accepts for draft decision (\$m)	Comments
<i>RCP4 and RCP5 programme support</i>	18.5	18.5	<p>This expenditure is for additional testing and data collection.</p> <p>The Verifier was unable to assess this as consistent with GEIP but considered it as prudent.</p> <p>We are satisfied that this work is necessary for the efficiency of the anticipated conductor replacement projects, but have some concerns with the accuracy of forecasting and made allowances for this in the overall step allowance.</p>
<i>Deferred maintenance</i>	14.3	14.3	<p>This includes the following components in Transpower's proposal - Attachment points (\$8.9m), steel and bolt (\$2.9m), deferred maintenance (\$2.5m).</p> <p>The Verifier assessed this as consistent with GEIP.</p> <p>We agree with the Verifier and we accept the proposed expenditure.</p>
<i>General maintenance of switchyard facilities</i>	2.6	2.6	<p>This includes maintenance of switchyard gravel and fencing, and appears to be due to deferred maintenance.</p> <p>The Verifier assessed this as consistent with GEIP.</p> <p>We accept the proposed expenditure.⁴²⁵</p>
<i>Health and safety</i>	4.8	4.8	<p>Additional cost for managing earth potential rise⁴²⁶ seems to be accelerating the works.</p> <p>Transpower advised that the additional cost is due to temporary mitigation of asbestos such as protection equipment, temporary barriers and tunnels.</p> <p>Verifier assessed this as consistent with GEIP.</p> <p>We accept the proposed expenditure.</p>
<i>Earth switch</i>	3.0	3.0	<p>Maintain rather than replace. The Verifier assessed this as consistent with GEIP.</p> <p>We accept the proposed expenditure.</p>

⁴²⁵ In RCP2, \$10m of opex was provided for substation building painting and refurbishing, switchyard surfacing and road maintenance, but not for fencing so this is potentially excluded from the base.

⁴²⁶ The electrical potential difference between different points, due to electric current flowing into the earth. If this difference in voltage between the two points is too great, there is a risk of electrocution where a person's step or touch forms a connection between the two points.

Drivers	Transpower Forecast (\$m)	Commission accepts for draft decision (\$m)	Comments
Auckland ageing assets – defer replacement via additional opex.	2.3	2.3	This cost is for assets that may be decommissioned. The Verifier was unable to assess this as consistent with GEIP. We accept this expenditure but have some reservations on the scope. (This is one of the things addressed by the forecasting adjustment.)
Tower painting within the minimum approach distance	2.0	0.0	Verifier assessed this as consistent with GEIP. We consider that this should be part of the tower painting capex and do not accept the proposed expenditure.
Forecasting adjustment		-6	Refer to the section on forecasting adjustment below.
Total	67.4	54.2	

172 Our assessment of the ‘step’ components is to:

172.1 accept the step change component “asset health”. The Verifier could not verify that this step change satisfies GEIP but considered that this is prudent. We accept the following explanations given by Transpower:

172.1.1 replace the oil of critical transformers with corrosive sulphur in the oil: this is to reduce the risk of premature transformer failures due to corrosive sulphur;⁴²⁷ and

172.1.2 gas insulated switchgear (GIS) testing and repairs: the additional work includes expert review of GIS and gas and partial discharge testing;⁴²⁸

172.2 accept the component “RCP4 and RCP5 programme support” since this has the potential to provide a more informed forecast of upcoming transmission line work;⁴²⁹

⁴²⁷ Transpower’s response to RFI042 - Risk informed maintenance and predictive maintenance step change.

⁴²⁸ Above n 316, at 107.

⁴²⁹ In its submission on the Issues paper, Genesis expressed “Our view is that facilitating necessary transmission and generation investment should be better addressed in the planning for RCP3 as well as future regulatory periods.” Genesis “Consultation on key issues for Transpower’s IPP reset for RCP3” (28 February 2019), at 1.

- I72.3 accept all “deferred maintenance components”. Refer to our discussion at paragraphs I18 to I22 above of how IRIS treats deferred expenditure;
- I72.4 accept the additional opex for “Health and safety work”. This includes an allowance for asbestos work which is in addition to the amount we have already funded in RCP2 through a cost-recovery mechanism; and
- I72.5 reject the forecast for “tower painting” within the minimum approach distance. This should either be already funded by the tower painting capex or is included in the base opex.

Forecasting adjustment on step change

I73 We have made a forecasting adjustment to the step forecast because:

- I73.1 Transpower has applied for \$26.4m of predictive maintenance to address deferred maintenance;⁴³⁰
- I73.2 We note that in the first three years of RCP2, Transpower has under-delivered its maintenance opex by \$21.4m;
- I73.3 Transpower’s forecast for the last two years of RCP2 does not show that Transpower is making up for this under-delivery. This indicates that most of the under-delivery is deferring work that is not required in RCP2 but was included in the RCP2 forecast;
- I73.4 While Transpower has improved its approach to forecasting it still does not have complete information on the condition of its assets particularly in respects to work covered under the step increases. There is no evidence to suggest that the forecasts for RCP3 exclude all work that would not be needed to be delivered in RCP3;
- I73.5 Given that the base component of the forecast reflects all delivered work, any over-forecasting would be in the step component of predictive maintenance forecast. Based on RCP2 disclosures and forecast, we estimate an over forecast of \$6m;
- I73.6 We therefore have adjusted the predictive opex allowance (“forecasting adjustment”) by (\$6m) to address this concern; and
- I73.7 We are satisfied that the forecasting adjustment does not impede Transpower’s plans to enhance service provider capability.

⁴³⁰ Further details are in Table I4 above.

High-level overview of our draft decision on maintenance opex

174 Table I5 and Table I6 outline the amounts of maintenance opex we have approved, and how they compare to Transpower's proposal.

Table I5 Summary of predictive maintenance forecast by components

Components	Description	Transpower's proposal (\$m) ⁴³¹	Draft decision (\$m)
Base amount	Based on the 2017/18 base year (\$57.4m) with a one-off amount of \$3.7m for aerial lines survey removed (\$53.7m) because this work is covered under an increased step component in RCP3.	268.5	268.5
Steps	The components of predictive maintenance during RCP3 are shown in Table I1.	67.4	54.2
Trends	There is no trend.	0	0
Total		335.9	322.7

Table I6 Summary of draft decision for Predictive maintenance

	FY20/21	21/22	22/23	23/24	24/25	RCP3 total
Transpower proposal	68.1	64.2	66.8	70.3	66.5	335.9
Approved for draft decision	65.4	61.6	64.2	67.6	63.9	322.7

Preventive maintenance

175 Preventive maintenance is delivering time-based maintenance activities, such as routine checks, to assess condition and carry out routine services.

176 The main preventive maintenance activities are:

176.1 Inspections, non-intrusive checks, patrols and functional testing to confirm safety and integrity of assets, checking continued fitness for service, and identifying follow-up work;

176.2 Condition assessments and condition monitoring – periodic measurement activities performed to monitor asset condition and to provide systematic data for analysis; and

⁴³¹ Above n 27, at 102.

176.3 Servicing – routine tasks performed on the asset to ensure that its condition remains at an acceptable level.

177 Defects found during preventive maintenance are addressed under predictive maintenance.

Relevant considerations

178 Transpower forecasted preventive maintenance using volumes of work and unit rates associated with those work tasks. Maximo, Transpower’s asset management application software, stores the standard maintenance procedures (**SMPs**) that determine the volume of work associated with each task.

179 The Verifier recommended that we accept Transpower’s forecast. The Verifier:

179.1 assessed that Transpower’s approach of forecasting using standard jobs and costs allows for direct link between maintenance work planning and risk assessment of maintenance programmes to support works prioritisation.

179.2 considered that this approach provides a sound basis for forecasting preventive maintenance expenditure but noted that in Australia the AER did not endorse this approach.

179.3 concluded that the RCP3 preventive maintenance forecast satisfies the expenditure outcome having regard to GEIP on the basis that RCP3 forecasts are consistent with the spending in RCP1 and RCP2.⁴³²

180 We have some concerns with preventive maintenance:

180.1 we expect preventive maintenance to reduce over time as Transpower implements reliability-based maintenance practice;

180.2 however, we see that the preventive maintenance forecast for RCP3 is greater than that for RCP2.

⁴³² Above n 29, at 315-317.

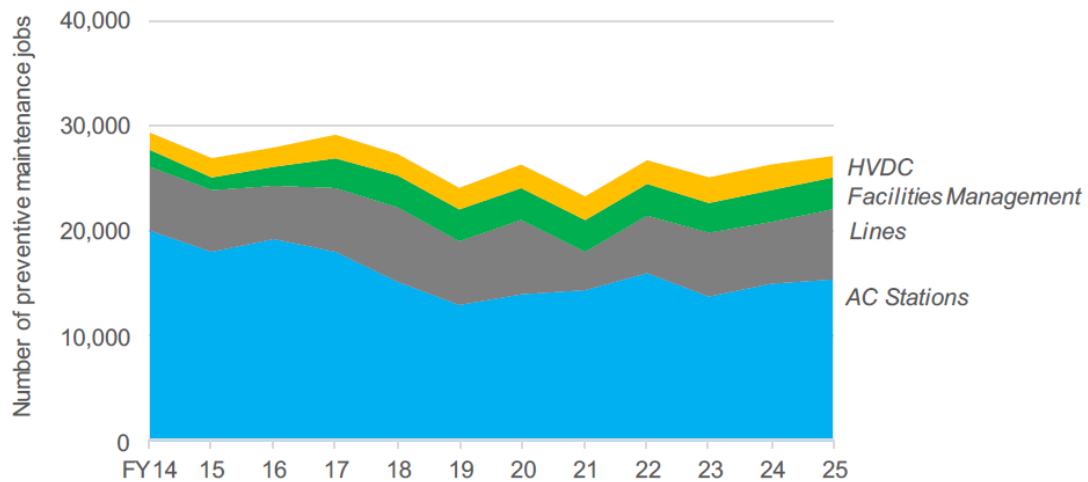
Figure I5 Preventive maintenance work volumes⁴³³

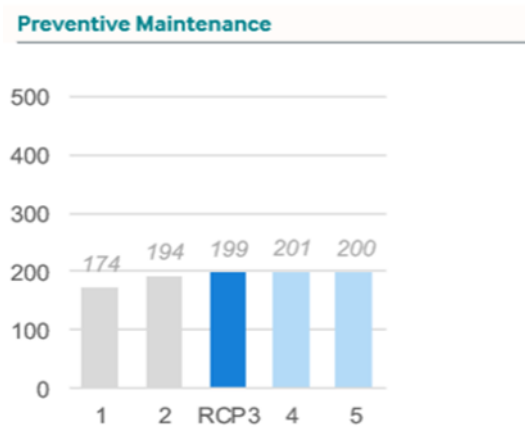
Figure 51: Preventive maintenance work volumes

- 181 Since RCP1, we have recommended that Transpower adopts a risk-based approach to maintenance. In response, Transpower is transitioning to reliability-informed maintenance (RIM) in RCP2 and then full optimisation in RCP3. Transpower's information shows that the transition to RIM reduced the volume of preventive maintenance work in RCP2 but the trend seems to increase in RCP3. The volume is shown in Figure I5 above.
- 182 Transpower has indicated that this is due to increases in its asset base and additional maintenance activities. We expect the optimisation planned in RCP3 would reduce the number of maintenance jobs in this portfolio. As noted above, Transpower is yet to achieve its 'best practice' levels of preventive and predictive maintenance.
- 183 Transpower has also signalled:⁴³⁴
- Ongoing improvement initiatives (preventive maintenance optimisation and Reliability Informed Maintenance processes) will continue and may identify further optimisation opportunities during RCP3. These opportunities can involve removing activities from our maintenance schedules, which can have the dual benefit of reducing costs and releasing capacity.
- 184 Transpower forecasts an increase in preventive maintenance in RCP3 and later, as shown in Figure I6.

⁴³³ Above n 27, at 104.

⁴³⁴ Above n 71, at 44.

Figure I6 Historical and forecast preventive maintenance (\$m 2018/18 constant)⁴³⁵



185 The main reasons for this increase are additional costs for field work and management services fees, as shown in Figure I7.

Figure I7 Preventive maintenance by category (per annum)⁴³⁶

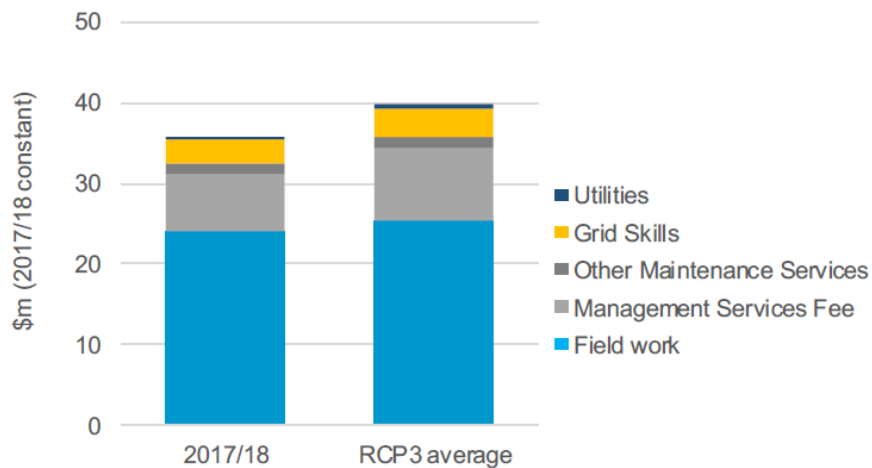


Figure 52: Composition of predictive maintenance forecast

186 Transpower explained the additional maintenance service fees as follows:⁴³⁷

There has been an increase in the complexity of the jobs, with the addition of new maintenance tasks combined with increased costs associated with health and safety activities, for example. This has increased costs for individual jobs. However, we are confident that the costs are efficient as the work is outsourced to service providers and is driven by market forces.

⁴³⁵ Above n 27, at 108.

⁴³⁶ Above n 27, at 105.

⁴³⁷ Above n 427.

The average Management services Fee for RCP3 was based on the contracted re-price for the 2018/19 during the 2017/18 year). This increase cost, when compared to 2017/18, is due to the increase in complexity for some job types and the reduction in live line work that resulted in more back support for planning purposes. There was also an adjustment due to under-recovery of costs by some providers in previous years.

- I87 Our draft decision is to accept Transpower's proposed forecast. We accept Transpower's argument that some of the jobs have become more complex due to reasons, such as health and safety requirements. We note that Transpower can offset the adjustment due to under recovery during RCP2 and use the resulting savings for maintenance expenditure in RCP3.

Draft Decision

- I88 Our draft decision is to accept Transpower's proposed preventive maintenance opex of \$198.8m (in 2017/18 prices). Table I7 shows Transpower's forecast.

Table I7 Summary of approval of Preventive maintenance

	FY20/21	21/22	22/23	23/24	24/25	RCP3 total
Transpower proposal	38.6	39.3	39.7	40.4	40.8	198.8
Accept	38.6	39.3	39.7	40.4	40.8	198.8

Corrective and Proactive maintenance

- I89 Corrective maintenance is responding to faults or performing maintenance work on failed equipment.
- I90 Proactive maintenance is improvement work driven by reliability analysis of either assets or design.
- I91 These maintenance activities are difficult to predict and Transpower has used a base-step-trend approach for forecasting these portfolios.

Draft decision

- I92 Our draft decision is to accept Transpower's proposed corrective and proactive maintenance, shown in Table I8.

Table I8 Summary of approval for draft decision of Proactive and Corrective maintenance

	FY20/21	21/22	22/23	23/24	24/25	RCP3 total
Corrective maintenance						
- Proposed	3.0	3.0	3.0	3.0	3.0	15.0
- Draft decision	3.0	3.0	3.0	3.0	3.0	15.0
Proactive maintenance						
- Proposed	0.5	0.5	0.5	0.5	0.5	2.5
- Draft decision	0.5	0.5	0.5	0.5	0.5	2.5

Attachment I.3: Further detail on AM&O opex

Asset management and operations

I93 Asset Management and Operations (**AM&O**) contains the staffing costs for planning and management of grid work. Transpower described the key activities that AM&O carries out as:⁴³⁸

- long-term strategic planning for network assets while providing the required service levels,
- tactical planning to develop solutions to maintain and enhance the asset base in line with the long-term development strategies,
- programming and scheduling of works based on the portfolio plans developed in the decision framework,
- safe and efficient delivery of project-based enhancements, refurbishments and renewals,
- interfacing with service providers for scheduling and efficient delivery of maintenance programmes, and
- efficient day-to-day grid operation and real-time management of operating centres.

I94 Costs within this portfolio may be capitalised to specific projects, once the required degree of certainty is reached. The AM&O opex forecast relates to the uncapitalized (operating) costs.

⁴³⁸ Above n 27, at 109.

I95 Transpower proposed \$309.5m in opex within AM&O over RCP3. This comprises:⁴³⁹

I95.1 Base-year amount of \$62.9m (\$62.2m base year, with an upwards adjustment of \$0.6m, largely attributable to atypically low investigations work in the base year);

I95.2 Three steps that net off as zero:

I95.2.1 decrease in expenditure due to RCP2 initiatives;

I95.2.2 increases in pre-capex investigations;

I95.2.3 increases in strategic investigations;

I95.3 Four trend factors that total a \$4.8m decrease in expenditure over RCP3:

I95.3.1 \$2.7m growth in black start⁴⁴⁰ and over-frequency event⁴⁴¹ costs;

I95.3.2 \$0.6m in event charges;

I95.3.3 \$3.1m decrease due to an expected 0.2% productivity gain; and

I95.3.4 \$5m decrease, attributable to efficiency gains from ICT capex.

I96 AM&O expenditure has increased since RCP1, but is forecast to stabilise from the base year onwards (see Figure I8). The Verifier sets out the changes over this period as follows has explained the increasing trend in expenditure since RCP1 as follows:⁴⁴²

During RCP1, Transpower decided to resume operational control activities, such as maintenance scheduling from the external service providers to enable better integration of operations and maintenance activities. Maximo was introduced as the asset management information system to allow better scheduling of preventive maintenance and to store asset data and related condition assessment results. Previously external service providers were responsible for recording asset condition data.

⁴³⁹ Above n 27, at 112.

⁴⁴⁰ "Black start" refers to the ability to start a generator, without power input from the grid. This capability is necessary in the event that the grid becomes de-energised. Transpower contracts with generators who can provide this service, to help ensure the grid can be re-energised, allowing other generation to be brought on line, in the event of an island-wide black out. Refer <https://www.transpower.co.nz/system-operator/electricity-market/black-start> for further information.

⁴⁴¹ Electricity generation should be balanced with demand. Where generation exceeds demand, system frequency will rise. Certain generating units can be automatically disconnected, reducing the electricity entering the grid and helping restore balance to the system. Transpower enters into contracts with parties who can provide these generating units.

⁴⁴² Above n 29, at 328-330.

