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

Decisions and reasons paper

Date of publication: 29 August 2019

Associated documents

Publication date	Reference	Title
1 June 2018	978-1-869456-39-9	*Transpower Capital Expenditure Input Methodology determination 2012* [2012] NZCC 2, as amended and consolidated as at 1 June 2018
25 October 2018	978-1-869456-63-4	Our process, framework and approach for setting Transpower's expenditure allowances, quality standards and individual price-quality path for 2020 to 2025
28 November 2018	978-1-869456-27-6	*Transpower Individual Price-Quality Path Determination 2015* [2014] NZCC 35, as amended and consolidated as at 26 November 2018
7 February 2019	978-1-869456-82-5	Transpower's individual price-quality path for the next regulatory period - Issues paper
16 May 2019	Notice of intention	Notice of Intention: Proposal to Consider Amending Input Methodologies for Electricity Distribution Services and Transpower New Zealand Limited
29 May 2019	978-1-869456-04-4	Transpower's individual price-quality path from 1 April 2020: Draft decisions and reasons paper
29 May 2019	978-1-869457-01-3	[DRAFT] Transpower Input Methodologies Amendments Determination 2019
29 May 2019	978-1-869457-02-0	[DRAFT] Transpower Capital Expenditure Input Methodology Amendments Determination 2019
29 May 2019	978-1-869456-98-6	Proposed amendments to input methodologies for electricity distributors and Transpower New Zealand Limited: Reasons paper
29 May 2019	Notice of intention	Notice of intention: Proposal to Consider Amending Input Methodologies for Transpower New Zealand Limited
6 June 2019	978-1-869457-08-2	Treatment of operating leases: Issues paper
10 June 2019	1178-2560	*Transpower Input Methodologies Determination 2010* [2012] NZCC 17, as amended and consolidated as at 10 June 2019
14 June 2019	978-1-869457-12-9	[DRAFT] Transpower Individual Price-Quality Path Determination 2020
12 July 2019	978-1-869457-16-7	Transpower's individual price-quality path from 1 April 2020 – IRIS baseline adjustment term: Draft decisions and reasons paper
18 July 2019	978-1-869457-18-1	Proposed further amendments to input methodologies for Transpower New Zealand Limited: Draft decisions and reasons paper
28 August 2019	978-1-869457-21-1	Treatment of operating leases: Draft decisions and reasons paper
28 August 2019	978-1-869457-52-5	Amendments to input methodologies for Transpower New Zealand Limited: Reasons paper
28 August 2019	1178-2560	*Transpower Capital Expenditure Input Methodology Amendments Determination 2019* [2019] NZCC 11

Publication date	Reference	Title
28 August 2019	1178-2560	*Transpower Input Methodologies Amendments Determination 2019* [2019] NZCC 10
29 August 2019	978-1-869457-55-6	[REVISED DRAFT] Transpower Individual Price-Quality Path Determination 2020
29 August 2019	Section 53ZD notice	DRAFT Notice to supply information to the Commerce Commission under section 53ZD(1)(d), (e), and (f) of the Commerce Act 1986 – Requirements for asset health and risk modelling information
29 August 2019	Section 53ZD notice	DRAFT Notice to supply information to the Commerce Commission under section 53ZD(1)(d), (e) and (f) of the Commerce Act 1986 – Customer consultation information
29 August 2019	Section 53ZD notice	DRAFT Notice to supply information to the Commerce Commission under section 53ZD(1)(e) of the Commerce Act 1986 – Cost estimation information

Commerce Commission
Wellington, New Zealand

Contents

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 and revenues from new investment contracts.

X5 This paper provides our decisions and supporting reasons for:

X5.1 values for key inputs to the IPP (base capex allowance, opex allowance, quality standards and grid output measures), 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]

X5.2 how we will calculate Transpower's smoothed maximum allowable revenue (**SMAR**) for each year of RCP3, and some effects of incentive mechanisms on Transpower's revenues; and

X5.3 how we have set Transpower's RCP3 reporting obligations, including requirements to report on performance against the price path and quality standards, performance measure development, and business improvement initiatives.

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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 10 June 2019.

X6 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 decisions, particularly on reporting and engagement by Transpower with interested persons, on a forward-looking basis. That forward-looking focus has resulted in our decisions to approve modest expenditure by Transpower in RCP3 that would allow Transpower to prepare for those later periods.

X7 One decision, that will potentially affect the price path we set, is the determination of the 'baseline adjustment term' which is required to be made in RCP3 to determine the value of the recoverable cost for the 'opex incentive amount'.[3, 4] We published our draft decision on our proposed method for calculating the baseline adjustment term on 12 July 2019.[5] Submissions closed on 22 August 2019 and cross-submissions are due on 5 September 2019. After considering submissions and cross-submissions, we will publish our decision on the method for calculation in November 2019. The final IPP determination which we will publish later in November 2019 will apply this method to calculate the forecast opex incentive amount.[6]

X8 We note that the estimated annual revenues shown in this paper include Transpower's estimate of the Incremental Rolling Incentive Scheme (**IRIS**) 'opex incentive amount' recoverable costs of approximately $100 million (nominal) over RCP3. This amount incorporates Transpower's estimate on the 'baseline adjustment term', which accounts for approximately $80 million of this value. Our draft decision on setting the baseline adjustment term results in a materially lower figure than this.[7]

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[3] In our 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. The paper outlined different approaches to calculating the baseline adjustment term. See: Commerce Commission *"*Input methodologies review final decision: Transpower Incremental Rolling Incentive Scheme" (29 June 2017), at Chapter 4.