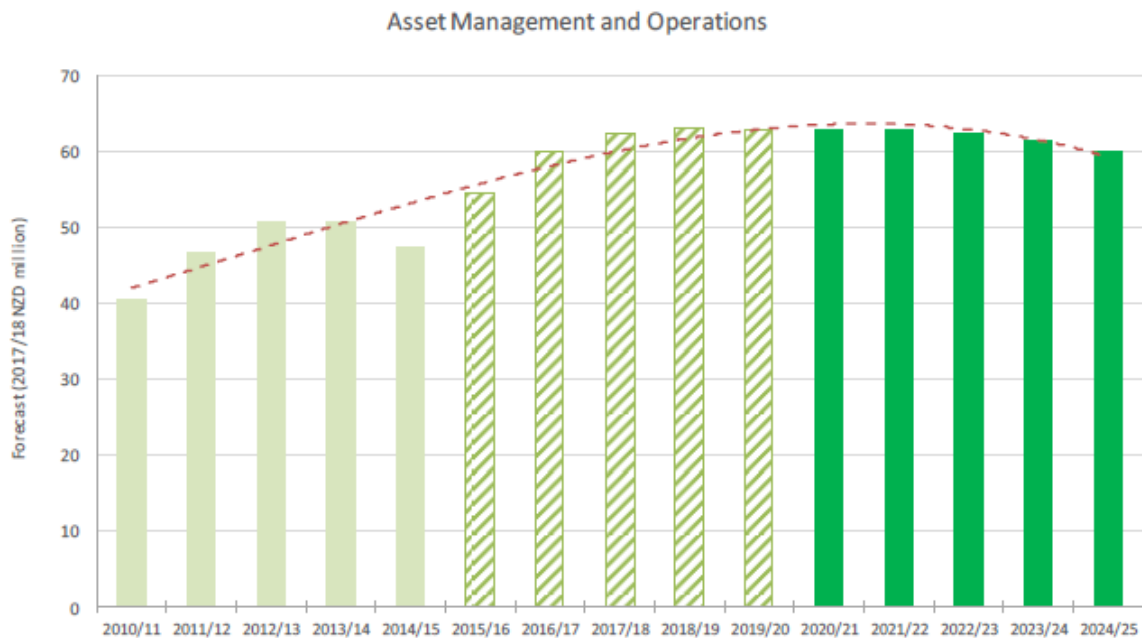
For RCP2, the maintenance planning changed to optimised, risk-based maintenance strategies using failure modes for many of the assets and continued time-based maintenance where it was more appropriate for other assets (such as power transformers and circuit breakers). This was supported by a review of frequency and scope of preventive maintenance work.

This fundamental change in maintenance philosophy required increased planning/scheduling resources through Maximo and the introduction of several new reliability-informed processes...

The increased planning and analytical work required additional asset management and operations staff. From Figure 93, this is apparent as a progressive increase in Asset Management & Operations expenditure from 2015/16 to 2017/18.

- 197 Transpower has indicated that it expects the same volume of work within RCP3 as in RCP2, although with a different makeup (the offsetting step changes).⁴⁴³

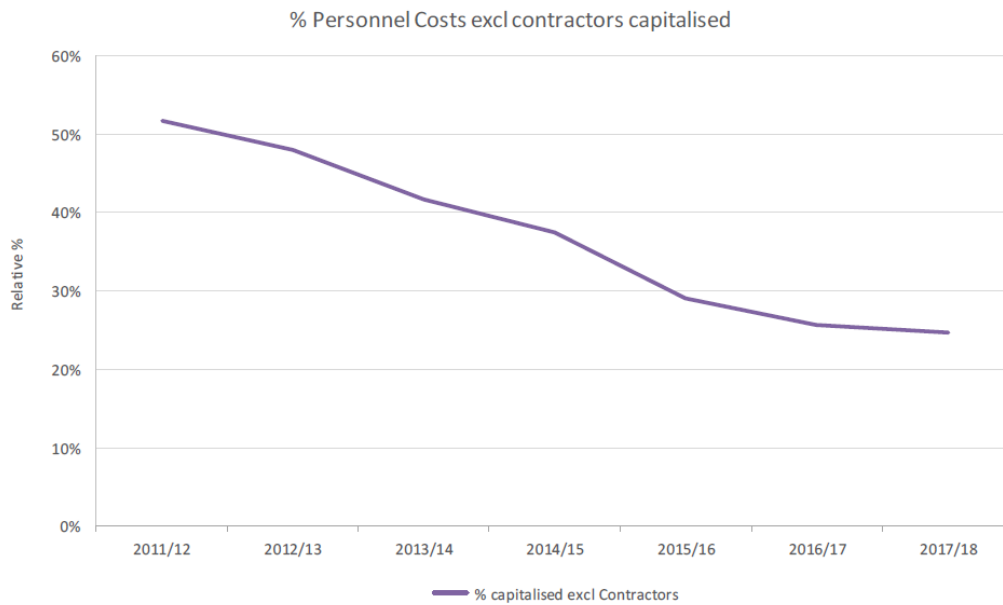
Figure I8 Annual AM&O Opex (RCP1-RCP3)⁴⁴⁴



- 198 However, since RCP1 the capitalisation rate has also decreased (see Figure I9). Where staff expense within AM&O cannot be capitalised, it will be included within AM&O opex. Assuming the same level of staffing, changes in the capitalisation rate will therefore directly affect the amount of AM&O opex.

⁴⁴³ Above n 27, at 109.

⁴⁴⁴ Above n 29, at 327.

Figure I9 Capitalisation of FTEs within AM&O⁴⁴⁵

The Verifier considered Transpower's proposed AM&O expenditure

- I99 In its review of Transpower's proposed expenditure, the Verifier focussed on the transition within AM&O, beginning with Transpower resuming operation control activities, which had previously been outsourced, and moving from a time-based maintenance strategy towards optimised, risk-based maintenance strategies with the introduction of the new asset management information system, Maximo.
- I100 The Verifier considered the level of staffing within AM&O over this time. Introduction of the new system and new processes in RCP2 required planning and scheduling resources, and the Verifier noted that we had challenged, but ultimately approved the number of full-time employees (**FTEs**) in RCP2, and that Transpower considered it had reached business-as-usual levels of staffing that was not expected to increase beyond RCP3. The Verifier also considered the transition from capex delivery to maintenance planning and the associated change in capitalisation rate.
- I101 In concluding, the Verifier said: ⁴⁴⁶

Whilst there is evidence of the shift from a major capital works to an enhanced maintenance planning focus and the supporting Asset Management and Maintenance Overview outlines qualitatively the activities and benefits of the current resource levels, we have not been able to verify the effectiveness of the increased number of FTEs planning the maintenance expenditure, particularly as the overall maintenance expenditure for RCP3 is only 4% higher than RCP2. However, a high-level comparison with Australian transmission utilities suggests Transpower is comparable with regards FTE numbers to total annual opex spend.

⁴⁴⁵ Above n 29, at 332.

⁴⁴⁶ Above n 29, at 335.

To provide greater confidence regarding the efficiency of the Asset Management and Operations, as well as effectiveness of the relatively new Grid Operating Model, we believe that Transpower should consider developing a business case detailing the number of FTEs in each division, their role and contribution to planning of the maintenance programme and a projected long-term benefit in monetary terms that is reasonably expected from their planning and investigative work.

- I102 The Verifier reviewed the forecast trend in black start costs and identified the benefits in productivity included from the ICT capex forecast, and concluded:⁴⁴⁷

We accept the 2017/18 base year as consistent with later year allowances for RCP2 previously approved by the Commerce Commission. The proposed trend and step changes for RCP3 have been verified, including the benefits from the RCP3 ICT capex programme, as part of the RCP3 forecast total of \$309.5 million.

- I103 The Verifier also considered the drivers of the steps and the expected trend, concluding:⁴⁴⁸

We have verified from the historic 'black start' costs from 2010 provided by Transpower, using NZ CPI as indexation, that the long-term average annual increase for these costs is approximately 4%. This increase is expected to be largely offset by a projected annual improvement in productivity of 0.2% based on estimated improvements in NZ professions, scientific and technical services sector.

We have verified that the RCP3 ICT capex forecast includes benefits totalling \$8.1 million (refer section 7.3.6), part of which is the driver for the productivity improvement of 0.2%.

We consulted on Transpower's AM&O expenditure

- I104 We identified the base level of AM&O expenditure as an area of interest, in our Issues paper, including staffing levels. We asked Transpower to provide further information on how the proposed expenditure fits into its preparation for future challenges.

- I105 Transpower provided this information in its submission on our issues paper, setting out its view that a focus on FTEs was overly narrow, setting out the key changes within AM&O since 2010/11, and the changing focus of work in RCP3, and in particular additional complexity of projects compared to RCP2.⁴⁴⁹

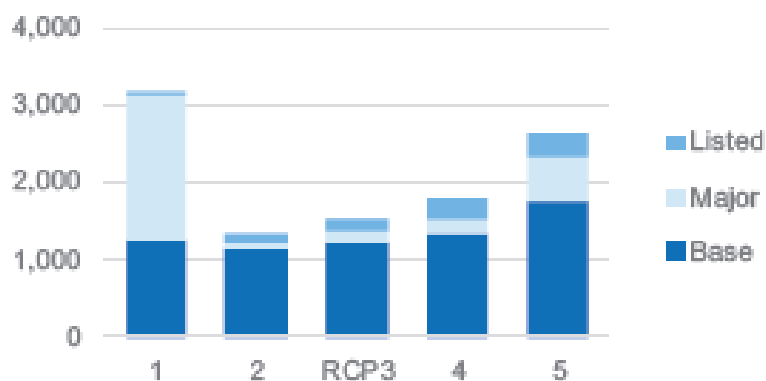
⁴⁴⁷ Above n 29, at 335.

⁴⁴⁸ Above n 29, at 334.

⁴⁴⁹ Above n 71, at 38-40.

Additional review

- I106 We reviewed the Verifier report against the base capex criteria, to the extent they were relevant. While we consider the work to be robust, there are gaps around the robustness of Transpower's internal challenge of forecasts, and its demonstration of cost effectiveness.
- I107 We also requested additional information from Transpower, to supplement the supporting information already provided to us.
- I108 Transpower's supporting documents provide an overview of the governance challenge to the forecast and are said to be consistent with internal policies and other expenditure forecasts.
- I109 Transpower provided additional information around the efficiency of the base year which we have considered (some of this information was also provided to the Verifier). This includes identified efficiencies generated in other areas, and included a qualitative explanation of a shift to more planning-intensive works (eg, a shift from power transformer or outdoor-to-indoor conversions, to increased work on substations).
- I110 After reviewing the AM&O opex, our view is that the increase in the amount of opex within this category was largely driven by the changing and increased activity in base capex and major capex, requiring more forward planning and coordination, with an associated decrease in capitalisation of planning and investigation work.
- I111 While base capex is relatively constant between RCP2 and RCP3, there is a shift towards increased work on transmission lines and secondary assets, which requires a greater degree of forward planning and scheduling (for example, outage management) than relatively standard transformer and switch yard conversions.
- I112 Major capex is also forecast to increase significantly over RCP3 and even more in RCP4. RCP4 major projects will likely require some amount of planning and investigations work to be carried out RCP3, and so affect the RCP3 opex. Capex for major and listed projects is forecast to increase from the RCP2 amount of \$167m, to \$314 in RCP3 and \$444m in RCP4. Reconductoring projects are also expected to increase over this period.
- I113 The increasing trend in major capex and listed projects is shown in Figure I10.

Figure I10 Total capex profile (\$m 2017/18)⁴⁵⁰

I114 We consider that appropriately targeted opex investment in AM&O would lead to efficiency gains in whole of asset lifecycle costs. Taking into consideration the improvements that are seen in Transpower's asset lifecycle systems and methods, we would expect there to be clearly identifiable and measurable benefit seen in RCP2 and built into the RCP3 forecast. However, the case for the benefits-driven ICT expenditure is not sufficiently demonstrated.

Energy Complaints Scheme

I115 The Energy Complaints Scheme, established under the Electricity Industry Act 2010 and the Gas Act 1992, operated by Utilities Disputes, provides a service to resolve complaints about distributors and retailers of electricity and gas. Transpower is required to be a member of this scheme.

I116 As a member, Transpower pays levies to fund the operation of the scheme. These levies form part of its AM&O expenditure.

I117 For RCP3, our draft decision is to treat these levies as a pass-through cost, which is the same treatment as applies for EDBs. This decision is discussed in Attachment J. Consequently, we do not need to include a forecasted amount for Energy Complaints Scheme levies in Transpower's opex allowance, and have reduced Transpower's allowance to compensate.

⁴⁵⁰ Above n 27, at 39.

Draft decision

- I118 Our draft decision is to accept \$309.2m AM&O opex. This is a reduction of \$0.4m from Transpower's proposal. This is on the basis that:
- I118.1 We are comfortable that the level of AM&O opex is consistent with the RCP2 expenditure;
 - I118.2 The Verifier found Transpower's personnel/expenditure ratio benchmarks comparable to Australian transmission networks;
 - I118.3 Transpower has a constant (ie, time-invariant) incentive to improve efficiency through the IRIS mechanism. Given that this mechanism has only been in place for a limited time, it is unlikely Transpower has discovered all efficiencies. However, it provides a constant incentive for Transpower to continue to pursue efficiency gains, which will be shared with consumers; and
 - I118.4 The reduction relates to Energy Complaints Scheme levies, which are to be treated as a pass-through cost.

Attachment I.4: Further detail on ICT opex

ICT opex

- I119 Transpower's ICT expenditure comprises three parts: ICT opex, ICT capex and staff costs which are included within Business Support. ICT opex falls into six categories:⁴⁵¹
- I119.1 **Leases:** the costs of leases for ICT components, such as fibre circuits, used to support core business functions;
 - I119.2 **Third-party support and maintenance:** third-party costs to deliver specialist outcomes, such as offsite backups;
 - I119.3 **Outsourced services:** where it is more practical and cost-efficient to use specialist providers;
 - I119.4 **Licenses:** software and hardware licenses;
 - I119.5 **Communications and Control:** third-party costs to maintain TransGO; and
 - I119.6 **Investigations:** pre-capex project activities exploring solutions options to deliver business outcomes.

⁴⁵¹ Above n 316, at 474-475.

I120 Transpower proposed \$195.9m in ICT opex over RCP3. This is a 2.3%, or \$4.3m increase over RCP2 expenditure. The RCP3 proposed expenditure comprises:⁴⁵²

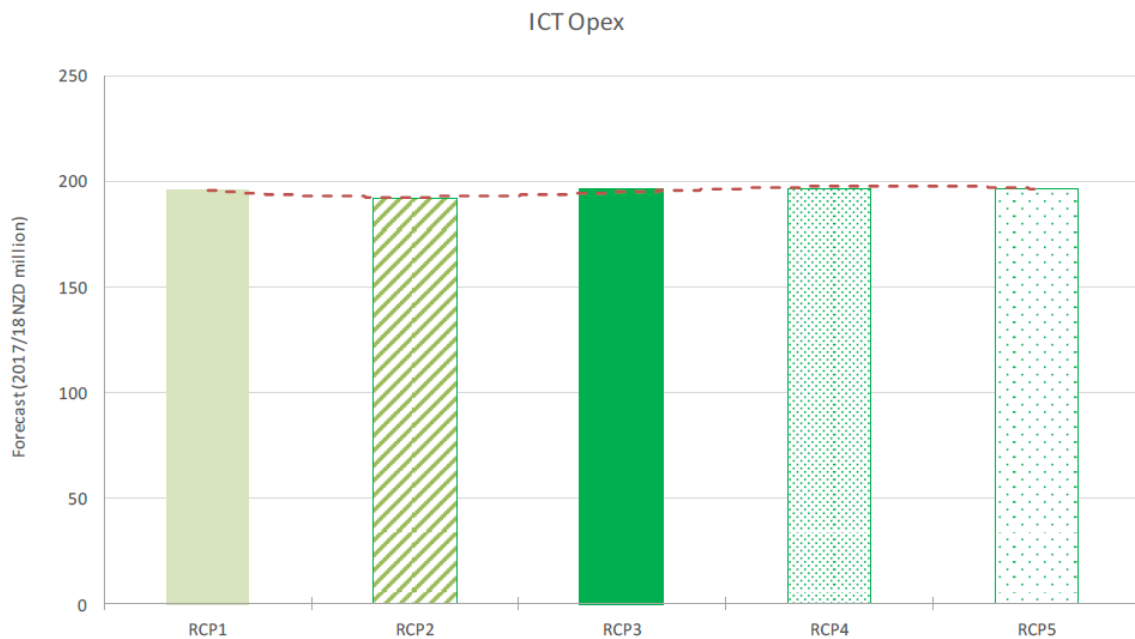
I120.1 Base-year amount of \$37.2m (\$37.4m base year, with a downwards adjustment of \$0.2m to match the forecast expenditure, as Transpower considered it to be more reflective of RCP3 costs than the actual);

I120.2 A number of steps that total \$9.9m. These are identified below, with regard to the individual categories that they relate to; and

I120.3 No trend factors.

I121 ICT opex expenditure has been, and is forecast to continue to be, relatively stable. Figure I11 shows the level of expenditure incurred or forecast over the RCP1 – RCP5 period.

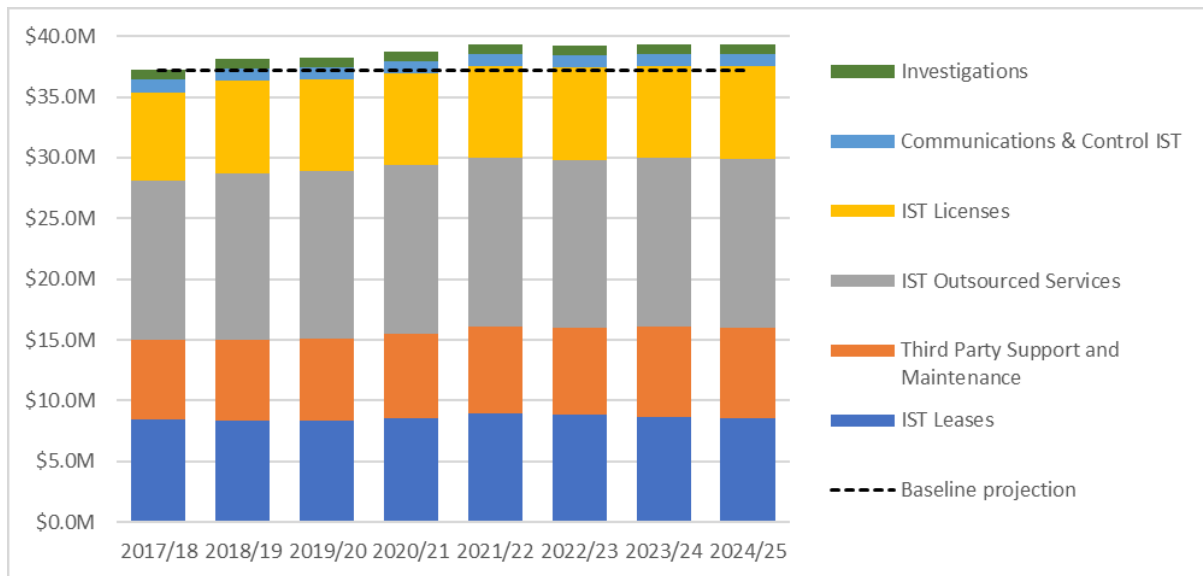
Figure I11 ICT Opex by RCP⁴⁵³



I122 Expenditure within the six categories is expected to be reasonably constant over RCP3, (see Figure I12). The small amount of variation in yearly expenditure is mainly attributable to Leases and Third Party Support and Maintenance, with the other categories remaining relatively consistent.

⁴⁵² Above n 27, at 122.

⁴⁵³ Above n 29, at 348.

Figure I12 ICT Opex by category⁴⁵⁴

I123 Although it was not an identified programme, the Verifier considered ICT opex.

I124 The Verifier noted that:⁴⁵⁵

There are three key steps in Transpower's planning process:

- identifying operational impacts of any planned capital investment;
- considering relevant trends in the ICT industry; and
- internal challenge to anticipated changes to operational support with regards to deliverability and cost effectiveness.

I125 The main factors influencing the RCP3 forecast were identified by the Verifier as:⁴⁵⁶

- a move to enterprise applications being standard solutions delivered via a public cloud, with more focus on managing interfaces;
- critical services to be retained in Transpower-managed data centres;
- DevOps initiative to deliver operational efficiencies through effective resourcing, enhanced delivery and operational automation and better overall operations reliability;
- ongoing investment in cybersecurity; and

⁴⁵⁴ Above n 29, at 351.

⁴⁵⁵ Above n 29, at 349.

⁴⁵⁶ Above n 29, at 349.

- deferring the TransGO upgrade to RCP4 requiring leasing of additional network capacity for substation data.

I126 The Verifier concluded:⁴⁵⁷

The step changes proposed for RCP3 are clearly defined, as is the strategic link from the overall corporate direction for Transpower to the ICT necessary to support the current corporate initiatives.

I127 While we asked stakeholders to comment on the efficiency of the base year for opex forecasts, we did not identify specific issues with ICT opex in our Issues paper. We did not receive submissions in relation to this opex category.

Our view

I128 The forecast for RCP3 is consistent with the RCP2 expenditure, representing only a small increase, and is consistent with expenditure in past RCPs, and the future forecast.

I129 The base year is lower than previous RCP2 years. The step changes also seem to be supported by the planning process set out above, with links between capex or ICT trends identified by Transpower.

I130 We also considered information provided by Transpower relating to the various categories of expenditure within ICT opex. The proportions are expected to be reasonably constant over RCP3 (see Figure I12 above), with low variation.

Leases

I131 The \$8.5m in Lease costs are largely attributable to a small number of items. Fibre leases constitutes \$7.25m (85% of the base amount), and over half of the remainder is attributable to Phone Rental and Usage, and Radio Circuits.⁴⁵⁸

I132 Leases contains two step changes that total \$1.2m. An increase in expenditure of \$2.6m is expected for leased network capacity in order to defer upgrading the TransGO network, and this is partially offset by a forecast decrease in expenditure of \$1.4m due to a capex project reducing the operation cost of fibre leases.⁴⁵⁹

⁴⁵⁷ Above n 29, at 353.

⁴⁵⁸ Above n 316, at 476.

⁴⁵⁹ Above n 29, at 352.

Third Party Support and Maintenance

- I133 Approximately half of the \$6.5m expenditure within this category relates to four items,⁴⁶⁰ with the remainder said to be from a variety of third-party service providers with relatively low (less than \$0.1m) individual costs.⁴⁶¹
- I134 Steps within this category total \$3.6m. They include increased security service solutions replacing on site solutions (\$1.9m), additional LANs at substations (\$1.0m), and general support and maintenance for new and expanded ICT services supporting business outcomes using new technology (\$0.7m).⁴⁶²

Outsourced services

- I135 The \$13.1 base expenditure within this portfolio is composed of five categories. The main costs making up the current expenditure within this category are:⁴⁶³
- I135.1 \$4.5m – infrastructure support (servers and desktops);
 - I135.2 \$4m – operations management of the TransGO network by specialist providers supporting the Transpower Network Operations Centre;
 - I135.3 \$2m – data centre facilities management;
 - I135.4 \$1.8m – amortisations of telecommunications service fees; and
 - I135.5 \$1.1m – service desk costs.
- I136 Three step changes totalling \$3.6m were identified:⁴⁶⁴
- I136.1 \$1.9m for cloud services. This is said to reduce capex costs, and the support requirement for commodity systems and adopting new (cloud native) technologies;
 - I136.2 \$1.0m for connection fees (to third-party core data traffic service) increase; and
 - I136.3 \$0.7m for electricity costs for Data Centres (contracted rise).

⁴⁶⁰ Provision of managed security services (\$1.5m), provision of support by GE for critical systems (SCADA/EMS) (\$0.5m), Inter Control-Centre Communications Protocol support (\$0.5m), Enterprise Application support (\$1.0m).

⁴⁶¹ Above n 316, at 476.

⁴⁶² Above n 29, at 352.

⁴⁶³ Above n 316, at 477.

⁴⁶⁴ Above n 27, at 123.

Licenses

- I137 The base amount of \$7.3m is largely attributable to licenses from four main vendors.⁴⁶⁵
- I137.1 \$1.5m Oracle database licences;
 - I137.2 \$1.1m IBM licences;
 - I137.3 \$900,00 Microsoft select licences;
 - I137.4 \$650,000 Checkpoint licences (software security); and
 - I137.5 the remainder (approximately \$3.15m) comprises the remaining software packages used across Transpower.
- I138 Transpower also forecasted a \$1.5m step due to increases in Microsoft licenses.

Communications and control

- I139 Transpower considered the current level of \$1.0m annual expenditure to be long-term sustainable, based on current operational needs, without step changes.⁴⁶⁶

Investigations

- I140 Transpower proposed maintaining the \$0.8m annual expenditure at its current level.⁴⁶⁷

EMCa review

- I141 We engaged EMCa to test the ICT capex and opex programmes as a whole. In its report, EMCa has provided a high-level overview of ICT expenditure trends in Australia. While it identified difficulties in forming reliably views on ICT trends due to inconsistencies relating to data and categorising expenditure, it noted that Transpower's trend in increasing opex was consistent with the outlook for Australian distribution network service providers.⁴⁶⁸

⁴⁶⁵ Above n 316, at 477.

⁴⁶⁶ Above n 316, at 478.

⁴⁶⁷ Above n 316, at 478.

⁴⁶⁸ We intend to publish EMCa's final report in the near future.

- I142 Although the EMCa report recommended a reduction in business support costs associated with ICT opex, it did not recommend reductions in the opex allowance for ICT opex. However, it recommended ways in which Transpower could strengthen its future expenditure proposals, including by:
- I142.1 providing a more explicit link between historical RCP3 expenditure and proposed RCP4 expenditure in its planning documents;
 - I142.2 providing more compelling needs analysis (including risk assessment), options analysis, and cost estimates in business cases (even preliminary versions); and
 - I142.3 adopting NPV analyses, with a well-defined counterfactual as the basis for project and programme options comparison and selection.
- I143 To progress these recommendations, we intend to issue an information request during RCP3 for appropriate information from Transpower in mid-RCP3. We think this will help us identify ICT trends at that time, and how Transpower is responding in respect of the three areas for improvement identified above.
- I144 This will enable us to better incorporate a more specific review of ICT expenditure of areas that may need greater focus when we set the terms of reference for the RCP4 Verifier.

Draft decision

- I145 Our draft decision is to approve the proposed \$195.9m of opex within this portfolio.
- I146 Our draft decision is on the basis that:
- I146.1 The proposed RCP3 ICT opex is only a small increase over the RCP2 expenditure;
 - I146.2 We agree with the Verifier's finding that the step changes are clearly defined, and linked to the overall corporate direction; and
 - I146.3 Transpower has a constant (ie, time-invariant) incentive to improve efficiency through the IRIS mechanism. Given that this mechanism has only been in place for a limited time, it is unlikely Transpower has discovered all efficiencies. However, it provides a constant incentive for Transpower to continue to pursue efficiency gains, which will be shared with consumers.

Attachment I.5: Further detail on Business Support opex

Business support

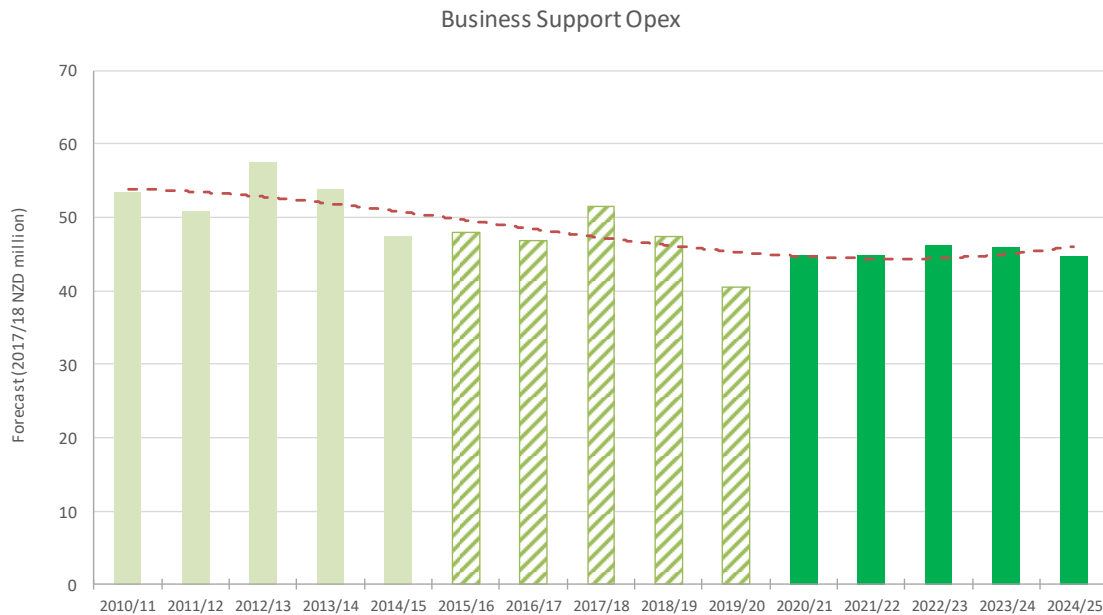
- I147 The Business Support category covers personnel and service related costs for four operating divisions:⁴⁶⁹
- I147.1 IST: responsible for developing and maintaining ICT systems for grid and non-network functions, enterprise information management and ICT strategy and architecture.
 - I147.2 The Chief Executive (CE) Office: responsible for governance and key advisory functions across the business, including corporate legal counsel, corporate communications.
 - I147.3 Corporate Services: responsible for providing financial support, treasury services, strategic planning, regulatory relationship management and corporate governance to Transpower.
 - I147.4 People: responsible for Transpower's human resources function, Health & Safety advisory services, management of technical training programmes and facilities management.
- I148 The proposed business support costs represent a decrease compared to RCP2, and Transpower forecasts business support opex to stabilise at the proposed level, from RCP3 to RCP5.⁴⁷⁰
- I149 The 2017/18 base-year amount is \$45.2m, comprising \$50.1m base-year expenditure less a net downwards adjustment of \$4.8m, which reflects three atypical amounts:
- I149.1 Transformation programme costs: -\$5.2m;
 - I149.2 RCP3 project costs: -\$1.3m;
 - I149.3 Atypical vacancies: \$1.4m; and
 - I149.4 Building lease cost increase: \$0.3m.
- I150 One step change was identified, totalling \$2.6m for preparation costs of the RCP4 proposal.

⁴⁶⁹ Above n 29, at 336-337.

⁴⁷⁰ Note that the proposal includes \$19.1m of operating leases, which will be instead capitalised under GAAP from July 2019. Treatment of these leases is considered under its own workstream and is not discussed further here.

- I151 A trend factor of 0.2% increasing productivity was applied, which is equivalent to \$2.3m in savings over RCP3.
- I152 The total Business Support opex proposed for RCP3 is \$226.5m, being \$10.8m less than the RCP2 amount. The trend in actual and forecast annual business support opex is set out in Figure I13 and reflects decreasing business support opex since RCP1.

Figure I13 Annual Business Support Opex (RCP1-RCP3)⁴⁷¹



- I153 The Verifier considered Business Support opex at a high level and concluded that the decreasing trend in costs in RCP3 is consistent with the corporate strategies previously reviewed as part of the RCP2 proposal review process and reflects an organisation that continues to deliver cost efficiencies in both Grid and non-grid activities.
- I154 While we asked stakeholders to comment on the efficiency of the base year for opex forecasts, we did not identify any specific issues with Business Support opex in our Issues paper. We did not receive any submissions in relation to this opex category.
- I155 While the Verifier considered that the trend reflects continuing cost efficiencies, we considered it prudent for us to scrutinise from a bottom-up approach.

⁴⁷¹ Above n 29, at 337.

I156 We considered additional information provided by Transpower as part of its proposal, as well as requesting additional information. These supporting documents provided evidence of Transpower's approach to applying governance challenges to its forecast, and how it attempts to ensure costs are efficient.

EMCa review

I157 As staff costs within the IST operating division fall within business support, this was assessed as part of the review of Transpower's ICT expenditure, carried out by EMCa. In carrying out this assessment, EMCa had regard to good industry practice, their experience in this area, and Transpower's responses to specific requests for additional information.

I158 EMCa considered the size of the six service groups within the division:

I158.1 GM IST;

I158.2 Digital Technology Services;

I158.3 Network and security services;

I158.4 Enterprise Services;

I158.5 Critical services; and

I158.6 Strategy and architecture.

I159 EMCa considered the size of the majority of these service groups to be reasonable, having regard to the work performed. However, it considered the size of Enterprise Services to be large compared to similar organisations and taking into account that the majority of systems and services it supported were outsourced to external providers or purchased as Platform as a Service. It assessed opex attributable to this service group as being high, and recommended we reduce business support opex by \$5.9m.

I160 We have considered this recommendation. We consider this to reflect that the overall expenditure on Enterprise Services may be high compared to similar organisations. We have made a corresponding reduction, for the purpose of the draft decision. We welcome submissions on the report and on this draft adjustment.

Draft decision

I161 Our draft decision is to approve the proposed \$220.6m of opex within this portfolio.

I162 Our draft decision is on the basis that:

- I162.1 While the 2017/18 base year is higher than previous years in RCP2, and also exceeds the forecast for future years, Transpower has made material downwards adjustments that result in a base expenditure that is less than these years (with the exception of the forecast 2019/20 expenditure);
- I162.2 The RCP3 forecast represents a decrease compared to RCP2, suggesting Transpower is finding efficiencies in this area;
- I162.3 The Verifier's top-down review concluded that the decreasing trend reflects an organisation that continues to deliver cost efficiencies;
- I162.4 Transpower has a constant (ie, time-invariant) incentive to improve efficiency through the IRIS mechanism. Given that this mechanism has only been in place for a limited time, it is unlikely Transpower has discovered all efficiencies. However, it provides a constant incentive for Transpower to continue to pursue efficiency gains, which will be shared with consumers; and
- I162.5 The \$5.9m reduction reflects that ICT expenditure is higher than would be expected.

Attachment I.6: Further detail on insurance opex

Insurance overview

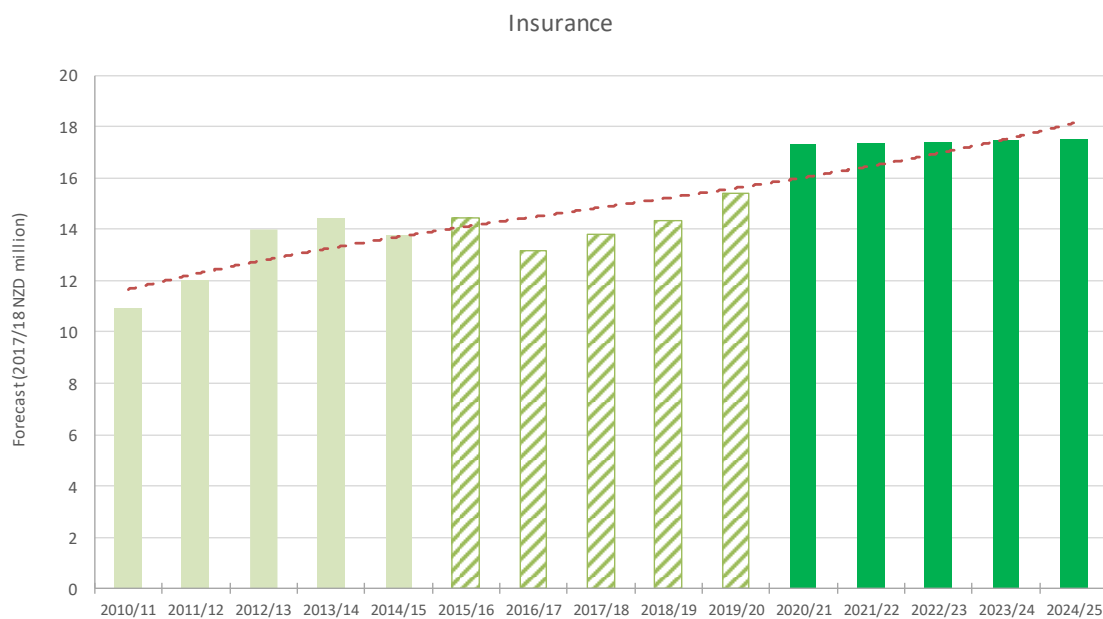
- I163 Transpower's insurance coverage is composed of two main types of insurance. Major risks are insured externally, whereas lesser risks are self-insured. In aggregate, its total coverage is approximately \$1 billion of risk.⁴⁷²
- I164 Transpower described its approach to insurance as follows:⁴⁷³
 - I164.1 purchasing insurance cover from external insurers for key risks, to a prudent level and where insurance cover is available at reasonable cost; and
 - I164.2 self-insuring (through its captive, Risk Reinsurance Limited (**RRL**)) where risks are small, where market-based cover is unavailable or expensive, and where it thinks it has a better understanding of the risks than the market and can therefore price the risk more accurately and lower than external insurers price.

⁴⁷² Above n 29, at 354.

⁴⁷³ Above n 27, at 130.

- I165 Figure I14 shows the yearly trend of Transpower’s insurance opex. Transpower forecasts higher RCP3 insurance opex than in previous RCPs.
- I166 The increase in expenditure is attributed to global insurance prices increasing from historically low levels back to historical averages, amongst other factors.⁴⁷⁴ While RCP3 insurance premiums are forecast as exceeding Transpower’s historic peaks in 2013/14 and 2015/16, we note that Transpower has applied assumptions of continued growth in asset exposure, new policies (eg, cyber risk), and an expectation of higher Fire and Emergency New Zealand (**FENZ**) levies following the reorganisation of FENZ.

Figure I14 Annual Insurance Opex (RCP1-RCP3)⁴⁷⁵



- I167 Insurance was outside the scope of the Verifier’s TOR, as it required actuarial expertise to assess the efficiency of the coverage. However, the Verifier provided some general comments in its report.

⁴⁷⁴ Above n 27, at 134.

⁴⁷⁵ Above n 29, at 355.

- I168 The Verifier considered that a prudent network operator would hold external insurance policies for specific risks, and self-insure for other risk exposures, particularly low-level losses, as a first layer of coverage. This spread of policies was seen as providing the best coverage.⁴⁷⁶ Transpower was seen as acting prudently in managing network risk exposures through its insurance programme.⁴⁷⁷
- I169 We sought to test Transpower's proposed insurance coverage and expenditure in our Issues paper, and in particular whether stakeholders considered the approach and coverage to be reasonable, and we noted that we were questioning whether the appropriate benchmark for self-insured policies was expected value of loss. We did not receive any submissions relating to Transpower's insurance coverage.
- I170 Transpower provided additional supporting documentation, including reports from its insurance broker and an actuary, to support of its premium forecasts. We were able to identify a clear linkage between these forecasts and Transpower's proposed opex. Given the specialist nature of this area and its sensitivity to global trends, we consider Transpower's approach of building its RCP3 forecast through expert advice to be reasonable.
- I171 Transpower has also set out its approach and governance to insurance. It identified four activities supporting its insurance portfolio that should ensure that its insurance coverage is reasonable and cost effective:⁴⁷⁸
- I171.1 identifying only those risks that are appropriate to insure;
 - I171.2 ensuring appropriate coverage (in terms of limits, deductibles, coverage terms and insurer security and diversity) is in place;
 - I171.3 engaging with the insurance market annually and undertaking a competitive tender process; and
 - I171.4 annually reviewing its insurance arrangements to ensure it remains comfortable with cost and risk.

⁴⁷⁶ Above n 29, at 356.

⁴⁷⁷ Above n 29, at 358.