[4] Above n 2, at [3.1.3(a)(i)] (for treatment as a recoverable cost) and Part 3, Subpart 6, Section 1 (for how the IRIS incentive amounts are calculated).

[5] Commerce Commission "Transpower's individual price-quality path from 1 April 2020 – IRIS baseline adjustment term: Draft decisions and reasons paper" (12 July 2019).

[6] This method of calculating the baseline adjustment term will be applied again during RCP3 to determine the final opex incentive amount, by washing up the forecast opex incentive amount with the actual amount.

[7] Above n 5, Table 4.

Effects of our expenditure decisions

X9 We consider that the RCP3 price path will promote the long-term benefit of consumers if electricity retailers and other companies that are billing electricity consumers pass on to the retail consumers the price reductions they receive from Transpower. Transpower will pass on to its customers most of the reduction in the weighted average cost of capital (**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.[8]

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.[9]

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.[10] 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.

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[8] ENA "Transpower's individual price-quality path from April 2020: Submission to the Commerce Commission" (27 June 2019) asked us to clarify our reference to electricity retailers and local lines companies on this point. Retail electricity 'consumers' pay for their electricity transmission services through their bills from their electricity retailer or, in some cases, 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. (While lines companies subject to price-quality regulation may be effectively required, through their price path, to pass on any reductions, some exempt electricity distribution businesses are not subject to this kind of regulation). 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.

[9] Although this paper sets out our final opex and base capex decisions for RCP3, the revenue numbers for RCP3 remain as estimates until we set the final RCP3 WACC rate. A final IPP determination on the price-quality path will then be made in November 2019.

[10] 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.

X12 We have made simplifying adjustments to the proposal model to provide estimated revenue results that reflect our expenditure decisions.[11, 12, 13]

Table X1 Total estimated annual RCP3 revenue

Year	Proposed by Transpower	Estimated based on our decisions
	$m	$m
2020/21	866	832
2021/22	875	840
2022/23	884	848
2023/24	893	857
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**).[14, 15]

[11] The final numbers for the maximum allowable revenue for each pricing year in RCP3 will be calculated by Transpower following the publication of this paper containing our expenditure decisions. The numbers will be audited. We will then include them in the final IPP determination which we will publish in November 2019.

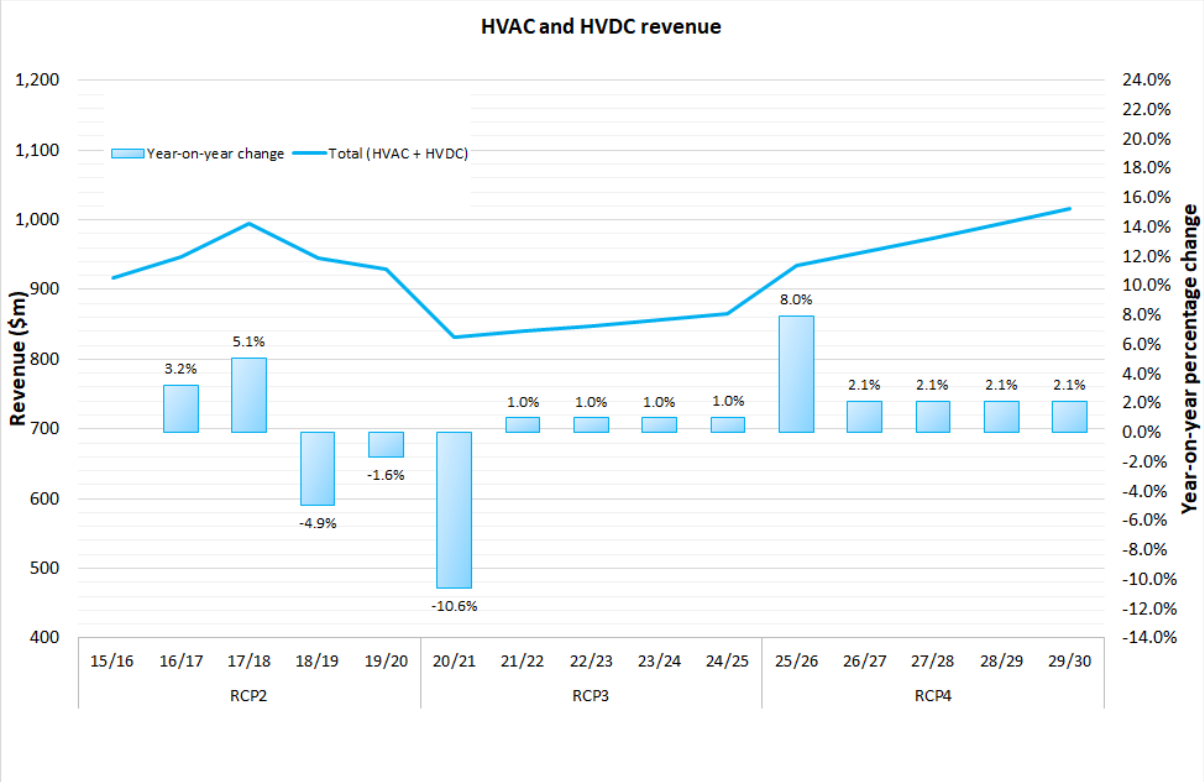
[12] The significant simplifying assumption is the use of the most recent WACC rate as an indicator of what we think the WACC rate might be when we finalise it for RCP3 in October 2019. Transpower used an estimated WACC rate of 5.5% in its November 2018 proposal and our draft decision assumed a WACC rate of 5.13% based on the most recent published WACC used for EDB information disclosure. We are using a WACC rate of 4.87%, consistent with our 31 July information disclosure WACC for Transpower, for modelling the price path in this decision.

[13] 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. We recently published our draft decision on how our input methodologies should follow GAAP accounting in this respect for the setting of price-quality paths, incentives and information disclosure. Commerce Commission "Treatment of operating leases: Draft decisions and reasons paper" (28 August 2019).

[14] Although not required by the Capex IM, in its proposal Transpower 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.

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

Figure X1 Estimated price path for RCP3 in context of RCP2 and a potential RCP4 scenario[16]



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 generators). We note that the Electricity Authority is consulting on changes to the Transmission Pricing Methodology (**TPM**) that would, if implemented in its proposed form, render these estimates redundant.[17]

[16] Figures X1 to X5 were generated using Transpower's revenue model, with minor modifications to reflect our decisions.

[17] Electricity Authority "2019 issues paper: Transmission pricing review" (23 July 2019).

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

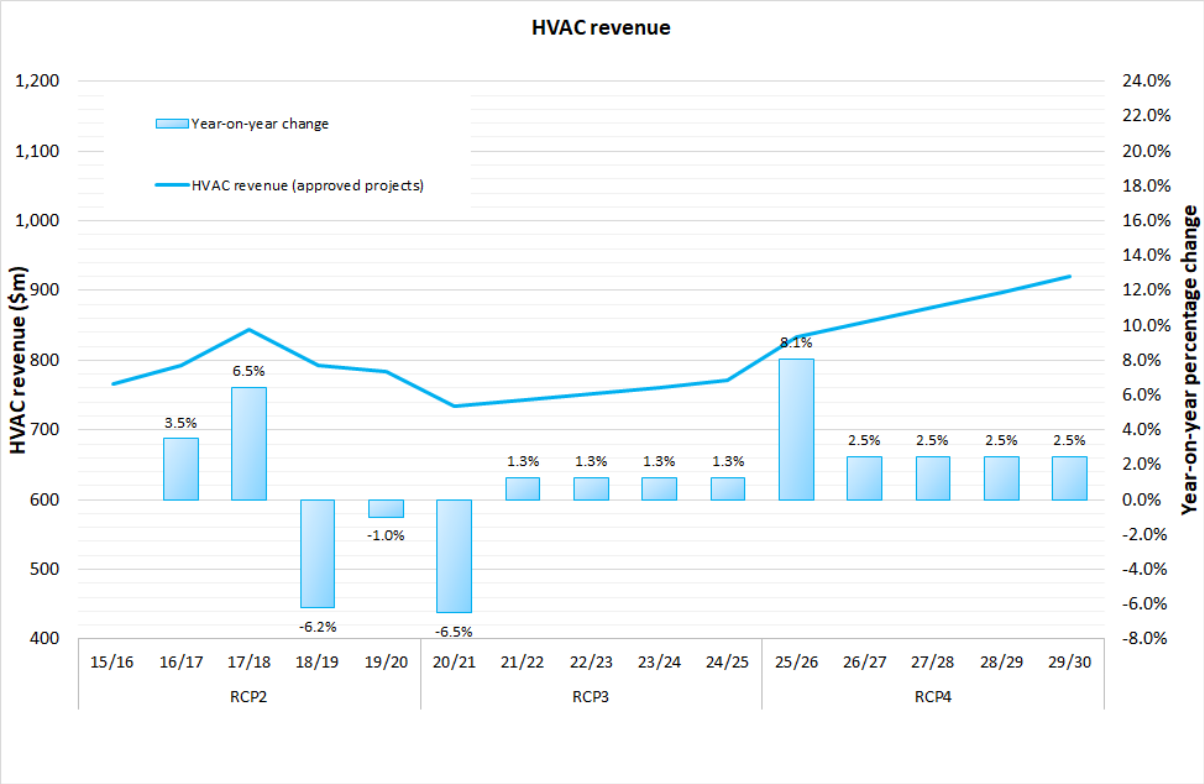
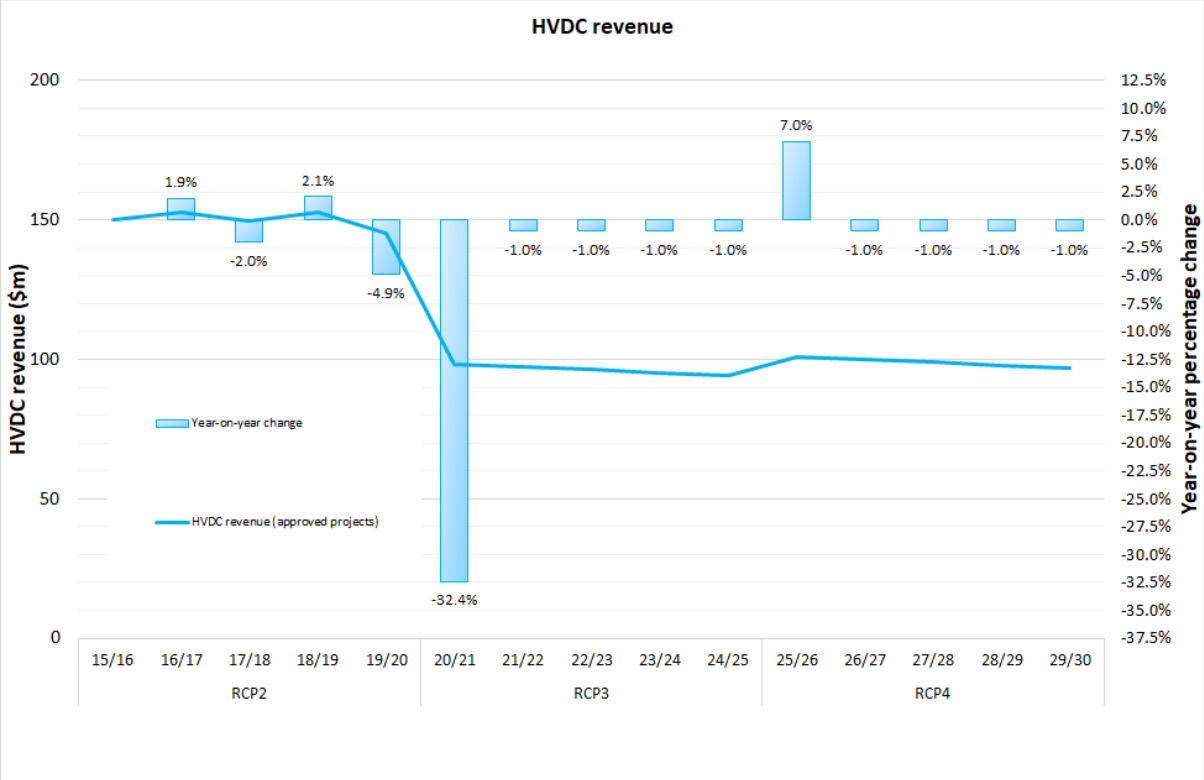
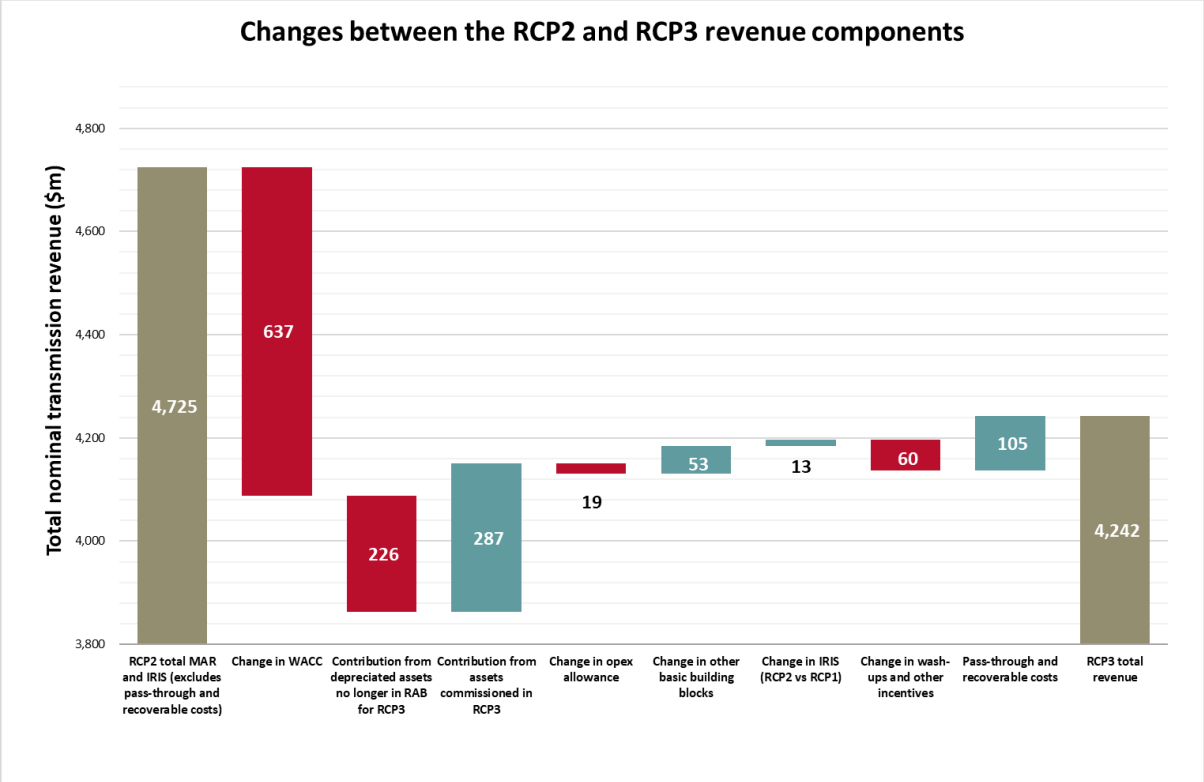