⁴⁷⁸ Above n 27, at 130.

Our view

I172 We consider that Transpower’s insurance coverage is reasonable, taking into account the views of the Verifier, the Broker’s report, our discussions with Transpower, and our own assessment. However, we have two areas of concern that we discuss further, below:

I172.1 Insurance opex related to an expected increase in the levy paid to FENZ; and

I172.2 Premiums of policies paid to its captive insurer.

FENZ levy

I173 Transpower has forecast an increase in the amount of FENZ levy it pays in RCP3. The FENZ levy is used to fund Fire and Emergency New Zealand, and applies to certain contracts of insurance. Consequently, this expense is largely outside Transpower’s control.

I174 Transpower proposed a step change of \$2.7m in opex allowance to meet an expected increase in the cost of this levy, on top of the amount of levy included in the base year. This forecast increase to the levy relates to recent Government reform of the fire services, integrating urban and rural fire services into a single entity (FENZ) and reviewing of the funding arrangements. At the time of Transpower’s proposal, its expected liability under the new arrangements could not be precisely determined.

I175 Further uncertainty has arisen since Transpower’s proposal. On 15 March 2019, the Minister of Internal Affairs announced a review of the levy-based funding model. The outcome of this review is not expected to be finalised before we are required to set the IPP.⁴⁷⁹

I176 Taking into account all the circumstances, we consider that there is too much uncertainty over the extent of this expense, and that the levy is appropriate to treat as a recoverable cost.

I177 Our draft decision is therefore to not include an amount of opex relating to FENZ levy that Transpower forecasts it will incur, in favour of including FENZ as a recoverable cost. This treatment is consistent with the approach we have taken under the DPP that applies to EDBs. Refer to our discussion in Attachment J regarding treatment of FENZ levies as recoverable costs.

⁴⁷⁹ Hon. Tracey Martin “Fire and Emergency New Zealand funding to be reviewed” (press release, 15 March 2019). See also the Cabinet paper “Fire and Emergency New Zealand: a funding review”, redacted copy released proactively under the Official Information Act, and available at: [https://www.dia.govt.nz/vwluResources/Cab-paper-FENZ-funding-review-scope/\\$file/Cab-paper-FENZ-funding-review-scope_Redacted.pdf](https://www.dia.govt.nz/vwluResources/Cab-paper-FENZ-funding-review-scope/$file/Cab-paper-FENZ-funding-review-scope_Redacted.pdf).

Premiums paid to captive insurer for self-insurance

- I178 As we indicated in our Issues paper, we consider that there is a question of the appropriate allowance for internally insured (self-insured) policies, and whether this might be appropriately set at the expected value of loss (including expenses).
- I179 We agree with the Verifier's comments that it is sensible for Transpower to retain risk in relation to low-materiality risks, and instead make provision for these amounts, as a cheaper alternative than purchasing external insurance.
- I180 As noted above, Transpower provided an actuary's report in support of its proposed insurance opex. It sets out the expected value of loss, and the forecast administration expenses, for a number of Transpower's self-insured policies. Applying this ratio across the internally insured policies,⁴⁸⁰ this results in a difference of \$15.7m.
- I181 While this methodology only produces a rough estimate, on balance we have reduced the insurance opex by this amount for the draft decision. This is because:
- I181.1 We expect that where Transpower can achieve a more efficient outcome by retaining risk, than by insuring it, it would do so;
- I181.2 These policies cover amounts related to core business that Transpower would be able to absorb more cheaply than by insuring at market rates.
- I182 We would appreciate submissions on this, including the appropriateness of this approach, and which policies (if any) should be subject to this approach.

Draft decision

- I183 Our draft decision is to approve \$68.1m of insurance opex. This is a decrease of \$19.8m from the proposed \$88m.
- I184 The \$19.8m reduction relates to two drivers:
- I184.1 Reducing amounts paid to RRL to reflect expected loss rather than market premiums; and
- I184.2 \$4.1m attributable to the FENZ levy it expects to pay over RCP3. For further discussion, see Attachment J, where we discuss FENZ as a recoverable cost.

⁴⁸⁰ Transpower sets out its self-insured policies in its RCP3 proposal as under-deductible submarine cables and internal electrical breakdown, MDBI (under deductible), Transmission Lines and Underground cables, Consumer Guarantees Act, Cyber Risk (above n 27, at 133),

Attachment J Revenue path design

Purpose of this attachment

- J1 This attachment explains our approach to setting Transpower's revenue path and various related disclosure requirements for the draft decision for the RCP3 IPP reset.

Summary of revenue path features

- J2 Our key draft decisions relating to Transpower's price path are to:
- J2.1 set Transpower's annual forecast MAR over RCP3 for a five-year period using a smoothed building blocks approach for each of Transpower's HVAC and HVDC revenues;
 - J2.2 smooth Transpower's annual revenue by:
 - J2.2.1 forecasting costs, including pass-through costs, recoverable costs,⁴⁸¹ and the EV account balance as at 30 June 2020, and building these into the forecast MAR;
 - J2.2.2 smoothing the resulting forecast MAR over RCP3 (to produce annual forecast smoothed maximum allowable revenue (**forecast SMAR**)); and
 - J2.2.3 washing up any variation, between the forecast SMAR and the actual revenue, and any incentive amounts, into the EV account and accumulating this over RCP3, with the balance to be spread over RCP4;⁴⁸²
 - J2.3 not partially close the forecast step from RCP2 to RCP3; and
 - J2.4 include a mechanism to allow us to release part of the accumulated EV account balance, and spread it over the remainder of RCP3, if the balance has built up to such an extent that it is likely to cause price shocks to Transpower's customers if it was recovered over RCP4 only.
- J3 To support these key draft decisions, we have propose reporting requirements to provide ourselves and other interested persons with visibility of the revenue path, Transpower's performance against the path, and Transpower's EV account.

⁴⁸¹ Pass-through costs and recoverable costs are amounts which are usually outside of Transpower control. IRIS amounts are a recoverable cost, despite Transpower arguably having some ability to influence these.

⁴⁸² Amounts would be carried forward at the WACC rate, to compensate for timing differences.

- J4 We also propose reclassifying two existing operating expenses as pass-through costs.
- J5 Unapproved major capex projects and listed projects would be subject to similar treatment to that which applied in RCP2, and we propose to reopen the price path after we approve an amount of expenditure and update the SMAR to reflect that additional capex.

Background on the WACC

- J6 The WACC has a significant impact on the revenue Transpower can earn over an RCP, as it determines the return Transpower earns on its regulatory asset base (**RAB**) (this is the Return on Capital building block).
- J7 We do not set the WACC as part of our IPP decision, as it is determined separately based on a methodology set out in the Transpower IM Determination. We will publish the final WACC that will apply for RCP3 in October.
- J8 To better understand the revenue impact of our draft decision, we have applied the same WACC as is used for ID for EDBs and Wellington Airport.⁴⁸³ This should be seen as illustrative only.

Background on EV account

- J9 Transpower's EV account is referred to throughout this attachment.
- J10 As we expect some variation between the revenue Transpower forecasts and the revenue it actually earns, the difference is calculated annually, and included in the EV account. Other amounts, such as incentive amounts that have not yet been recovered from, or returned to, Transpower's customers are also included within the EV account.
- J11 In RCP2 the forecast MAR was updated annually, and the EV account balance was carried forward (being adjusted at the WACC rate) until the next available pricing year. For RCP3 we have adopted a different approach, which is discussed below under 'Accumulation of wash-up and incentive amounts'.

Smoothing revenue over a 5-year period

- J12 The building blocks approach to setting Transpower's forecast MAR can produce volatility from year to year, and when transitioning between RCPs. This volatility is reflected in the prices Transpower charges its customers.

⁴⁸³ *Cost of capital determination for disclosure year 2020 for information disclosure regulation – Electricity distribution businesses and Wellington International Airport [2019] NZCC 7.*

- J13 Volatility in annual prices can potentially lead to increased difficulty of budgeting for transmission lines charges. Transpower's customers have previously supported smoothing to avoid a large, temporary, change in revenue.⁴⁸⁴

Draft decision

- J14 Our draft decision is to set Transpower's annual RCP3 revenue using smoothed building blocks forecast MAR values. We have allocated the resulting annual revenue between pricing years to produce a constant rate of change over RCP3 (ie, the resulting annual revenue will be smoothed to give forecast SMAR amounts).
- J15 Because Transpower recovers charges for its HVAC services and HVDC services from different customer bases, these amounts are separately smoothed.
- J16 Differences between the forecast SMAR and the revenue Transpower earns will be washed up annually and included within the EV account.

Alternatives considered

- J17 In addition to smoothing revenue over RCP3, we considered:
- J17.1 Smoothing revenue over RCP3, and attempting to partially close any step when moving from RCP2 to RCP3, and RCP3 to RCP4; and
 - J17.2 using unsmoothed annual forecast MAR building blocks (status quo counterfactual to Transpower's proposal to smooth the price path).

Analysis

- J18 An unsmoothed building block approach sets the forecast MAR directly. The building blocks used in RCP2 were:
- J18.1 Capital charge;
 - J18.2 Forecast depreciation;
 - J18.3 Opex allowance;
 - J18.4 Forecast tax;
 - J18.5 Forecast TCSD;⁴⁸⁵ and

⁴⁸⁴ For example, in the December 2017 update of the RCP2 forecast MAR, there would have been an initial large reduction in the forecast MAR, followed by a bounce back up in the forecast MAR for the following years. Transpower's customers supported smoothing the forecast MAR for the remaining years.

J18.6 EV adjustments.⁴⁸⁶

- J19 The forecast MAR was combined with pass-through costs and recoverable costs to set the annual revenue Transpower can earn. In RCP2, the forecast MAR was updated yearly, which included EV adjustments in the second following year of each entry going into the EV account. However, this approach caused volatility in Transpower's annual revenues and we made a smoothing adjustment over two years of RCP2 in response to that at Transpower's request.
- J20 Transpower and some of its customers consider that an unsmoothed price path may be less desirable than a more predictable, smoothed price path, and by extension, a smoothed price path might be better for consumers.
- J21 As well as volatility from differences in the size of the building blocks in consecutive years, there is also potential additional volatility in the form of a step change when transitioning between RCPs (for example, due to differences in WACC rates).
- J22 In our Process paper, we identified the benefits of revenue smoothing:
- 6.20 Smoothing the total forecast revenues could be beneficial, as it reduces volatility in Transpower's year-on-year total forecast revenues, and therefore would promote pricing predictability for Transpower's customers and, to a proportionately lesser extent, household consumers.
 - 6.21 We did not smooth the total forecast revenues when we initially set the IPP for RCP2. We concluded that smoothing was not justified because any wash-up values and pass-through costs and recoverable costs up to then had not been material to the yearly revenue totals, and pricing predictability had not been an issue for Transpower's customers or electricity consumers.
 - 6.22 However, such updates to revenues have to date become more substantial during RCP2, and we are of the view that the associated potential benefits of smoothing may now outweigh any additional costs and complexity (which we consider to be low). Also, smoothing the total forecast revenues would align the approach to setting revenues across the sector.
- J23 Transpower has proposed that it would smooth its revenue over RCP3. It has not proposed to close the forecast step change when transitioning between RCPs (ie, RCP2 to RCP3 and RCP3 to RCP4).

⁴⁸⁵ Forecast TCSD captures the "term credit spread differential", which is used to adjust funding cash-flows of regulated suppliers which have issued longer-term debt than that assumed when calculating the WACC rate.

⁴⁸⁶ These cover both revenue adjustments for previous under/over-recovered revenues and revenue adjustments resulting from the incentive mechanisms in the regime.

- J24 Some stakeholders have identified some potential benefits of an unsmoothed price path, including:
- J24.1 that the risk of additional scrutiny will incentivise Transpower to have strong justification for price changes and to minimise volatility in annual expenditure;⁴⁸⁷
 - J24.2 that volatility in prices will create greater public awareness of, participation in, and/or debate relating to regulation of Transpower;⁴⁸⁸
 - J24.3 that there is additional cost and complexity involved in revenue smoothing;⁴⁸⁹ and
 - J24.4 that costs are incurred at the time that they occur, which matches accounting treatment.⁴⁹⁰
- J25 In our view, pricing volatility is not necessarily linked to expenditure decisions, but could be driven by other factors (including wash-up of forecast error and recovery or repayment of incentive or penalty amounts). Smoothing annual revenue should still preserve visibility of general trends in revenue, attributable to expenditure and investment over RCP3.
- J26 To support interested persons forming their own views on Transpower’s performance, our draft decision is that the IPP will include a number of information requirements:
- J26.1 Requiring Transpower to annually publish and explain its EV account balance and the forecast impact of its recovery on RCP4 revenues;
 - J26.2 Requiring Transpower to publish a post-consultation review of base capex decisions, including the extent and effectiveness of its consultation, which will support meaningful stakeholder engagement. This is discussed in Attachment K; and

⁴⁸⁷ MEUG “Transpower IPP 2020 - Process, Framework and Approach paper” (15 November 2018), at [4.e)].

⁴⁸⁸ Above n 487, at [4.e)].

⁴⁸⁹ Fonterra Co-operative Group “Submission to Transpower NZ Ltd – Regulatory Control Period 3 Draft Proposal for Consultation” (August 2018), at 6-7.

⁴⁹⁰ Above n 489, at 6-7.

- J26.3 Requiring Transpower to publicise updates on progress towards developing asset health models, life-extension models, and criticality frameworks for certain asset classes. Development of these models will support a greater level of rigour in investment and expenditure decision making, and these updates will give interested persons better visibility of progress in this area. This is discussed in more detail in Attachment L.
- J27 On balance, we consider smoothing annual revenues to be appropriate.
- J28 However, in contrast to smoothing over RCP3, we consider there are significant difficulties with attempting to partially close the step changes when transitioning between RCPs, due to the different underlying causes (in particular, the forecast change in WACC).⁴⁹¹
- J29 Based on the forecast WACC, the RCP3 starting revenue is expected to be a significant decrease from the RCP2 closing revenue. We make the following observations:
- J29.1 The forecast step decrease is largely attributable to a reduction in the WACC in RCP3. The WACC that applied for RCP3 was 7.19%. At the time Transpower submitted its proposal, it forecast the RCP3 WACC as 5.50%. Since then, there have been indications that the final RCP3 WACC may be even lower. Attempts to mitigate this step by bringing revenue forward would result in a flatter, or decreasing, price path over RCP3;
- J29.2 While we cannot accurately forecast the RCP4 WACC rate, and hence the RCP4 opening revenue, we note that Transpower's RAB is increasing over RCP3. Therefore, all else being equal, Transpower's revenue in RCP4 will be higher than in RCP3. Flattening the price path would result in a lower approved revenue in the closing year of RCP3 and would increase the size of the step up when transitioning to RCP4; and
- J29.3 This would limit us to attempting to partially close only one of the potential steps.
- J30 We consider that these issues make it undesirable to attempt to partially close either forecast step change when transitioning between RCPs.

⁴⁹¹ Transpower made a detailed submission on this point in its response to our Issues paper (above n 71, at Section 11).

5-year period

- J31 The Act requires us to set a five-year RCP, unless a shorter period would better meet the purposes of Part 4 of the Act (however, a period may not be shorter than four years).
- J32 While there is some potential uncertainty in future demand that a four-year IPP could help mitigate,⁴⁹² we note the Verifier found that Transpower’s demand scenarios appeared reasonably plausible, and Transpower’s forecast demand for RCP3 under three of the four scenarios is moderate and aligned.⁴⁹³ Any significant growth is expected to happen from RCP4 onwards, with no direct implications for RCP3.
- J33 We have not identified that a shorter period would better meet the purposes of Part 4 and therefore our draft decision is to set the price-quality path for a five-year period. We also note that Transpower has formulated its proposal based on a five-year period for RCP3.

Summary of stakeholder views

- J34 We consulted on potential revenue smoothing in our Process paper, and in our Issues paper.
- J35 We received submissions from three submitters. These are summarised in Table J1.

Table J1 Submissions on price path smoothing (our consultations)

Submitter	Document	Stance	Summary
MEUG	Process paper	Neutral	Considered there could be benefit in not smoothing from increased scrutiny of price changes.
	Issues paper	Oppose	
Transpower	Issues paper	Oppose closing of step change between RCPs	Discussed above.
Vector	Issues paper	Supports	Transpower’s revenue should be smoothed in a similar manner to EDBs’ revenue.

⁴⁹² This was suggested by MEUG, in its response to our Process paper (above n 487, at [4.c]).

⁴⁹³ Above n 29, at 51.

- J36 Transpower also consulted on intra-period revenue smoothing prior to submitting its proposal, and the submissions on this were published. These are summarised in Table J2.
- J37 The seven submissions received represented three generator-retailers, two EDBs and two large energy users' groups. The generator-retailers and EDBs supported smoothing, while the energy users did not.

Table J2 Submissions on price path smoothing (Transpower's proposal consultation)

Support		Does not support	
Orion	Supports smoothing.	MEUG	Would want to see clear evidence of consumer benefit.
Contact	Increases certainty around budgeting.	Fonterra	Seen as complex and expensive. Lowers visibility of increases. Annual recovery matches accounting practices.
Northpower	Helps ensure price reductions passed through.		
Mercury	Promotes stability and predictability.		
Genesis	Considers it reasonable to smooth.		

- J38 As noted above, MEUG also submitted that we should consider a shorter RCP in order to avoid potential uncertainty with future demand forecasts.⁴⁹⁴

Smoothing recovery of pass-through costs and recoverable costs

- J39 In RCP2, forecast pass-through costs and forecast recoverable costs do not form part of the building blocks used to set the forecast MAR.
- J40 Pass-through costs or recoverable costs can add volatility to Transpower's total annual revenue.

Draft decision

- J41 Consistent with the smoothing of the forecast MAR, we have smoothed Transpower's recovery of pass-through costs and recoverable costs in our draft decision.

⁴⁹⁴ Above n 487, at [4.c)] and above n 69 at [8].

- J42 A forecast of these amounts for RCP3 has been included within the price path and included in the forecast SMAR. The difference between the forecast SMAR and the actual costs will be washed up annually, with the variances being included in the EV account.
- J43 Consistent with RCP2 reporting requirements, Transpower would be required to provide us with the wash-up calculation within 80 working days of the end of each disclosure period.

Analysis

- J44 Given that Transpower's revenue is smoothed, it is undesirable for pass-through and recoverable amounts to reintroduce volatility to Transpower's annual prices. Forecasting these amounts in advance enables them to also be smoothed, taking out most of the volatility attributable to them.
- J45 As these amounts are not set, and can only be forecast, any forecasting inaccuracy would need to be washed up. Transpower already performs an annual wash-up calculation on its forecast MAR and its cost building blocks, and the difference between forecast and actual pass-through costs and recoverable amounts could be included in this wash-up calculation. These would then be disclosed when Transpower provides us with the its other wash-up calculations.
- J46 We consider the additional complexity involved in estimating these amounts, including them within the forecast SMAR, and for Transpower to include these within its annual wash-up calculation, to be low.

Stakeholder views

- J47 Our draft decision to smooth pass-through and recoverable costs is consistent with Transpower's proposal and, included with the draft decision below, should help address the concerns raised by Vector – that volatility in transmission lines charges is a significant source of revenue instability for EDBs.

Accumulation of wash-up and incentive amounts

- J48 Consistent with the approach of setting an ex-ante expectation of earning WACC, and providing incentives for meeting quality measures (and penalties for failure to do so) Transpower should be able to recover wash-up and incentive amounts (or required to repay, where it has over-recovered or incurred penalties). However, annual recovery of these amounts would reintroduce volatility to a smoothed price path.