Figure X3 Estimated price path for RCP3 as applied to HVDC customers



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 WACC rate of 7.19% to the estimated RCP3 WACC rate of 4.87%. This is mainly due to the decline in interest rates over RCP2.[18]

Figure X4 Waterfall of key elements of forecast total revenue for RCP3 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.

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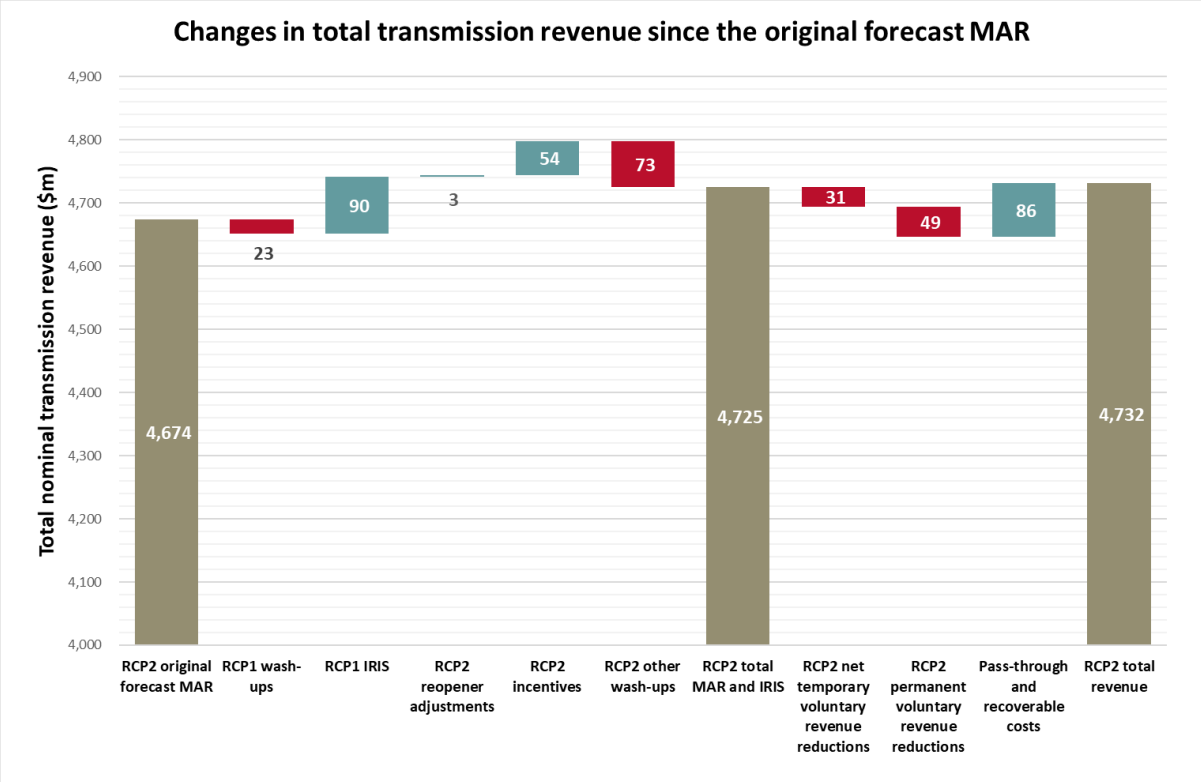
[18] As a result of our decision to combine the forecast maximum allowable revenue with the forecast pass-through costs and forecast recoverable costs for the purposes of Transpower's recovery of each of these in the smoothed price path in RCP3, the revenue components in Figure X4 compare the RCP2 total 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 X5 Waterfall of key elements of Transpower's performance against RCP2 forecast total allowable revenue



New information requirements for key focus areas

X17 We will issue information requests under s 53ZD(1) of the Act for the following, which we consider will support Transpower to efficiently move forward in RCP3 and future periods:

X17.1 for asset management:[19]

X17.1.1 a roadmap for further developing its asset health models, risk-based decision-making frameworks, and asset life-extension models for RCP3, combined with a requirement to provide information annually on its progress in implementing the roadmap;

X17.1.2 a mid-period independent expert opinion 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

[19] Commerce Commission "DRAFT Notice to supply information to the Commerce Commission under section 53ZD(1)(d), (e), and (f) of the Commerce Act 1986 - Requirements for asset health and risk modelling information" (29 August 2019).

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 customer consultation:[20]

X17.2.1 a customer engagement plan within 105 working days after the end of the last disclosure year of RCP2;

X17.2.2 information annually on the extent and effectiveness of its consultation in relation to actual capital expenditure;

X17.2.3 an annual report on post-project reviews for significant capital expenditure projects; and

X17.2.4 a mid-period independent expert opinion on its proposed customer engagement process leading up to its RCP4 proposal; and

X17.3 for cost estimation:[21]

X17.3.1 annual updates on variances in cost estimation for completed projects over $5m; and

X17.3.2 information at the end of RCP3 on variances in cost estimation for base capex programmes over $20m.

X18 We intend to seek this information under s 53ZD instead of s 53N or s 53C because this information is not strictly for monitoring of compliance with the RCP3 price-quality path and may not meet the purpose of information disclosure. Rather, the information is intended to assist us in our evaluations of various capex approvals during RCP3 and to give us confidence in the evaluation process for RCP4.

X19 Drafts of these three s 53ZD notices have been published alongside this paper. We welcome feedback from interested persons on the technical aspects of these notices. The submission period will run for two weeks, closing on 12 September 2019.

X20 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.

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[20] Commerce Commission "DRAFT Notice to supply information to the Commerce Commission under section 53ZD(1)(d), (e) and (f) of the Commerce Act 1986 – Customer consultation information" (29 August 2019).

[21] Commerce Commission "DRAFT Notice to supply information to the Commerce Commission under section 53ZD(1)(e) of the Commerce Act 1986 – Cost estimation information" (29 August 2019).

X21 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 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.

X22 More details on each of these non-financial 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 decisions

X23 We initially set out our proposed process, framework and approach for resetting Transpower's individual price-quality path (**Process paper**), and sought feedback from interested persons.[22]

X24 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.

X25 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**).[23]

[22] 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).

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

X26 Our analysis of these documents enabled us to identify areas for us to inquire further, to identify key issues, and to prepare an issues paper (**Issues paper**)[24] to seek feedback from interested persons, to assist us in coming to a comprehensive draft decision covering the entire proposal. This approach enabled us to seek feedback from interested persons on both the technical aspects of the draft individual price-quality path determination (**Draft IPP determination**),[25] and on the underlying policy decisions explained in our draft decisions and reasons paper (**Draft decisions and reasons paper**).[26]

X27 In reviewing Transpower's proposal and reaching our decisions we have applied the Part 4 purpose, the Capex IM and the evaluation criteria set out in Attachment B of this paper. Our review also took into account:

X27.1 the Verifier's recommendations to us;

X27.2 an initial consultation process through our Process paper of 25 October 2018 and our Issues paper of 7 February 2019;

X27.3 submissions and cross-submissions on our Draft decisions and reasons paper of 29 May 2019;

X27.4 advice from Energy Market Consulting associates (**EMCa**) on Transpower's Information and Communication Technology (**ICT**) expenditure; and

X27.5 submissions on our Draft IPP determination of 14 June 2019.

X28 In assessing Transpower's proposed expenditure, we have been guided by whether the proposed expenditure is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier of electricity transmission services (**expenditure outcome**).[27] 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.

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[24] Commerce Commission "Transpower's individual price-quality path for the next regulatory period – Issues paper" (7 February 2019).

[25] *[DRAFT] Transpower Individual Price-Quality Path Determination 2020* [2019] NZCC [XX] – available at: https://comcom.govt.nz/__data/assets/pdf_file/0029/153866/DRAFT-Transpower-Individual-Price-Quality-Path-Determination-2020-14-June-2019.PDF.

[26] Commerce Commission "Transpower's individual price-quality path for the next regulatory period – Draft decisions and reasons paper" (29 May 2019).

[27] Assessing Transpower's proposed expenditure is only one aspect of the decisions we face in setting the IPP. Attachment B provides more detail about the framework and evaluation approach we have applied in reaching our IPP decisions.

X29 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**).[28]

X30 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 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.

X31 Key steps in our review included:

X31.1 our consultation with interested persons on our process for evaluating Transpower's proposal through our Process paper;

X31.2 our initial review of Transpower's proposal and the associated Verifier report;

X31.3 our review of Transpower's financial model and its estimated revenue outputs for RCP3;[29]

X31.4 our request for the views of interested persons on identified issues through our Issues paper;

X31.5 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;[30] and

X31.6 our consultation with interested persons on our Draft decisions and reasons paper and Draft IPP determination.

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[28] The Code is available at: https://www.ea.govt.nz/code-and-compliance/the-code/.

[29] Attachment E describes Transpower's financial model and how we have used the financial model to demonstrate the estimated financial effects of the decisions in this paper.

[30] A list of the RFIs issued at the time of the draft decision can be found here: https://comcom.govt.nz/__data/assets/pdf_file/0034/149839/Questions-from-Commission-to-Transpower-Q01-Q063-RCP3-IPP-draft-reset-29-May-2019.pdf.

An updated list, including additional RFIs since the publication of the draft decision has also been made available 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.

X32 In our review we identified that 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 EMCa, an expert consultant with expertise in the areas of ICT expenditure and cybersecurity to review this expenditure.[31]

X33 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.

X34 Our consultation documents are also available on our website, from the above address, alongside EMCa's report on Transpower's ICT expenditure and Transpower's interim response to this report. A supplementary report from EMCa, which addresses Transpower's interim response and response in its submission on our Draft decision and reasons paper,[32, 33] has been published alongside this paper.[34]

Key decisions

X35 We have made decisions on the following key inputs:

X35.1 the grid output measures and quality standards for RCP3;

X35.2 Transpower's opex and base capex allowances for each year of RCP3; and

X35.3 the incentive rates that will apply to Transpower's incentive mechanisms.

X36 Our 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.

X37 The report from our expert on ICT expenditure recommended that we make adjustments to the proposed ICT expenditure. We have considered this recommendation, as well as submissions on our Draft decisions and reasons paper where we set out proposed reductions to ICT opex and capex allowances, and have made decisions to reduce the capex allowances for RCP3 ICT expenditure.

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[31] EMCa was engaged through our expert consulting contract with Strata Energy Consultants Limited.

[32] Transpower "Submission on Transpower's individual price-quality path from 1 April 2020: draft decisions and reasons paper" (27 June 2019).

[33] Transpower "Interim Feedback on EMCa Review of Transpower's Proposed ICT Expenditure" (10 June 2019).

[34] EMCa "Transpower Individual Price-Quality Path 2020-25: Review of aspects of Transpower's response to the Draft Decisions and Reasons Paper – ICT" (August 2019).

X38 Our 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

X39 Our decisions on quality of service are to:

X39.1 set quality standards specific to each of the revenue-linked grid performance and asset performance measures. This is a change on the approach of RCP2, where the quality standards were set to the 'target' values of the service performance measures;

X39.2 set quality standards in combination with revenue-linked grid output incentive measures, which provide Transpower with financial incentives to maintain or improve quality.[35] Our decisions put an annual cap of +/-1.40% of RCP3 revenue at risk for Transpower under these revenue-linked grid output measures;

X39.3 set quality standards through a 'pooling' approach for measures of grid performance, which assess contravention of the quality standards based on performance across points of service categories for a rolling time period.[36] This increases the effective sample size of the individual grid performance measures to reduce the risk of quality breaches from volatility due to low numbers of observations in a point of service category, and to filter single-year performance issues in individual categories;[37]

X39.4 set quality standards for measures of asset performance through a 'deadband' zone approach between the collar value of the grid output measure and the quality standard. We consider it appropriate to reduce the risk of breaches for quality standard variations over which Transpower has less control;

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

[36] Our approach to pooling is explained in paragraphs F129 to F132.