Draft decision

- J49 Our draft decision is for recovery (or repayment) of wash-up and incentive amounts to be deferred until RCP4, when the net balance would be recovered. These amounts would be calculated annually during RCP3 and accumulate within Transpower's EV account.
- J50 The annual value of the EV account would be disclosed so that interested persons could form a view on the likely impact on RCP4 revenues. This would be supplemented by an independent assurance requirement to provide interested persons with assurance on the calculations.
- J51 A 'release mechanism' would be included, which would enable Transpower's price path to be reopened, and some of the balance of the EV account to be spread over the remaining years of RCP3. This would be used where the accumulated balance became sufficiently material that it could cause a price shock to Transpower's customers if it was only carried forward and spread over RCP4.
- J52 Consistent with this approach of carrying EV account balances to the next RCP, we are including the balance in Transpower's EV account at the end of RCP2 in the RCP3 forecast SMAR calculations and spreading it over RCP3, via an estimate of the 30 June 2020 amount. The difference will be washed up and rolled forward within the EV account until RCP4.⁴⁹⁵

Analysis

- J53 Wash-up and incentive amounts⁴⁹⁶ are a source of price path volatility, similar to pass-through and recoverable amounts. Recovery of these wash-up and incentive amounts during RCP3 would reintroduce a layer of volatility into Transpower's price path.
- J54 However, unlike most pass-through and recoverable amounts, these cannot be forecast in advance and their expected value is neither positive nor negative.⁴⁹⁷ However, some fluctuation in annual amounts is expected.
- J55 So long as the balance does not become materially large, we consider that accumulation over RCP3 and recovery of the net balance over RCP4 is preferable to the potential additional volatility in RCP3 annual revenue from recovery during the period.

⁴⁹⁵ This contrasts with the RCP2 approach where the forecast MAR was reset annually.

⁴⁹⁶ For example, the major capex incentive.

⁴⁹⁷ Wash-up amounts are effectively forecast error, and incentive amounts relate to Transpower's performance against quality targets and grid output measures, which should similarly not be accurately forecastable in advance.

- J56 It is not expected that these would accumulate to a point where recovery or repayment over RCP4 would cause a price shock to Transpower's customers, or a revenue shock to Transpower. However, we consider it prudent for there to be a mechanism put in place as a contingency. In such an event, enabling the price path to be reopened and the accumulated EV account balance to be spread over the remaining years of RCP3, in addition to RCP4, would help mitigate this risk.
- J57 On balance, where we consider that continuing to roll the EV account balance forward would contribute to a step up in annual revenue, and make an impact of more than 1% (if the balance was spread across RCP4) to consumer prices, we would reopen the RCP3 revenue path and spread some of the balance over the remainder of RCP3, and RCP4 as well.
- J58 We consider the additional complexity of such a contingency mechanism to be low.
- J59 As the EV account would effectively be locked for RCP3, subject to some of the balance being released under the contingency mechanism discussed, consideration should be given to any balance remaining at the end of RCP2. There seems to be limited justification for deferring recovery of the RCP2 amount until RCP4, and spreading it over that RCP along with the result of the EV account balance. This would potentially result in some of the RCP2 amount not being recovered until over ten years later. We consider that spreading this balance over RCP3 would better mitigate any inter-generational inequity (ie, tomorrow's consumers paying for today's consumption, or vice versa) and be more consistent with our draft decision.
- J60 As the price path must be set before the closing balance will be available, Transpower will need to estimate the balance as at 30 June 2020. Any difference between this forecast and the actual balance will be washed up and rolled forward with the EV account.

Stakeholder views

- J61 Our approach is largely consistent with Transpower's proposal.
- J62 We asked stakeholders for views on accumulating wash-up and incentive amounts, and on the contingency mechanism, in our Issues paper.⁴⁹⁸ Vector expressed a preference for Transpower to accumulate incentive amounts in the same way as EDBs, to reduce volatility.
- J63 Transpower also consulted on this when preparing its proposal, asking stakeholders whether these amounts should be carried across control periods or applied annually. The responses are set out in Table J3.

⁴⁹⁸ Above n 15, at [10.31.3] and [10.31.4].

**Table J3 Submissions on accumulation of wash-up and incentive amounts
(Transpower’s proposal consultation)**

Supports		Does not support	
Contact	Concerned with the volatility in interconnection charge in RCP2.	MEUG	Would want to see clear evidence of long-term benefit to consumers.
Northpower	This will support revenue smoothing over RCP3.	Orion	Prefers annual adjustment due to potential for RCPD ⁴⁹⁹ and TPM to reallocate Transpower charges between regions.
Mercury	This will support revenue smoothing over RCP3.	Fonterra	Annual recovery preferable -does not support smoothing revenue.
Genesis	Deferring recovery until RCP4 rationalises effort.		

New pass-through costs

Problem definition

J64 Two costs have been identified that are largely outside Transpower’s control for RCP3. These are the Energy Complaints Scheme levy, and the FENZ levy paid alongside its insurance. Unlike EDBs, Energy Complaints Scheme levies are not currently reflected in the Transpower specification of price IM as a pass-through.

Draft decision

J65 We have included Energy Complaints Scheme levies as a pass-through cost, and FENZ levies as a recoverable cost, for our draft decision.

Analysis – Energy Complaints Scheme levies

J66 Transpower is a member of the Energy Complaints Scheme, operated by Utilities Disputes, which provides consumers with a free and independent dispute resolution service for electricity, and other, complaints. Members pay an annual levy to fund the service.

J67 While Transpower is a member of this scheme, the levy amount will be outside its control. The amount involved is relatively small and EDBs currently treat this levy as a pass-through cost. We consider it appropriate for Transpower to adopt the same treatment.

⁴⁹⁹ Regional Coincidental Peak Demand – a pricing methodology that allocates the interconnection charge according to customers’ contributions to the regional coincident peak load.

Analysis – FENZ levies

- J68 As discussed in Attachment G, there is now an additional layer of uncertainty regarding the amount of FENZ levy Transpower will pay over RCP3, and of what might arise from the Government’s review of the levy-based funding model.
- J69 As the levy amount is largely outside Transpower’s control, we consider that it is appropriate for this to be a recoverable cost.
- J70 This is consistent with the approach proposed to be adopted under the DPP in relation to EDBs.

Price path reporting features**Summary**

- J71 To help us ensure compliance with the price path, and to enable scrutiny from interested persons, there should be access to accurate information about Transpower’s price path performance and EV account (and other) calculations.

Comment

- J72 The draft decisions in Table J4 are to support our substantive draft decisions made in relation to the price path and are intended to help ensure compliance (and visibility of compliance) with the price path, while not being onerous or expensive to comply with.

Table J4 Price path reporting features

Item	Description
Pricing compliance statement (ex-ante)	Statement of compliance with the price path when setting annual pricing. Certified by Directors. Provided each November, within 5 days of announcement of the HVAC and HVDC amounts.
Compliance with price path (ex-post)	Report on compliance with price path and wash-up calculations. Certified by Directors and independently audited. Provided within 80 working days of the end of the disclosure year.
Wash-up calculation, incentive calculations, and EV account disclosure	Disclosure and publication of the wash-up calculation, incentive calculations, ⁵⁰⁰ and the EV account, including an updated forecast EV account balance at end of RCP3. Enables interested persons to form view on likely impact in RCP4.
Other summaries	Disclosure of the forecast MAR, HVAC and HVDC amounts for a pricing year. Summary of actual pass-through and recoverable costs for a pricing year. Explanations for voluntary revenue reductions (if any). ⁵⁰¹

Reopening the price path – major capex projects and listed projects

- J73 In RCP3 Transpower may incur further approved capex that is not included within the IPP, through the major capex projects and listed projects mechanisms. When these projects are commissioned, Transpower should earn a higher revenue due to a return on capital, and depreciation, from these projects.
- J74 Transpower's forecast SMAR will be updated following our approval of an amount of expenditure for a major capex project or a listed project.
- J75 So that the summary of approved base capex or the major capex allowances for each major capex project are kept up-to-date on a timely basis, we are requiring, as part of our draft decision, Transpower to provide a director-certified and independently assured new forecast MAR for the remaining years of RCP3, alongside its annual compliance statement, where we have approved expenditure for a major capex project or a listed project.

⁵⁰⁰ This includes amounts of incentives from IRIS, incentives arising under the Capex IM, and incentives relating to Grid Output Measures and Quality Standards.

⁵⁰¹ Transpower is able to voluntarily price below the revenue cap, subject to reporting on the reasons why. Transpower has no incentive to under-recover (for reasons other than price smoothing).

Analysis

- J76 Listed projects are base capex projects where there is sufficient uncertainty regarding scope or timing that they will not be included within the capex forecast for RCP3. Instead, the price path may be reopened under the Transpower IM Determination to include these projects if certain conditions are met and as we approve them.
- J77 Major capex projects are capex projects incurred to either meet existing GRS or to provide a net market benefit, and for which the cost is estimated to exceed \$20m. They provide transmission capacity enhancement to existing assets or add new transmission capacity to the network.⁵⁰²
- J78 The revenue impact of newly-approved listed projects or major capex projects will depend on when in the regulatory period we approve the projects, how much expenditure we approve for each project, and when Transpower begins to capitalise costs in respect of the projects.
- J79 While these are not included as part of the IPP reset, Transpower has indicated that it intends to seek approval for \$135m of listed projects and \$178m of major capex projects (\$2017/18) over RCP3. These all relate to HVAC projects and therefore have potential to impact on Transpower's HVAC charges.

Possible impacts on the smoothed price path

- J80 The listed projects that Transpower has proposed for RCP3 are set out in Table J5.

Table J5 Forecast capex impact of potential yet-to-be-approved listed projects in RCP3 as indicated by Transpower (\$m nominal)

Project	2020/21	2021/22	2022/23	2023/24	2024/25	Total RCP3
Bombay – Otahuhu A			13.7	35.8		49.5
Brunswick – Stratford A & B	6.7	12.2	20.1	13.8		52.8
Otahuhu – Whakamaru A & B				33.0		33.0
Bunnythorpe-Wilton A				5.9	15.2	21.2
Total listed projects (commissioned basis)	6.7	12.2	33.9	88.5	15.2	156.5

- J81 Transpower has forecast the HVAC revenue impact of these potential projects as being an additional \$3.8m in 2023/24 and \$7.8m in 2024/25 if we approve the capex values proposed.

⁵⁰² Clause 1.1.5 of the Capex IM.

J82 The capex values for potential major capex projects for RCP3 are set out in Table J6.

Table J6 Forecast capex impact of potential yet-to-be-approved major capex projects in RCP3 as indicated by Transpower (\$m nominal)

Project	2020/21	2021/22	2022/23	2023/24	2024/25	Total RCP3
Waikato & Upper North Island voltage management	24.9	72.7	20.3			118.0
South Island reliability – HVDC 2 replacement cables and 1 new cable	0.6	1.1	0.1	0.1	0.1	2.0
Upper South Island voltage stability - switching station at Rangitata			12.3	41.1	29.1	82.5
Total	25.5	73.9	32.7	41.1	29.2	202.5

J83 The revenue impact of these projects is set out in Table J7.

Table J7 Forecast impact of potential yet-to-be-approved major capex projects on RCP3 HVAC revenues (\$m nominal)

	2020/21	2021/22	2022/23	2023/24	2024/25	Total RCP3
Major capex projects	0.0	0.2	4.9	8.9	12.2	26.0
Listed projects				3.8	7.8	11.6

J84 When a listed project or major capex project is approved, the price path is reopened in accordance with the Transpower IM Determination and the forecast MAR for the remainder of the RCP is updated.

J85 Potential projects that have not yet been approved do not form part of Transpower's proposal and hence would not be incorporated initially in the smoothed price path we determine. However, if approved during RCP3 they will increase the size of the RAB and will therefore have a recurring effect on annual revenue. They effectively become a one-off step as they are approved and recognised in the RAB,⁵⁰³ with a consistent annual effect thereafter.

⁵⁰³ This step may occur over multiple years, as the full impact of the project will not necessarily be recognised in the first year.

Attachment K Customer consultation

Purpose of this attachment

- K1 The purpose of this attachment is to set out and explain our draft decisions in relation to Transpower's consultation with its customers.

Why we focus on Transpower's customer consultation

- K2 It is important that Transpower understands its customers' preferences regarding price-quality trade-offs, and takes these into account when making asset management, planning and investment decisions, because ultimately it is customers who have to pay for those decisions, and who have to manage the quality outcomes. By incorporating robust and timely consultation into its decision-making processes, Transpower's understanding of its customers' preferences will improve.

Approach set out in our Process paper and our Issues paper

- K3 In our Process paper we identified Transpower's approach to customer consultation as one of the focus areas for our review of Transpower's proposal.^{504, 505} We indicated that while our scope for actively shaping Transpower's customer engagement for each reset is limited (as the Transpower IM Determination does not specify customer engagement requirements in the way the IMs for CPPs do for CPP applicants), we expected to see the following in Transpower's proposal:

- K3.1 we wanted to see clear evidence of how Transpower had considered customer preferences in shaping its expenditure forecasts and proposed quality measures and targets (revenue-linked where applicable) for RCP3; and
- K3.2 we expected Transpower to develop a customer engagement model where customer preferences drive the grid output targets, where appropriate, and where those targets define the expenditure proposal. This includes providing for transparent engagement on the trade-off Transpower's customers have to make in weighing-up the amount of risk they are prepared to accept in exchange for the price they have to pay for transmission services (Transpower's revenues).

⁵⁰⁴ Above n 31, at [4.25-4.31].

⁵⁰⁵ We also included in the Verifier TOR a requirement for it to provide an opinion on the extent and effectiveness of Transpower's consultation with its stakeholders, and on the extent to which Transpower's proposal was consistent with the feedback Transpower received from its stakeholders (see Attachment M).

- K4 In our Issues paper, we noted that effective customer engagement will become even more important in preparing for RCP4 and beyond, as the anticipated increase in expenditures in those periods flow through to Transpower's customers in transmission prices, and ultimately to end-use consumers.⁵⁰⁶
- K5 We set out our views on:
- K5.1 expectations on Transpower to consult with stakeholders during RCP3, including how Transpower will consider transmission alternatives in its customer engagement and project prioritisation; and
 - K5.2 the effectiveness of Transpower's consultation with customers in preparing its proposal, and our expectations for how this should improve for RCP4.

Summary of draft decisions

- K6 In relation to consultation on Transpower's expenditure decisions during RCP3, our draft decision is to place new obligations on Transpower to:
- K6.1 publish its engagement plan for RCP3 by 1 October 2020;
 - K6.2 report at the end of each disclosure year in relation to aspects of its customer consultation on how it has applied its actual base capex allowance; and
 - K6.3 report on significant capex projects upon the completion of the project, ie, a post-project review.
- K7 In relation to consultation on Transpower's RCP4 proposal, our draft decision is to place a new obligation on Transpower to engage an independent expert to undertake a mid-period review of Transpower's proposed engagement process leading up to submission of its RCP4 proposal.
- K8 These decisions are explained further below.

Transpower's consultation during RCP3

Problem definition

- K9 As noted in paragraph K2 above, it is important for Transpower to engage effectively with its customers during RCP3 to make ongoing prioritisation and investment decisions on base capex (or substituted opex) throughout the regulatory period that reflect customer preferences.

⁵⁰⁶ Above n 33, at [4.4].

What we said in our Issues paper

- K10 In our Issues paper, we acknowledged concerns previously raised by some stakeholders about Transpower’s consultation processes during regulatory periods, but we also noted that larger elements of Transpower’s forecast expenditure will be covered by existing consultation requirements in the Capex IM.^{507, 508}
- K11 In addition, as we had previously noted in our Capex IM review reasons paper, we considered that Transpower provides a significant amount of information about the ongoing needs of the network in its network planning report and ITP.⁵⁰⁹ We noted that Transpower’s submission on our Capex IM review draft decisions had stated that Transpower was also working on improving its communication and engagement with stakeholders, and that Transpower was using multiple channels for this, such as existing ID documents, annual reports, and stakeholder and industry events.^{510, 511}
- K12 We acknowledged Transpower’s efforts to:⁵¹²
- K12.1 integrate stakeholder engagement into its ‘business-as-usual’ activities;⁵¹³
 - K12.2 implement initiatives such as the establishment of its Consumer Advisory Panel and the release of Te Mauri Hiko;^{514, 515} and
 - K12.3 commit to developing its approach to customer consultation further.⁵¹⁶
- K13 We asked Transpower to provide in its submission on the Issues paper a detailed explanation of Transpower’s ongoing engagement with its customers throughout the regulatory period, including its customer engagement strategy.⁵¹⁷

⁵⁰⁷ Above n 43, at [3.2.1(b)], [3.2.3(2)(h)], [3.3.1(3)(a)], [3.3.6-3.3.9] and [8.1.1-8.1.3].

⁵⁰⁸ Above n 33, at [4.23-4.26].

⁵⁰⁹ Above n 65, at [315].

⁵¹⁰ Transpower “Capex IM draft decisions cross-submission” (16 January 2018), at 2.

⁵¹¹ Above n 33, at [4.27].

⁵¹² Above n 33, at [4.28].

⁵¹³ Above n 29, at 90.

⁵¹⁴ For information on Transpower’s Consumer Advisory Panel, see: <https://www.transpower.co.nz/keeping-you-connected/consumer-advisory-panel>.

⁵¹⁵ Transpower “Te Mauri Hiko Energy Futures” (2018), available at: <https://www.transpower.co.nz/resources/te-mauri-hiko-energy-futures>.

⁵¹⁶ Above n 27, at 36.

⁵¹⁷ Above n 33, at [4.29].

- K14 While our Capex IM review decision was to retain the existing consultation requirements for both base capex and major capex, we noted our intention to consider changing Transpower’s ID requirements to require it to report annually on the following matters in relation to its actual base capex:^{518, 519}
- K14.1 whether Transpower consulted with stakeholders (including customers) and, if so, how it consulted;
 - K14.2 how effective Transpower considered that consultation was; and
 - K14.3 how satisfied stakeholders were with the consultation process based on the views they expressed.
- K15 We also noted we were considering whether we should require Transpower to report on significant capex projects after their implementation, ie, a post-project review.⁵²⁰

Response in submissions

- K16 Wellington Electricity, Vector and MEUG raised concerns about the quality of Transpower’s engagement with stakeholders during RCP2 and supported initiatives to encourage Transpower to improve its engagement during RCP3:⁵²¹
- K16.1 Wellington Electricity (supported by Vector) was concerned that Transpower had not always considered customer preferences in shaping its expenditure forecasts or the impact its investment decisions will have on the operation of its customers’ own networks;^{522, 523} and

⁵¹⁸ Above n 65, at [306].

⁵¹⁹ Above n 33, at [4.30].

⁵²⁰ Above n 33, at [4.31].

⁵²¹ The Capex IM sets out consultation requirements for major capex projects, listed projects, and base capex projects over \$20M. However, within the RCP3 base capex allowance there will be significant spending by Transpower that does not currently have any formalised consultation requirement.

⁵²² Wellington Electricity “Wellington Electricity’s submission on Transpower IPP 2020 Issues Paper” (28 February 2019), at 1-2.

⁵²³ Above n 206, at 3.