[37] Quality breaches will highlight deterioration in performance over multiple years rather than exceeding the standard in a single year which may not represent the overall trend in quality. We have also introduced reporting requirements for major unplanned interruptions to capture these large single year events. This is explained in paragraphs F138 and F139.

X39.5 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 to selected asset classes.[38] We will issue an information gathering notice under s 53ZD of the Act that will enable us to evaluate the measures over time for possible implementation as future revenue-linked measures. As described in paragraph X17.1 above, our s 53ZD notice will require Transpower to:

X39.5.1 provide information on the asset health measures as if these were revenue-linked; and

X39.5.2 obtain and provide a limited scope mid-RCP3 expert opinion on Transpower's progress in this area (including asset health information), with details of the review process to be specified in the s 53ZD notice;

X39.6 set a normalisation approach for the measures of grid performance and asset performance measures for certain events that are beyond the reasonable control of Transpower in circumstances where Transpower exercised GEIP; and

X39.7 set requirements to provide information on grid performance, asset performance, and post-event communications, with no associated quality standards. These reporting requirements provide information to interested parties and allow us to evaluate these measures for potential future implementation as quality standards.

Capital expenditure and operating expenditure allowances

X40 We have made 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 revised draft IPP determination which is published alongside this paper.[39] 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.

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[38] We have set quality standards for the asset classes that we consider are more mature, and not set standards for asset classes that are less developed.

[39] *[REVISED DRAFT] Transpower Individual Price-Quality Path Determination 2020* [2019] NZCC [XX] (**revised draft IPP determination**).

X41 Our 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 X26 to X28. In our base capex decisions, we have adjusted the base capex allowance for RCP3 down by $36.1 million due to the following:

X41.1 Enhancement and Development expenditure reduced by $17.4 million; and

X41.2 ICT capex reduced by $18.7 million.

X42 Our 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 X26 to X28, as well as a change in treatment of some of the proposed opex under the Transpower IM Determination (becoming pass-through costs or recoverable costs). Our decision also reflects the treatment under Generally Accepted Accounting Principles (**GAAP**) (capitalisation) of operating lease payments. In our opex decisions we have adjusted the opex allowance for RCP3 by $64.5m (the majority of this relates to the change in GAAP to capitalise payments relating to operating leases). The reductions are as follows:

X42.1 Predictive maintenance expenditure reduced by $13.2 million;

X42.2 Business support expenditure reduced by $17.4 million (reflecting the estimated expenditure on operating lease payments);

X42.3 ICT opex reduced by $27.6 million (reflecting the estimated expenditure on operating lease payments);

X42.4 Insurance expenditure reduced by $6.0 million; and

X42.5 Asset management and operations (**AM&O**) expenditure reduced by $0.4 million.

X43 The opex and base capex amounts which we approve under our decisions for RCP3 represent a pool of fungible expenditure within which Transpower has the freedom to make its spend decisions during RCP3. This means that any decision by us to reduce a specific category of expenditure, compared to what Transpower proposed, does not mean that Transpower cannot reprioritise and spend its proposed amount during RCP3 if it considers that this is the priority use of funds. We have made our decisions in this paper based on our draft decisions on the treatment of operating lease payments and on the IRIS baseline adjustment term. If our final decisions on those treatments were to differ from one or both of those draft decisions, the final values of the opex allowances for the RCP3 price path and the IRIS incentive will be determined in the IPP determination in November 2019.[40]

X44 Our expenditure decisions do not include any opex allowance or approved base capex for further development of the TPM because the development, timing and amount of expenditure necessary to make that development happen is still not sufficiently certain. The Electricity Authority has published a consultation paper on the TPM,[41] and 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.[42] An adjustment to the expenditure allowances may be required during the regulatory period to accommodate this at the request of the Electricity Authority, which is permitted under the Act.[43]

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[40] Although under the IMs, the RCP3 opex allowance for the setting of the price path is not required to be determined at this time, it is desirable to do so – under the IPP we allow fungibility of expenditure within opex and within capex, and between opex and capex. Also, the aligned opex and capex incentive rates set for Transpower promote fungibility between opex and capex. Hence our conclusion that the opex allowance should be set alongside the base capex allowance and the grid output measures and our view that Transpower is not restricted in reprioritising the spending of the effective combined approved opex and capex expenditure envelope in RCP3. However, because there is ongoing consultation on the treatment of operating lease payments and the IRIS baseline adjustment term, both of which are expected to result in a final decision in November 2019, it is possible that the final determination of the opex allowance may differ from the treatment we have adopted in making our decision in this paper. The final values of the opex allowances for the RCP3 price path and the IRIS incentive will therefore be determined in the IPP determination in November 2019. The opex allowance values set out in this reasons paper may change, for instance, if we identify any material differences from our consultations on the operating lease payments and the IRIS baseline adjustment term.

[41] Electricity Authority "Transmission pricing review: 2019 issues paper" (23 July 2019).

[42] The Electricity Authority's indicative timeline assumes guidelines being published in April 2020 and Transpower having until 31 October 2021 to propose a new TPM (above n 41, at Figure 19). We discuss potential costs arising from a new TPM, including Transpower's submission on a related IM amendment, at paragraphs I47 to I49.

[43] 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)).

Revenue-path design

X45 We have used Transpower's existing IPP as a starting point for our decisions on determining the maximum revenues that Transpower can recover from its customers. Our decisions are that:

X45.1 the RCP3 regulatory period will be for five years;

X45.2 Transpower's forecast maximum allowable revenue (**forecast MAR**) will continue to be calculated using a "building blocks approach" with a "MAR wash-up";

X45.3 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;

X45.4 the present value of the forecast MAR amounts will be calculated and smoothed over RCP3 (producing a smooth rate of change over RCP3). This is the forecast SMAR; and

X45.5 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.