- K16.2 MEUG was disappointed with the quality of engagement by Transpower over the last year on the wider opportunities that new technologies, more cost-reflective prices and new business models might provide to improve outcomes for consumers.⁵²⁴ MEUG suggested Transpower should be required to publish its stakeholder engagement plan for RCP3 prior to the start of RCP3, as this would enable stakeholders to hold Transpower to account for progress over RCP3.⁵²⁵
- K17 Meridian and MEUG supported our proposal to require Transpower to report annually on whether, and how, it has consulted with stakeholders, and how effective stakeholders considered that consultation was.^{526, 527}
- K18 Independent Electricity Generators Association (**IEGA**) suggested the Commission should monitor Transpower’s proposed engagement on transmission alternatives as part of its overall approach to ensuring effective engagement, and provide for sufficient funding in the RCP3 decision for this engagement.⁵²⁸
- K19 In its submission on the Issues paper, Transpower provided more details about its ongoing engagement with its customers during the regulatory period.⁵²⁹

We have been working hard to extend our engagement with customers and stakeholders and bring what we learn through the engagement process back into our planning and decision-making. Our key engagement initiatives over the past five years have been:

Engagement on strategic issues – our Transmission Tomorrow, Auckland Strategy and Te Mauri Hiko efforts have successfully engaged a broad set of stakeholders, including our direct customers, on important, strategic issues. These efforts are crucial for clarifying our strategic context and for laying the foundation for the strategy that will drive our longer-term planning.

Transparency of plans and planning process – we provide extensive planning information, and aim to make this material accessible and relevant. We go beyond our disclosure requirements in terms of the coverage and accessibility of the information we publish, and in our efforts to engage through regional planning forums and stakeholder workshops.

⁵²⁴ Major Electricity Users’ Group “Transpower’s IPP Issues paper – cross-submission” (7 March 2019), at [17-20].

⁵²⁵ Above n 524, at [24].

⁵²⁶ Above n 524, at [11].

⁵²⁷ Above n 222, at 6.

⁵²⁸ Independent Electricity Generators Association “Submission on Transpower IPP 2020 – Issues Paper” (28 February 2019), at 2.

⁵²⁹ Above n 71, at 1-2.

Planning Inputs – we have used survey techniques to elicit information on the value consumers place on reliability and we use that information in our planning. We have also worked closely with distributors and our supply chain partners, on matters such as regional development and contingency planning for N-security sites.

Grid Outputs – we consulted in multiple stages to determine the dimensions of service quality that matter most to our customers and to define suitable measures and performance standards.

RCP3 direction – we published our draft RCP3 proposal for consultation, sought stakeholder feedback on key choices and trialed a new approach to communicating high-level price-quality trade-offs. This engagement complemented our wider RCP3 engagement and, as set out in our RCP3 proposal document, helped shape our proposal.

K20 Transpower submitted it had been developing detailed plans for engaging with its customers and stakeholders during RCP3, including through its Consumer Advisory Panel.⁵³⁰

K21 Transpower also stated its customer and stakeholder engagement is core to its commitment to ensuring that the grid meets the needs of all electricity consumers now and for the future.⁵³¹ Transpower submitted:⁵³²

We will document how we currently engage and how we see that evolving in response to industry, customer and stakeholder expectations and any regulatory changes. We will provide information for customers and stakeholders on how they can engage with us on the work we do and the service we deliver during RCP3. This will give customers and stakeholders visibility of our business-as-usual work (BAU), major capital projects (MCPs), strategic work and the reset process for RCP4.

Our approach will be based on existing regulatory and engagement processes for large capital projects (listed projects, MCPs and base capex projects over \$20m) and Part 12 of the Electricity Industry Participation Code, our own process for transmission alternatives for base capex and continuing established processes for investment projects under way.

K22 Transpower also acknowledged stakeholders' engagement in the Commission's process of evaluating its proposal, and the valuable feedback provided. Transpower noted it would continue to be available to provide further information as required.⁵³³

⁵³⁰ Above n 71, at 8.

⁵³¹ Above n 71, at 11.

⁵³² Above n 71, at 11.

⁵³³ Transpower "Cross-submission on Transpower's individual price-quality path for the next regulatory control period: issues paper" (7 March 2019), at 2.

Our draft decision on Transpower's consultation on projects during RCP3

- K23 While Transpower considers it goes beyond the requirements for engagement set out in the Capex IM, and that it understands what is important to its customers and stakeholders, we consider there is a disconnect between Transpower's views on the quality of its engagement, and those of Transpower's customers and stakeholders.
- K24 We want to encourage Transpower to become more open and transparent in its customer engagement during RCP3, so that Transpower's customers will:
- K24.1 feel they have an opportunity to engage with Transpower to influence more of its investment decisions throughout the regulatory period; and
 - K24.2 become more confident that Transpower is efficiently investing and operating in a way that reflects customer preferences.
- K25 Therefore, in relation to Transpower's consultation with customers on its expenditure decisions during RCP3, our draft decision is to place new obligations on Transpower to:
- K25.1 publish its engagement plan for RCP3 by 1 October 2020. Our expectation is that Transpower would engage with stakeholders in developing this engagement plan, and we may, through a notice issued under s 53ZD of the Act, require Transpower to provide updates to the engagement plan later in RCP3, if we consider the initial plan is not of sufficient quality;
 - K25.2 report at the end of each disclosure year on the following matters in relation to its actual base capex:
 - K25.2.1 whether Transpower consulted with stakeholders (including customers) and, if so, how it consulted, and what it consulted on;
 - K25.2.2 how effective Transpower considers that consultation was; and
 - K25.2.3 how satisfied stakeholders were with the consultation process based on the views they expressed to Transpower; and
 - K25.3 report on significant capex projects upon the completion of the project, ie, a post-project review. Our expectation is that the threshold for significant capex projects would be those projects that required approval from Transpower's Board to proceed, and that the post-project review would include an assessment of the extent to which each project met the relevant measures of success established by Transpower prior to starting that project.

Transpower's consultation ahead of RCP4

Problem definition

K26 As noted in paragraph K2 above, it is important for Transpower to engage effectively with its customers during the development of its RCP4 proposal in RCP3 so that Transpower's proposed forecast revenues, expenditure allowances and performance measures take into account customer preferences.

Verifier's views on the extent and effectiveness of Transpower's consultation ahead of RCP3

Transpower's consultation should be more outcome-focussed

K27 The Verifier found it challenging to form a definite view on the effectiveness of Transpower's consultation, as it considered the consultation lacked clearly defined outcomes accompanied with some meaningful and quantifiable success measures the Verifier could have used to assess its effectiveness.

K28 Overall, the Verifier's view was that Transpower's consultation had been moderately effective. In its report, the Verifier commented:⁵³⁴

Our opinion is that Transpower's consultation has been moderately effective to-date.

We have found assessing the effectiveness of Transpower's consultation challenging, as it has no documented consultation objectives or success measures. As previously noted, Transpower integrates stakeholder engagement into its 'business as usual' activities, rather than managing it as a distinct work stream with its own objectives, strategy, tactics and success measures. While this is effective for day-to-day operations, it is our opinion that major engagement projects (such as consultation for the RCP3 service measures refresh) benefit from a more structured approach.

It is our opinion that had Transpower identified engagement as a key work stream supporting the multiple RCP3-related projects and planned and managed this work stream independently of those projects, consultation would have been more effective and success easy to measure.

K29 The Verifier considered that Transpower's consultation was very focussed on outputs – ie, activities such as identifying what would be communicated, when, to which audience, and through which channel. However, Transpower failed to articulate and quantify appropriate outcomes – ie, what it was seeking to achieve through its consultation with customers.

⁵³⁴ Above n 513, at 90.

- K30 The Verifier further explained that an outcomes-focussed consultation usually includes:
- K30.1 the relevant business objectives;
 - K30.2 the consultation objectives that support such business objectives (which should be specific, measurable, achievable, realistic, time based); and
 - K30.3 relevant success measures for each objective.
- K31 The Verifier suggested that any identified outputs in the form of activities should be outlined in the context of how they help to achieve each of these objectives.

Transpower's testing of the price-quality balance was less effective than it could have been

- K32 The Verifier concluded that Transpower's consultation did not seek views from its customers on the amount of risk they would be prepared to accept in exchange for the price they would have to pay for transmission services.
- K33 The Verifier considered Transpower's price-quality testing to be "well-intentioned", but had doubts that it could effectively play the role it intended consultation to have. In particular, the Verifier considered that:⁵³⁵

what Transpower appears to be doing is quantifying the revenue/price effects of re-calibrating its network risk tolerances, by reducing or increasing expenditure in certain programmes (eg re-conductoring, ICT), with only a qualitative assessment made of the effect on the various quality dimensions of service. Hence, there is no quantification of the economic consequences of changing risk tolerances.

We recognise the difficulty of quantifying explicit price-quality trade-offs. This includes because modest cuts in expenditure can be made with little or no immediate or short-term impact on service performance or asset health. It may only be over a longer period when the cumulative effects of the expenditure cuts are revealed through service degradation and/or it becomes apparent that a bow wave of 'catch-up' work is required to prevent further and highly disruptive service degradation presenting.

Considering these difficulties, there is a risk that because Transpower's price-quality testing is effectively being applied as a final gateway to determine the RCP3 forecasts, it creates the potential for the process to override the risk assessments (and price-quality testing) previously incorporated into asset management and planning decisions and ultimately the RCP3 baseline expenditure forecasts. In practice, we are concerned that the high level price-quality testing as it is currently developed lacks the rigour to play this role.

...

⁵³⁵ Above n 513, at 383-384.

Importantly, this issue links back to Transpower's asset health modelling development initiatives over RCP2, which are attempting to quantify and link network-related risk tolerances to the economic consequences of these risks, including safety, reliability and environmental. We consider this asset modelling approach is likely to be a more powerful tool in the longer term to robustly assess price-quality trade-offs than the proposed high-level RCP3 price-quality testing. This would also allow the embedding of the price-quality testing in Transpower's asset management decision-making framework.

What we said in our Issues paper

- K34 In our Issues paper, we stated our view that, while there are limitations to what can be achieved through consultation, we still considered Transpower's customer consultation in preparing its proposal could have been improved. Specifically, we noted:^{536, 537}
- K34.1 Transpower's consultation lacked clearly defined outcomes, and some meaningful and quantifiable success measures that could have been used to assess its effectiveness;
 - K34.2 Transpower's consultation did not seek views from its customers on the amount of risk they are prepared to accept in exchange for the price they have to pay for transmission services; and
 - K34.3 Transpower's main consultation event was held rather late in the process of developing the proposal, which meant there may have been little scope to significantly shape the proposal based on customer feedback.

Response in submissions

- K35 MEUG and Meridian raised concerns about Transpower's consultation in preparing its proposal:
- K35.1 MEUG submitted that Transpower's consultation had been ad hoc, and that some had taken place at such a late stage it was questionable whether material feedback could have been incorporated into Transpower's final proposal.⁵³⁸

⁵³⁶ Transpower acknowledged these findings in its main proposal document and has committed to developing its approach to customer consultation further in that regard (Above n 27, at 36).

⁵³⁷ Above n 33, at [4.10-4.21].

⁵³⁸ Above n 69, at [9].

- K35.2 MEUG also considered that Transpower did not adequately test with customers the price-quality trade-off that MEUG would expect from any business including capital intensive enterprises, in a workably competitive market.⁵³⁹
- K35.3 MEUG suggested more extensive ID requirements should be put in place for major capex and listed projects (for example, to require Transpower to identify and explain differences between beneficiaries and the parties that will pay for those projects, and customer consultation). MEUG considered this would assist in the preparation of Transpower's RCP4 proposal, as it would allow Transpower to base its proposal on best practice asset management practices integrating asset health and criticality measures along with feedback from better informed consumers on significant projects.⁵⁴⁰
- K35.4 Meridian considered that Strata's work on the efficiency of base opex should have been available during Transpower's consultation with interested parties during its preparation of its proposal, and suggested the Commission should hold a workshop to discuss the analysis, when available.⁵⁴¹
- K36 Transpower considered its pre-proposal engagement process went well, although it did acknowledge it intended to make improvements for RCP4, including setting clearly defined objectives and measures of effectiveness. Transpower advised that, early in the RCP4 reset process, it plans to engage with its customers and stakeholders on its approach to engagement for RCP4, seeking their ideas on how Transpower can improve before finalising the details of its engagement plan. Transpower also intends to draw upon and develop the approach used in its first engagement paper on RCP3 service performance measures (October 2016).⁵⁴²

Our draft decision on Transpower's pre-proposal engagement processes

- K37 Transpower appears to have taken on board the comments and suggestions made by the Verifier and submitters about its pre-proposal engagement processes, and has indicated it intends to make improvements to its processes ahead of RCP4.

⁵³⁹ Above n 69, at [10].

⁵⁴⁰ Above n 69, at [11].

⁵⁴¹ Above n 222, at 5.

⁵⁴² Above n 71, at 11.

- K38 However, to mitigate the risk that Transpower fails to follow through on these intentions and therefore undermines the quality of the RCP4 proposal, our draft decision is to require Transpower to engage an independent expert to undertake a mid-period review of Transpower's proposed engagement process leading up to submission of its RCP4 proposal. This also reinforces our focus on good engagement processes during RCP3.
- K39 We consider our draft decision would improve Transpower's customer engagement ahead of RCP4, so that:
- K39.1 Transpower's customers are able to better understand Transpower's proposed investment decisions relative to risk;
 - K39.2 Transpower's customers feel they have an opportunity to engage with Transpower to influence its proposed expenditure allowances, performance measures and investment decisions, and therefore become more confident that Transpower is efficiently investing and operating in a way that reflects customer preferences; and
 - K39.3 Transpower is better able to identify customer preferences, and can demonstrate how customer preferences are driving the ranking of expenditure priorities.

Attachment L Asset management

Purpose of this attachment

- L1 The purpose of this attachment is to explain why we consider Transpower's asset management practices are a continuing key focus area for us and to outline those aspects of asset management where we are seeking improvements.

Why we focus on Transpower's asset management practices

- L2 In assessing Transpower's base capex proposal and aspects of proposed opex, we have focussed on the asset management framework under which Transpower both developed its proposal and relied on the input assumptions. We are guided in this assessment by whether the proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier.⁵⁴³
- L3 Achieving the required levels of service, at least cost, over the full life of the network assets, requires expenditure to be planned and implemented through business processes that are based on sound grid strategies, asset management principles and methodologies. We consider this is consistent with the Part 4 purpose, which is a required consideration under the capex evaluation criteria.⁵⁴⁴
- L4 We consider that our continued focus on Transpower's asset management is appropriate, as the extent to which Transpower's expenditure forecasts are prudent and efficient will depend upon the quality of its asset management framework and the appropriateness of the input assumptions.
- L5 Since our RCP1 decision we have been encouraging Transpower to improve its understanding of the linkage between its proposed expenditure, which affects price, and performance, which affects quality. This is at the heart of price-quality regulation and the expectation is that:
- L5.1 the link between price and quality outcomes is able to be made; and
 - L5.2 that price/quality trade-offs can also be understood when making investment decisions.

⁵⁴³ Above n 65, at [A15].

⁵⁴⁴ Clause 6.1.1(2)(b) of the Capex IM.

- L6 In our Process paper we stated that we considered that a well-functioning transmission asset owner should understand the health and criticality of its assets and that this understanding should be used to inform risk-based investment decision making; ie, a framework that can inform likely outage impacts versus costs which results in an understanding of price/quality trade-offs. We consider that a modern well-functioning transmission asset owner should consider a risk-based investment decision-making framework as a necessity.⁵⁴⁵
- L7 There are two key inputs to an asset management approach informed by a risk-based investment decision-making framework; namely, asset health and asset criticality.
- L8 Asset health reflects the likelihood of an asset failing due to its assessed condition, while asset criticality reflects the consequence of the asset failing, ie, how the asset failure would affect network reliability and consumer supply.
- L9 In our recent publications in the RCP3 process, we have identified that there are a number of advantages in having a risk-based investment decision-making framework that has asset health modelling and asset criticality understanding as its foundation.
- L10 We consider that a prudent transmission asset owner should have a good understanding of asset health and that this is a cornerstone of effective asset management because:
- L10.1 it informs asset replacement or refurbishment expenditure decisions; and
- L10.2 asset expenditure forecasts can be made with more certainty, particularly within the context of the regulatory approvals process.
- L11 While it may be impractical to derive detailed asset health models and perform asset condition assessments for all asset types, we expect that where asset health models are practical and useful, they should be developed and implemented.
- L12 The decision to derive asset health models and their level of complexity will be based on many considerations. However, for all primary assets, we would expect that sufficient asset health modelling is being carried out by Transpower and that adequate condition assessment processes exist to inform this modelling.⁵⁴⁶

⁵⁴⁵ Above n 31, at [4.19].

⁵⁴⁶ Primary assets – Power system equipment operating at a high voltage that forms part of the grid. Examples of primary assets are circuit breakers and transformers, Transpower “2018 Integrated Transmission Plan Glossary” (2018), at 3, available at: https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/2018%20ITP%20Glossary%20-%20FINAL.pdf.

- L13 Conversely, we recognise that asset health models may not be appropriate for some secondary asset classes, and that simpler models may be more practical, with some replacement strategies necessarily being based on volumetric, age-based or technical obsolescence factors.⁵⁴⁷
- L14 Despite these practicalities of deriving asset health models, how complex they are, and what processes exist for condition assessments to inform them, asset health modelling has many benefits.
- L15 Specifically, asset health models inform expenditure decision making and not just decisions to replace an asset. These models also assist in determining if it is economic to refurbish an asset, how long refurbishment is likely to provide a benefit, and the timing of expenditure intervention.
- L16 Asset criticality modelling is about understanding the supply security consequences and outage implications of an asset within the context of the wider network. We consider that this understanding is also a key input to effective asset management because:
- L16.1 it can provide timely, risk-based signals for refurbishment/replacement investment decisions that reliability outcomes may not provide;
 - L16.2 it allows asset refurbishment and replacement strategies to be compared across the asset fleet, and prioritisation decisions can be made if a common criticality measure is employed (eg, a monetised approach to risk);⁵⁴⁸
 - L16.3 it can provide connected parties and stakeholders with an informed estimate of the likely outage risk that they face, linked to the price they are required to pay;⁵⁴⁹ and
 - L16.4 it can provide Transpower with the ability to use network risk estimates to set performance measures and targets based on their investment strategy, rather than just using historical performance as a predictor of future performance.

⁵⁴⁷ Secondary assets – Secondary assets support the overall operation of the grid and provide essential services for the monitoring and control of equipment. They cover the protection, station DC systems, revenue metering and substation management systems (above n 316, at 67).

⁵⁴⁸ Having a credible tool to prioritise expenditure is particularly important when dealing with pooled allowances for fungible expenditure such as the base capex allowance.

⁵⁴⁹ The ability of Transpower to actively and constructively engage with its customers on investment decisions is a key plank of our decisions on improving customer engagement in RCP3.

Verifier view of Transpower's asset management maturity

- L17 The Verifier reviewed Transpower's asset management practices that supported the proposal, and analysed Transpower's asset data processes and its asset health and asset criticality modelling.⁵⁵⁰
- L18 The Verifier concluded that while Transpower had made progress in developing asset health models to its target level of maturity in many key asset classes, and that its criticality framework appeared to be comprehensive, the Verifier:^{551, 552}
- L18.1 lacked confidence in the level of asset health and condition data Transpower had in several asset classes;⁵⁵³
 - L18.2 identified that there are several opportunities for improving Transpower's asset health and criticality modelling. While the Verifier considered that the maturity of asset health modelling of some asset classes, such as substation outdoor primary assets, was well understood by Transpower, modelling for other asset types, such as transmission line conductors, HVDC, reactive support plant and some secondary systems (eg, protection relays and substation site Direct Current (DC) control and protection supply systems), required further development;
 - L18.3 noted that there are considerable benefits in improving the life expectancy of some secondary assets and hence there are benefits from improved data and asset health modelling for these assets; and
 - L18.4 recommended that Transpower's asset health models can and should be refined for HVDC assets and the majority of individual reactive plant assets, using a facility approach rather than a fleet-based approach.
- L19 The Verifier also made some recommendations for asset health and criticality modelling improvements, such as:⁵⁵⁴
- L19.1 increasing the coverage of asset classes for criticality modelling and the continuing development of the criticality model through reviewing assumptions, such as restoration times;

⁵⁵⁰ Chapter 5 (at 108-133) of the Verifier report contains the review of Transpower asset management practices. Additionally, the Verifier refers to asset management practices throughout its review of the base capex (Chapter 7 at 154-296) and opex (Chapter 8 at 297-358).

⁵⁵¹ Above n 29, at Chapter 5.

⁵⁵² Above n 29, at Chapter 7.

⁵⁵³ Above n 29, at Table 29.

⁵⁵⁴ Above n 29, at 125.

- L19.2 developing asset health models for transmission lines – existing models in Excel to be transferred to Condition Based Risk Management (**CBRM**) models,⁵⁵⁵ and
- L19.3 continuing to develop ‘Probability of Failure’ curves for each asset class and improving probability of failure from well-researched historical failure models.

Transpower’s asset management practices

- L20 The Verifier report indicated that Transpower’s use and understanding of asset health and criticality modelling across the asset fleet is progressing, but that there are some inconsistencies.
- L21 In some asset classes, notably the ‘AC Substations – Power Transformers’ asset class, Transpower uses and benefits from an in-depth level of asset health and criticality modelling. We consider that this is the level of asset management understanding that Transpower should aim for in all of its primary assets and certain of its secondary asset classes.
- L22 However, in some primary asset classes, there are no asset health models (for example the HVDC and reactive support assets), and asset health modelling of key secondary assets is generally limited.⁵⁵⁶
- L23 We consider that improving asset health and criticality modelling should be one of the top priorities for Transpower over RCP3, especially given that it is signalling a significant expenditure uplift in RCP4 and RCP5 in some asset categories with limited asset health understanding.
- L24 We also consider that rather than modelling individual asset classes in isolation, Transpower’s asset health and criticality modelling should be integrated to ensure Transpower understands the level of risk that the grid carries as a whole.

⁵⁵⁵ Condition Based Risk Management (**CBRM**) is a well-known electricity industry asset management process developed to assist asset owners to make risk-based asset management decisions.

⁵⁵⁶ Above n 29, at 221.

L25 In their submissions on our Process paper, MEUG and Genesis both supported greater use by Transpower of asset health and criticality frameworks to underpin investment decisions. MEUG further submitted that the timeframe for improving asset health and criticality modelling was not ambitious enough and that Transpower must achieve this by the end of RCP3.⁵⁵⁷ We agree.

L26 On this topic, and in our Process paper, we stated that:

We currently consider that by the end of RCP3, Transpower should be in a state where its investment decision making framework is underpinned, where appropriate, by a risk-based asset management approach that includes considering both asset health and criticality.

L27 MEUG responded to this statement in its submission, stating that:⁵⁵⁸

The above goal has been the objective ever since RCP1 commenced 8-years ago in July 2011. We think an innovative customer-centric business in a workably competitive market would have achieved this goal by now. Rather than expecting the goal should be achieved in another 6-years, we suggest it must be achieved.

L28 Like MEUG, we agree that Transpower should have a continuous focus on improving its asset health models and criticality understanding to better inform its expenditure forecasts and investment decision-making processes, and that by the end of RCP3, this aspect of the asset management practice should be well developed.

L29 We are encouraged that Transpower has begun developing and refining its asset condition assessment processes and procedures, and network asset criticality framework tools, and has begun using them to inform its expenditure forecasting and work program decision making.

Issues paper questions we asked

L30 In our Issues paper, we sought views about submitter experience with asset health and criticality, in order to test:

L30.1 submitter experience in using asset criticality in the business environment;

L30.2 how submitters use asset health modelling to inform asset criticality;

L30.3 how useful an asset criticality framework is to submitters in their business in deciding priorities for their work programmes; and

⁵⁵⁷ Genesis Energy Ltd "Our process, framework and approach for setting Transpower's expenditure allowances, quality standards and individual price-quality path for 2020-25" (15 November 2018), at 1-2; and above n 487, at [4(a)].

⁵⁵⁸ Above n 487, at [4(a)].

- L30.4 whether Transpower should approach asset health and criticality in a different way and, if so, how submitters suggested that it should do this.
- L31 We also indicated that we see the future application of asset health and criticality frameworks being combined to develop a network risk model. This type of model could enable the communication of network outage risk, for a variety of network investment strategies, to stakeholders and connected parties. We asked submitters if this information would be useful to them.
- L32 We tested ideas about how we might incentivise Transpower to prioritise development of a network risk model (which includes as inputs, asset health and criticality), and proposed several options to do this, including:
- L32.1 financial (dis)incentives using a regulatory compliance mechanism during RCP3;
- L32.2 independent review and reporting, for example, at the mid-point of RCP3 (which was our preferred option); and
- L32.3 annual Transpower self-disclosure on progress using a regulatory compliance mechanism during RCP3.

Submitter views on our Issues paper

- L33 The responses to our Issues paper questions fell into three broad categories:
- L33.1 asset health and criticality frameworks;
- L33.2 reporting and mid-RCP3 verification of progress; and
- L33.3 risk modelling and how this may be used.
- L34 On the topic of asset health and asset criticality frameworks in general, Genesis stated that it had already indicated the importance of these and that they needed to be robust, while Meridian agreed with MEUG that it was important to improve these as soon as possible and that they should be mature at the end of RCP3.^{559, 560, 561}

⁵⁵⁹ Above n 429, at 1.

⁵⁶⁰ Above n 222, at 6.

⁵⁶¹ Above n 69, at [5].

- L35 Two submitters supported the proposed reporting and the idea of mid-RCP3 period verification. Meridian and MEUG were supportive of the process, while MEUG further indicated there should be penalties applied to Transpower if it was not delivering, stating that:⁵⁶²

The mid-RCP benchmarks should be set to ensure completion of best practice asset management processes for the AMP that will inform the price-quality path for RCP4. If Transpower fails to achieve predefined final outcomes for the end of RCP3, then Transpower's owners should bear material financial penalties. We think in this case the ends-justify sufficiently strong penalties to motivate the Board and management to complete this work.

- L36 However, while MEUG was supportive of our reporting measures, it also criticised them as being too weak, stating that:⁵⁶³

The proposed preferred option by the Commission to require an independent verification part way through RCP3 to report progress in this area seems to us to be a continuation of the weak incentives to date leading to delays in RCP1 and RCP2 from making real progress.

- L37 MEUG also discussed the practical use of a risk model stating that:⁵⁶⁴

The benefit of and therefore the need for Transpower to provide more granular forecast price effects is discussed later in this submission in paragraph 11 in relation to suggestions from MEUG not taken up in the Capex Input Methodologies review that should be considered for improvements in Transpower's Information Disclosure requirements.

- L38 MEUG further stated:⁵⁶⁵

MEUG does not consider Transpower tested with customers the price-quality trade-off that we would expect from any business including capital intensive enterprises, in a workably competitive market.

- L39 Transpower made a number of statements about how it is progressing its risk modelling and ability to make the investment/quality outcome linkages, stating that:⁵⁶⁶

Linking performance measures to planning is complex and we are on a maturity journey. In line with other transmission businesses, we have developed an incremental approach we believe is appropriate for Transpower's business. As we work through the complexities and our maturity evolves, the link between planned investment and likely performance outcomes is expected to become stronger and more transparent.

⁵⁶² Above n 69, at [5].

⁵⁶³ Above n 69, at [4(b)].

⁵⁶⁴ Above n 69, at [6].

⁵⁶⁵ Above n 69, at [10].

⁵⁶⁶ Above n 71, at 17.

L40 We consider that there are a number of benefits of having a functional network risk model, which will also allow Transpower to discuss the investment/risk trade-offs with stakeholders and connected parties. The submissions on the Issues paper indicated that this understanding is desirable.

L41 Finally, Transpower noted that it had not identified any other transmission businesses pursuing an asset risk modelling approach of the type proposed in the Issues paper, stating that:⁵⁶⁷

We intend to improve our asset management maturity over RCP3, which includes exploring the definition of an asset management approach to network risk and evaluating how such an approach could be implemented. We are not aware of any international peers that have made this complex, bold step....

L42 However, the Verifier demonstrated in its report that one utility in Australia uses asset risk modelling; namely TransGrid, with its Investment Risk Tool. While this still appears to be developmental, it is an example of a transmission utility progressing towards using risk analysis to inform investment decision making and define investment/quality outcomes.⁵⁶⁸

L43 The Verifier also summarised the CNAIM approach used by Ofgem for asset health, asset criticality and monetised risk for DNOs in the Great Britain electricity distribution network sector. This framework can also link investment to potential quality outcomes.⁵⁶⁹

L44 Given these international examples, and the clear benefits, we consider that it is reasonable to expect Transpower to fully develop its asset health modelling and asset criticality frameworks, and to ultimately link them together to understand the risk profile of its network and assets.

L45 The modelling may be complex but the international practice examples demonstrate that many utilities are starting to develop these frameworks. Moreover, submitters are expecting Transpower to be able to discuss with them, in a more granular way, an understanding of investment/quality trade-offs. This is essentially what a risk model can do.

⁵⁶⁷ Above n 71, at 17.

⁵⁶⁸ Above n 29, at 114, and TransGrid “Approach to Forecasting Expenditure 2018/19 to 2022/23” (31 July 2016), at 8, available at: <https://www.aer.gov.au/system/files/TransGrid%20-%20Approach%20to%20forecasting%20expenditure%20for%202018-23%20-%20June%202016.pdf>.

⁵⁶⁹ Ofgem “DNO Common Network Asset Indices Methodology: Health & Criticality - Version 1.1” (30 January 2017), available at: https://www.ofgem.gov.uk/system/files/docs/2017/05/dno_common_network_asset_indices_methodology_v1.1.pdf.

Further information from RFIs relevant to asset management practices

- L46 Between January and March 2019, we issued RFIs to Transpower to gather data on aspects of its asset management practices. These RFIs focussed on a range of asset management related questions, namely:
- L46.1 Whether there was any technical reason preventing Transpower from having a functional network risk model informing network risk, investment strategy, and likely future performance by the end of RCP3;⁵⁷⁰
 - L46.2 Whether Transpower had any plans to integrate its asset health and criticality modelling to the extent that it could begin to understand network risk and ultimately be able to communicate this network risk to customers and other stakeholders;⁵⁷¹ and
 - L46.3 Given that it appears that many of the asset classes in Transpower’s AHI model will have a higher proportion of assets with scores above 8 at the end of RCP3 compared to the start of the period.⁵⁷²
 - L46.3.1 whether this is part of Transpower's strategy and whether there is an economic justification behind the decision to operate with more assets with these scores; and
 - L46.3.2 whether this decision making was informed by the risk/investment trade-off of the asset health classes.⁵⁷³

RFI018 and RFI020– network risk model and communicating risk

- L47 In its Issues paper submission to us, Transpower responded to our RFI questions about developing a network risk model and communicating that risk. We used these RFIs to test Transpower’s commitment to moving towards an ability to be able to communicate risk and investment/quality trade-offs with connected parties and stakeholders.

⁵⁷⁰ Above n 71, at Section 7 and Appendix B.

⁵⁷¹ Above n 71, at Section 7 and Appendix B.

⁵⁷² An asset health score of 8 or above is Transpower’s terminology for assets that are in “poor to very poor condition”. Transpower qualified the asset scoring system – “Over time, an asset deteriorates and moves through the asset health scores in the index until it is given a score of 8 or above, indicating that it is near the end of its useful life and that the probability of failure (which may cause an interruption to service) increases. This is generally when we decide to actively manage the asset” (above n 210, at 19).

⁵⁷³ Above n 280.

L48 Transpower stated that it remains committed to developing its asset health and criticality modelling and that these are important priorities. However, Transpower further stated that linking performance measures to planning is complex and that the business is on a “maturity journey”:⁵⁷⁴

In line with other transmission businesses, we have developed an incremental approach we believe is appropriate for Transpower’s business. As we work through the complexities and our maturity evolves, the link between planned investment and likely performance outcomes is expected to become stronger and more transparent.

L49 We note that there is no expression of a concrete plan to deliver the outcomes. MEUG made the point that Transpower has been “on a journey” since RCP1 and that the review of the base capex proposal has revealed many asset classes with minimal or non-existent asset health models. Asset health is a fundamental input into a risk model.

L50 MEUG has made the point in its Issues paper submission that the initiatives we set should involve financial disincentives to ensure that they are delivered. However, this is the first reset where we have specifically asked Transpower about its plans to link asset health and criticality to form an understanding of asset and network risk.

L51 While we agree with MEUG that there is no real reason why Transpower should not have well-developed asset health models for its primary assets and key secondary assets (an absence identified by the Verifier in its base capex verification review), understanding the investment/quality linkages is another level of complexity.

L52 We consider that Transpower’s RFI responses did not fully answer the questions we put to it and agree with MEUG that progress seems less than ideal. We would expect Transpower to have some concrete idea about when it might deliver on this outcome and we propose to encourage this with some reporting requirements over RCP3.

L53 We propose to introduce further reporting requirements from Transpower relating to its development of the network risk model, so that Transpower is able to:

L53.1 understand risk and how this is affected by different asset investment strategies;

L53.2 sufficiently understand asset and network risk so that it can explain investment/quality linkages to external parties; and

⁵⁷⁴ Above n 71, at 17.

- L53.3 sufficiently understand asset and network risk so that it can be used to set forward-looking quality measures rather than using historical performance as a predictor of future performance.

RFI039 – asset health measures informed by investment/risk trade-off

- L54 Transpower’s response to RFIs RFI018 and RFI019 seemed at odds with its answers to the questions we posed in RFI039.
- L55 We noticed that as part of Transpower’s proposed asset health measures, the asset health of the power transformer asset class over RCP3 was set to worsen, ie, that there was a higher percentage of assets with an asset health score of 8 or above (in poor or very poor condition) at the end of the period than at the beginning.⁵⁷⁵
- L56 In RFI039 we asked Transpower if this was because an investment/risk trade-off had been made and whether this trade-off was economically justified. Transpower responded by stating that:⁵⁷⁶
- L56.1 Transpower has strategically moved to a more risk-based approach (eg, Power Transformers) and while an asset’s health score may be greater than 8, the consequences of failure will also have an impact on Transpower’s mitigation decisions;
 - L56.2 system change and unconfirmed customer commitments may delay investment;
 - L56.3 data errors can misrepresent asset health, and asset health models are necessarily data-driven;
 - L56.4 alternative mitigation measures may be employed instead of replacement, such as higher levels of monitoring to enable contingency planning, notwithstanding the asset health score is at, or greater than, 8; and
 - L56.5 packaging and integration of works may result in some asset projects being done early and others being done later.
- L57 While there are a number of factors stated here as reasons for the proposed worsening of the asset health of the power transformer fleet, our provisional judgement is that the main driver in decision making is the fact that, in this asset class, Transpower has a fully functional risk model informed by asset health modelling and a monetised criticality framework.

⁵⁷⁵ Above n 210, at Table 8.

⁵⁷⁶ Above n 280.

L58 This has enabled investment/risk trade-offs to be made. Otherwise, Transpower would not be able to judge whether running this asset class with transformers in poorer condition at the end of RCP3 was a reasonable risk to take.

L59 In its RFI039 response (specifically with reference to the Power Transformers asset class), Transpower confirmed this by stating that:⁵⁷⁷

Our planning approach allows us to scale our expenditure to each asset to strike the right balance between cost and risk whilst maintaining service levels

L60 We consider that Transpower should be focussing on replicating this type of analysis framework and rolling this out across the asset fleet during RCP3. The framework appears to have enabled different investment decisions to be made than would otherwise have been the case, and a judgement was able to be made on the level of risk that could reasonably be carried.

How we propose to address Transpower's asset management practices

L61 In its review of the RCP3 base capex proposal, the Verifier identified a number of asset classes where asset health modelling needed to be improved. We agree with the Verifier and have included these as part of our base capex programme recommendations.

L62 We also propose that annual reporting requirements be implemented so Transpower can demonstrate progress, and a mid-RCP3 expert review be carried out alongside the proposed review of customer consultation developments. This review would provide an external opinion on Transpower's progress in a number of key focus areas.

L63 As discussed previously, we propose that one of the key areas of development Transpower should be progressing is an ability to understand risk across the asset fleet.

L64 In the absence of a properly functioning risk model, and as an interim measure, we propose to set quality standards associated with the asset health measures proposed by Transpower. These quality standards linked to asset health will act as a proxy for a functioning risk model to signal timely investment or intervention decisions as opposed to quality outcomes, which are considered to be a lagging measure when linked to investment decisions.

⁵⁷⁷ Above n 576.

- L65 Ultimately Transpower's goal should be to have fully functional asset health models and asset criticality understanding that feed into a risk model where asset investment/risk trade-offs can be made. Clearly this is possible, as evidenced by the maturity of investment decision making in the Power Transformer asset class.
- L66 We would like to see Transpower extend this risk modelling to other asset classes, with a goal to not only enable investment/risk trade-offs to be made at an asset class level, but also at a network level. Ultimately the risk model should enable potential outage risk, for a particular investment strategy, to be expressed at a grid exit point (GXP) level of granularity.
- L67 We agree with MEUG that Transpower should make this modelling a priority and that the risk model should be sufficiently mature to drive RCP4 expenditure forecasts and inform price/quality understanding.
- L68 To this end, we would like Transpower to develop its risk modelling so that network outage risk linked to all primary assets (incorporating the effects of associated secondary assets) can be expressed in preparation for its RCP4 proposal. This is the first step in the development of a risk model that would enable Transpower to predict connected party risk at each GXP, and ultimately enable price/quality understanding.⁵⁷⁸
- L69 Our draft decision is to require annual reporting and a mid-RCP3 expert review, the details of which will be set out in a notice issued under s 53ZD of the Act.

Our conclusions

- L70 We propose for inclusion as part of these draft decisions, that we introduce a range of reporting and review requirements, namely:
- L70.1 a proposal that Transpower produces a roadmap at the start of RCP3 for the development of its asset and network risk modelling in preparation for its RCP4 proposal. This roadmap should detail how Transpower plans to develop its risk modelling in order that it can:
- L70.1.1 enable the understanding of investment/risk trade-offs that can be made across the asset fleet (ie, how asset and network outage risk is affected by different asset investment strategies);

⁵⁷⁸ Being able to model its risk at a GXP level will have the benefit of allowing Transpower to more accurately target its customer engagement. With recent developments by the Electricity Authority on the area of benefit (AOB) methodology under the transmission pricing methodology (TPM) there is likely to be greater demand from customers for this level of granularity of decision making and engagement with Transpower.

- L70.1.2 sufficiently explain different investment strategies and the likely quality outcomes to external parties, firstly at a network level of granularity but with a goal to do this at each GXP; and
 - L70.1.3 set forward-looking performance measures.
- L70.2 a proposal that Transpower:
- L70.2.1 provides the RCP3 roadmap by 1 October 2020;
 - L70.2.2 reports annually on its risk modelling development progress; and
 - L70.2.3 obtains a review of the risk modelling progress by a mid-RCP3 expert reviewer alongside the mid-period review of the progress on customer consultation.

Attachment M Verifier terms of reference

Purpose of this attachment

M1 This attachment provides the terms of reference for the Verifier, which were attached to the tripartite deed between the Verifier, Transpower and the Commission.

16 April 2018

Terms of reference for verification of Transpower's RCP3 proposal

Purpose of this document

1. The purpose of this document is to set out the terms of reference for a verifier to verify Transpower's RCP3 proposal.¹
2. Note: These terms of reference have been prepared on the basis of the Capex IM, taking into account the revised draft amendment determination published on 29 March 2018 following the Commission's final decisions on the Capex IM review.² The revised draft amendment determination is currently under technical consultation and so remains subject to minor changes. The amendment determination is expected to be finalised by the end of May 2018. In carrying out these terms of reference, the verifier will apply the Capex IM as amended by the final amendment determination in May 2018 (which, in the meantime, the verifier should assume will be very similar to the revised draft amendment determination published on 29 March 2018).

The verifier's role and obligations

3. At a high level, the verifier's role and obligations will be:
 - 3.1 engaging with Transpower in an independent manner in accordance with the tripartite deed;

¹ Transpower's RCP3 proposal will comprise a base capex proposal and an opex proposal. The requirements for the base capex proposal are governed by the Capex IM, and must include a proposed base capex allowance, proposed listed projects, and proposed grid output measures. The requirements for Transpower's opex proposal will be set out in an information gathering notice from the Commission to Transpower, likely in April 2018. Proposed major capex is not included in the RCP3 proposal because a separate approval regime exists for major capex. In short, major capex is enhancement and development capex over the value of \$20m (the full definition is found in the Capex IM); all other capex should be included in the base capex proposal.

² The revised draft capex IM amendment determination is available at <http://www.comcom.govt.nz/dmsdocument/16189>.

- 3.2 evaluating whether Transpower's proposed base capex allowance, proposed opex allowance, proposed grid output measures, and key assumptions are consistent with an expenditure outcome which represents the efficient costs of a prudent supplier, having regard to:
 - 3.2.1 GEIP as reflecting the appropriate planning and performance standards for a prudent supplier;³ and
 - 3.2.2 the evaluation criteria in Attachment A; and
- 3.3 producing a verification report that meets the requirements in these terms of reference.

Content of verification report

- 4. In the verification report, the verifier will:
 - 4.1 provide an opinion on whether Transpower's proposed base capex allowance, proposed opex allowance, proposed grid output measures, and key assumptions are consistent with the expenditure outcome described in paragraph 3.2;
 - 4.2 provide an opinion on the extent to which Transpower's relevant policies and governance processes (including Transpower's approach to, and use of, asset health modelling) are consistent with good asset management practice and are directed towards the expenditure outcome described in paragraph 3.2;
 - 4.3 provide an opinion on the extent to which Transpower's key policies and governance processes on which the proposal or its implementation depend have been made effective;
 - 4.4 provide an opinion on the extent to which Transpower has adequately addressed in its proposal its ability to deliver against its proposed base capex allowance and proposed opex allowance during RCP3, taking into account the expected availability of the resources required to deliver on those proposed allowances;
 - 4.5 provide an opinion on the extent and effectiveness of Transpower's consultation with its stakeholders;

³ 'Good electricity industry practice' is defined in Part 1 of the Electricity Industry Participation Code 2010 as: **good electricity industry practice** in relation to transmission, means the exercise of that degree of skill, diligence, prudence, foresight and economic management, as determined by reference to good international practice, which would reasonably be expected from a skilled and experienced **asset** owner engaged in the management of a transmission network under conditions comparable to those applicable to the **grid** consistent with applicable law, safety and environmental protection. The determination is to take into account factors such as the relative size, duty, age and technological status of the relevant transmission network and the applicable law [bold terms in original].

- 4.6 provide an opinion on the extent to which Transpower's proposal is consistent with the feedback Transpower received from its stakeholders;
- 4.7 provide a list of the key issues and areas that it considers the Commission should focus on when the Commission evaluates Transpower's RCP3 proposal;
- 4.8 provide an opinion on whether Transpower provided the verifier with the type and depth of information it needed to provide its verification report; and
- 4.9 identify any other information not included in the RCP3 proposal that the verifier reasonably believes would:
 - 4.9.1 be available to Transpower; and
 - 4.9.2 assist the Commission's evaluation of Transpower's RCP3 proposal.

Key process matters

- 5. The verifier will carry out its role under a tripartite deed between the verifier, Transpower and the Commission. This will allow the Commission to communicate with the verifier during the verification process.
- 6. Transpower will provide the verifier with information on sections of the expenditure and quality proposal progressively during the compilation of its draft RCP3 proposal. It is anticipated that the information provided by Transpower in response to the requirements in the Capex IM, supplemented by the Commission's opex information gathering request to be made at about the same time, will provide the majority of the information required by the verifier.
- 7. As soon as reasonably practicable after the engagement of the verifier, Transpower and the verifier will agree a timeline for the verification process. This will set out what information Transpower will provide to the verifier and when.
- 8. It is anticipated that Transpower will prepare its RCP3 proposal in three stages:
 - 8.1 preparation of a baseline plan for expenditure and grid output measures;
 - 8.2 performing additional price-quality testing on that plan;
 - 8.3 finalising the RCP3 proposal in light of final stakeholder engagement.
- 9. In carrying out its verification work, the verifier will engage with Transpower on an ongoing basis during each of the stages of the proposal development. For the avoidance of doubt, the verifier is not required to prepare a draft report to be shared with the Commission at the conclusion of each stage.
- 10. In preparing the verification report, the verifier will follow the following process:
 - 10.1 the verifier will first produce a draft verification report.

- 10.2 the draft verification report will be provided to Transpower, to give Transpower the opportunity to comment on the draft report and take account of the verifier's draft comments prior to submitting its RCP3 proposal to the verifier for final verification.
- 10.3 the draft verification report will also be made available to the Commission to assist the Commission in planning for how it will evaluate the RCP3 proposal. The Commission may provide comments on the draft report (with a view to ensuring the final report meets the Commission's needs for its later evaluation of Transpower's RCP3 proposal) but the Commission does not intend to provide comments on Transpower's RCP3 proposal at this point.
11. The verifier may update its draft report to take account of any responses or further information provided by Transpower or any changes Transpower may make to its RCP3 proposal.
12. The verifier will provide Transpower with its final verification report so that Transpower can submit it to the Commission with Transpower's RCP3 proposal.
13. Transpower will highlight any matters in its RCP3 proposal where it maintains a different view from that of the verifier.
14. It is anticipated that the Commission will meet with and/or ask questions of the verifier after Transpower submits its RCP3 proposal to confirm the Commission's understanding of the verification report and to inform the Commission's plan for its evaluation of Transpower's RCP3 proposal.
15. It is anticipated that the verifier's findings will help inform a process and issues paper that the Commission will publish to invite stakeholder comment on Transpower's RCP3 proposal. As part of this paper the Commission anticipates consulting on the extent to which it should rely in its evaluation of the RCP3 proposal on the verifier's findings.
16. It is anticipated that the weight that the Commission attaches to the verification report will depend (amongst other things) on the level of engagement of the verifier at each stage of the RCP3 proposal development and the robustness of the analysis and information on which the verifier relied in preparing the report, taking account of the evaluation criteria (specified in Attachment A).

What the verifier will review (scope of work)

17. In preparing its verification report, the verifier will review:
 - 17.1 the opex and base capex allowances Transpower has proposed, with emphasis on identified programmes (as determined in accordance with the identified programmes criteria specified by the Commission on 28 March 2018), broken down into the following expenditure types or such further agreed types:
 - 17.1.1 opex;
 - 17.1.2 replacement and refurbishment base capex;
 - 17.1.3 enhancement and development base capex;
 - 17.1.4 information and communication technology capex; and
 - 17.1.5 business support capex;
 - 17.2 the grid output measures Transpower has proposed;
 - 17.3 to the extent that Transpower includes listed projects in its RCP3 proposal, whether, having regard to paragraph A10 in Attachment A, those projects meet the criteria to be specified by the Commission as listed projects;
 - 17.4 to the extent that Transpower includes low incentive rate base capex projects in its RCP3 proposal (as defined in the Capex IM), whether, having regard to paragraph A4 in Attachment A, those projects should be specified by the Commission as low incentive rate base capex projects;
 - 17.5 the extent to which Transpower adequately demonstrates that its RCP3 proposal is consistent with the relevant input methodologies;
 - 17.6 the extent of Transpower's stakeholder engagement (including on grid output measures) and the extent to which Transpower's RCP3 proposal reflects the outcomes of that engagement; and
 - 17.7 whether any enhancement and development base capex projects or programmes included in Transpower's RCP3 proposal are subject to uncertainty such that the Commission should consider making those projects or programmes subject to a base capex allowance adjustment mechanism (as defined in the Capex IM). For any such projects or programmes, the verifier should also provide its view on the appropriate pre-set base capex amounts of any such adjustments that should be provided for during the regulatory period and what the trigger thresholds should be for these base capex amounts. In reviewing this aspect of the proposal, the verifier shall have regard to paragraph A9 in Attachment A.

18. The verifier will not be asked to review issues relating to the form of control (eg, smoothed price path and reopener provisions, application of the listed projects mechanism, and processes for annual forecast MAR updates).

How the verifier will perform the review (process of work)

19. In preparing its verification report, the verifier will have regard to (as relevant):
- 19.1 Transpower's policies and processes;
 - 19.2 Transpower's application of its policies and processes;
 - 19.3 Transpower's strategic documents (including Transmission Tomorrow);
 - 19.4 the consistency of Transpower's RCP3 proposal with the strategies set out in the strategic documents;
 - 19.5 information supplied by Transpower to the verifier in the course of the verification process;
 - 19.6 the proportionate scrutiny principle;⁴
 - 19.7 the identified evaluation criteria specified in Attachment A;
 - 19.8 Transpower's performance in RCP1 and RCP2; and
 - 19.9 international best practices where appropriate in a New Zealand context.
20. For the avoidance of doubt, the verifier is not required to audit the quantitative information in Transpower's RCP3 proposal. But it is expected that the verifier will ascertain and conclude on the effectiveness of the process used to assemble the quantitative information that informs the RCP3 proposal (consistent with paragraph 4.3 above).
21. Identified evaluation criteria are specified in Attachment A to these terms of reference to provide both Transpower and the Commission with more certainty about how the verifier will evaluate Transpower's RCP3 proposal.
22. The verifier and Transpower will agree directly the communication protocols regarding the sourcing and use of information from Transpower by the verifier.

⁴ The principle that the level of scrutiny applied should generally be commensurate with the price and quality impact on consumers of the aspect of the proposal being scrutinised.

Attachment A: Evaluation criteria

Purpose

This attachment provides more detail on the evaluation criteria that the verifier is to apply in undertaking the verification.

The evaluation criteria for the **base capex proposal** largely reflect the evaluation criteria in Schedule A of the Capex IM, which the Commission must apply when assessing Transpower's **base capex proposal**. The evaluation criteria for the **opex proposal** are consistent with those for the **base capex proposal** where appropriate and include further criteria that are specific to assessing opex proposals. While some of the criteria below apply just to base capex, others just to opex, and some to both, the verifier should, where relevant, consider opex and base capex together given the potential cost trade-offs between opex and base capex.

In applying these evaluation criteria, the verifier should exercise its professional judgement about the relative consideration to give to each of the criteria, having regard to the proportionate scrutiny principle described at paragraph 19.6 above.

Definitions

Terms in bold are defined in the Capex IM.

A1 General evaluation of the base capex proposal and the opex proposal

The verifier will have regard to the following factors when evaluating the **base capex proposal** and the **opex proposal**:

- (a) the reasonableness of the key assumptions relevant to **base capex** and opex relied upon, including-
 - (i) the method and information used to develop them;
 - (ii) how they were applied;
 - (iii) for the **base capex proposal**, their effect on the proposed **base capex allowance**; and
 - (iv) for the **opex proposal**, their effect or impact on the proposed opex allowance.
- (b) whether **policies** regarding the need for, and prioritisation of, **projects** and **programmes** demonstrate a risk-based approach consistent with good asset management practice and are directed towards achieving cost-effective and efficient solutions;
- (c) the dependencies between the proposed **grid output measures** and the proposed **base capex allowance** and proposed opex allowance at the level of the **grid** and for each **base capex category** and opex category;
- (d) the dependencies between the proposed **grid output targets** and the proposed **base capex allowance** and proposed opex allowance at the level of the **grid** and for each **base capex category** and opex category;

- (d) the extent to which the **grid output targets** were met in the previous **regulatory period**;
- (e) the overall deliverability of the proposed **base capex** and opex during the current **regulatory period**;
- (f) the reasonableness and adequacy of any models used, including but not limited to asset replacement models, to prepare the proposed **base capex allowance** and proposed opex allowance including-
 - (i) inputs to the model; and
 - (ii) the methods used to check the reasonableness of the forecasts and related expenditure;
- (h) the reasonableness of the key assumptions, key input data and forecasting methods used in determining demand forecasts;
- (i) the appropriateness of using those demand forecasts and **other** key assumptions in determining the proposed **base capex allowance** and proposed opex allowance;
- (j) the extent to which Transpower has demonstrated the type of efficiency improvements obtained in the current and previous **regulatory periods**; and
- (k) the extent to which Transpower has demonstrated the scope for efficiency improvements during the **regulatory period** in question.

A2 **Specific evaluation of the opex proposal**

In addition to the criteria provided above in clause A1, when evaluating the **opex proposal**, the verifier will review and assess:

- (a) any other opex drivers not covered by the key assumptions that have contributed the proposed opex allowance, and whether the opex associated with these drivers is consistent with the expenditure outcome described in paragraph 3.2;
- (b) the reasonableness of the methodologies used in establishing the proposed opex allowance (such as cost benchmarking or internal historic cost trending), including the relationship between the proposed opex allowance and the proposed base capex allowance;
- (c) the reasonableness of any opex reduction initiatives undertaken or planned during the current **regulatory period** or RCP3; and
- (d) the reasonableness of any efficiencies built into the proposed opex allowance as a result of the investment programme carried out under RCP1 and RCP2.

A3 Evaluation of identified programmes

In evaluating the **base capex proposal** and the **opex proposal**, the verifier will undertake a review of each identified programme (as determined in accordance with the identified programmes criteria specified by the Commission on 28 March 2018), and such a review may include evaluation of at least-

- (a) whether **policies** regarding the need for the identified programme and its priority demonstrate a risk-based approach consistent with good asset management practice and were applied appropriately;
- (b) whether other relevant **policies** and planning standards were applied appropriately;
- (c) **Transpower's** process to determine the identified programme's reasonableness and cost-effectiveness;
- (d) **Transpower's** internal processes for challenging a need for an identified programme and the possible alternative solutions;
- (e) how **grid outputs**, key drivers, assumptions, and cost modelling were used to determine its forecast **capital expenditure**;
- (f) the capital costing methodology and formulation, including unit rate sources and the quantum of included contingencies;
- (g) the effect of its forecast **capital expenditure** on other cost categories, including the relationship with **operating expenditure**;
- (h) the effect of its forecast **operating expenditure** on other cost categories, including the relationship with **capital expenditure**;
- (i) links with other **projects** or **programmes**, whether proposed or in progress; and
- (j) the proposed approach to procurement of associated goods and services.

A4 Criteria for considering the low incentive rate base capex allowance

Where the verifier considers that a **base capex project** or **base capex programme** proposed by **Transpower** as a **low incentive rate base capex project** is likely to require **capital expenditure** greater than \$20 million, it will take into account at least the following criteria in evaluating whether the **base capex project** or **base capex programme** should be specified by the Commission as a **low incentive rate base capex project**:

- (a) the extent to which **Transpower** has demonstrated that it has considered whether there are viable alternatives that meet the same **investment need**; and
- (b) the magnitude of cost uncertainty of the **base capex project** or **base capex programme** demonstrated by **Transpower**.

A5 Evaluation techniques

In undertaking the evaluations described in clauses A1–A4, A9 and A10, the verifier may employ one or more of the following techniques:

- (a) process benchmarking;
- (b) process or functional modelling;
- (c) trending or time-series analysis;
- (d) high level governance and process reviews;
- (e) internal benchmarking of forecast costs against costs in the current period;
- (f) project and programme sampling;
- (g) critiques or independent development of-
 - (i) demand forecasts;
 - (ii) labour unit cost forecasts;
 - (iii) materials forecasts;
 - (iv) plant forecasts; and
 - (v) equipment unit cost forecasts; and
- (h) any other technique or approach that the verifier considers appropriate in the circumstances.

A6 Criteria for considering grid output measures

The verifier will take into account at least the following criteria in considering **grid output measures**:

- (a) the extent to which a measure is a recognised measure of either or both of the following things:
 - (i) risk in the **supply of electricity transmission services**; and
 - (ii) performance of the **supply of electricity transmission services**;
- (b) the relationship between a measure, **base capex, major capex** and **operating expenditure** including the extent to which the relationship can be quantified; and
- (c) the extent to which the measure aligns with the business processes used by **Transpower** in its **supply of electricity transmission services**.

A7 Criteria for considering revenue-linked grid output measures

In addition to the criteria specified in clause A6, the verifier will take into account at least the following criteria in considering **revenue-linked grid output measures**:

- (a) the extent to which a measure is a recognised measure of **grid outputs** that are valued by **consumers**;

- (b) the strength of the relationship between a measure and **base capex**; and
- (c) whether a measure is quantifiable, controllable by **Transpower**, auditable and replicable over time.

A8 **Criteria for considering matters relating to revenue-linked grid output measures**

The verifier will take into account at least the following criteria in considering **caps, collars, the grid output incentive rate and grid output targets** in respect of each **revenue-linked grid output measure**:

- (a) the value that **consumers** place on that **grid output measure** and the relationship between this value and the proposed **grid output incentive rate**;
- (b) quantification of relationship between **base capex** and the **grid output** both-
 - (i) within the **regulatory period** in question; and
 - (ii) over the longer term;
- (c) the extent of the likely effect of factors unrelated to investment that may affect the **grid output**, such as-
 - (i) natural degradation in asset condition;
 - (ii) impact of changes in loading of the **grid**; and
 - (iii) extreme weather events;
- (d) the plausible range of **grid outputs** likely to be delivered taking into account factors described in paragraphs (b) and (c);
- (e) the relationship between the range described in paragraph (d) and the proposed **caps and collars**; and
- (f) the impact on return on capital implied by both the range described in paragraph (d) and the application of the proposed **cap, collars and grid output incentive rate**.

A9 **Criteria for considering base capex allowance adjustment mechanism**

Where the verifier evaluates whether any **E & D base capex projects** or **E & D base capex programmes** are subject to uncertainty such that a **base capex allowance adjustment mechanism** should be specified by the Commission in respect of such projects or programmes, the verifier will take into account at least one of the following criteria:

- (a) the cost and timing uncertainties of any individual **E & D base capex project** or **E & D base capex programme**;
- (b) the extent to which any timing uncertainties of an **E & D base capex project** or **E & D base capex programme** are linked to a certain level of demand or connecting new generation;

- (c) any other relevant drivers of **E & D base capex** that may influence **project** or **programme** need or uncertainty.

A10 **Criteria for considering listed projects**

Where the verifier evaluates whether a **base capex project** or **base capex programme** meets the criteria specified to qualify as a **listed project**, the verifier will assess whether it is a **base capex project** or **base capex programme** that meets all of the following criteria:

- (a) will require **capital expenditure** greater than \$20 million;
- (b) is reasonably required by **Transpower**;
- (c) has at least one asset that is likely to be **commissioned** in the **regulatory period**;
- (d) for which the **base capex** forecast to be incurred is in relation to **asset replacement, asset refurbishment**, or both **asset replacement** and **asset refurbishment**;
- (e) has an anticipated commencement date within the **regulatory period** but that cannot be forecast with specificity; and
- (f) is not already accommodated in the **base capex allowances** for the **regulatory period**.