X46 We have made enhancements to the RCP2 IPP to better promote the purpose of Part 4. Key changes from RCP2 to RCP3 are:

X46.1 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;

X46.2 a smoothed price path will apply for RCP3, which we consider will help limit volatility in Transpower's revenues; and

X46.3 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.[44] Our 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.

[44] The price path reconsideration provision (ie, the reopener rules) is contained in the Transpower IM Determination. We have amended the Transpower IM 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.

X47 We will not finalise Transpower's IPP until November 2019, as Transpower's final WACC is needed to calculate the smoothed maximum revenues. We are required by the Transpower IM Determination to determine the WACC rate for RCP3 by 30 September 2019, and then we must publish the WACC rate within a month of our decision.[45, 46]

Compliance and information reporting requirements

X48 To demonstrate compliance with the IPP Transpower will be required to produce and publish:

X48.1 a director-certified pricing compliance statement each November when setting its customer charges for each upcoming pricing year; and

X48.2 a director-certified annual compliance statement, including an assurance opinion by an assurance auditor that demonstrates reasonable compliance in all material respects with the compliance requirements of the annual compliance statement, not later than 105 working days after the end of each disclosure year.[47]

X49 Under our decisions, Transpower will also be required to report on:

X49.1 time to restore supply for significant events including information for interruptions that last 12 hours or more, and interruptions over one system minute;

X49.2 the reasons for Transpower being outside the collar value of the incentive range. For the grid performance measures explaining the reasons that each point of service category was above the collar value, and for the asset

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[45] 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.

[46] MEUG "Transpower IPP 2020 – Draft decisions" (27 June 2019) submitted that we should review the application of the 67th percentile WACC estimate in view of the time which has passed since we commenced our last IM review, suggesting that 5.5 years will have passed, representing a substantial portion of a standard period for an IM review. However, at the commencement of RCP3 only slightly more than three years will have passed since we determined our decisions on that IM review in December 2016. We do not consider a case has been made at this time for us to consult on changing that IM decision in advance of the next IM review.

[47] The assurance opinion must be prepared in accordance with the Standard on Assurance Engagements 3100 – Assurance Engagements on Compliance (SAE 3100 (Revised)) and International Standard on Assurance Engagements (New Zealand) 3000 (ISAE (NZ) 3000 (Revised)), or their successor standards, issued by The External Reporting Board (**XRB**).

performance measures explaining the reasons for being in the deadband zone (ie, between the collar and quality standard);

X49.3 quality standards with pilot revenue-linked grid output measures to enable us to evaluate the measures over time for possible implementation as future revenue-linked measures; and

X49.4 pilot 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.

Next steps

We now welcome technical submissions on the revised draft determination and draft information gathering notices

X50 Alongside this paper, we today published a revised draft IPP determination and draft information gathering notices intended to give effect to the decisions explained in this paper.

X51 You are invited to provide your written views on the revised draft IPP determination and the draft information gathering notices by **5pm, Thursday 12 September 2019**. We do not intend to call for cross-submissions.

X52 Submissions should focus on whether the revised draft IPP determination combined with the information gathering notices will accurately give effect to the decisions explained in this paper. Further instructions for providing submissions are detailed in Chapter 1.

Final IPP determination

X53 After considering technical submissions on the revised draft determination and the draft information gathering notices, we will finalise the notices and IPP determination in November 2019, concluding the IPP reset for RCP3. The final IPP determination in November 2019 will be updated for updated forecasts for the 2020-21 disclosure year based on extrapolations of 2019 actual values in the 2019 annual compliance statement we will receive in October 2019, it will take account of the WACC to be published in October 2019, and will take into account our decision on the IRIS baseline adjustment term and our decision on the treatment of operating lease payments.

Chapter 1 Introduction

Introduction

1.1 Transpower New Zealand Limited (**Transpower**) is the owner and operator of New Zealand's national transmission grid (**grid**).[48] 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**) commencing 1 April 2020 (**RCP3**).[49]

1.3 The IPP that we determine for RCP3 will set out the maximum revenue that Transpower may receive for providing electricity lines services over that period, and the minimum 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 paper.

Purpose of this paper

1.6 The purpose of this paper is to explain our decisions for the Transpower IPP reset for RCP3 and our reasons for those decisions.

Summary of process to date

1.7 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.[50]

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[48] 'Transpower' is defined in s 54B of the Act.

[49] More information about the regulation of Transpower is provided in Attachment A.

[50] 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).

1.8 On 23 November 2018, we received Transpower's proposal setting out its forecast expenditure and proposed performance measures for RCP3 (**Transpower's proposal**).[51, 52] 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**).[53, 54]

1.9 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. To do so, we 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.[55, 56]

1.10 We published our draft decisions and reasons paper (**Draft decisions and reasons paper**) on 29 May 2019, having reviewed Transpower's proposal, the Verifier report, and the submissions received to date.[57] We invited submissions and cross-submissions on our Draft decisions and reasons paper.[58]

1.11 Following the publication of our Draft decisions and reasons paper, we published our Draft IPP determination on 14 June 2019, intended to show the drafting that would give effect to our draft decisions if adopted.[59] We invited submissions on the Draft IPP determination.

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51 Transpower "Securing our Energy Future 2020-2025" (November 2018).

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

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

54 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.

55 Commerce Commission "Transpower's individual price-quality path for the next regulatory period – Issues paper" (7 February 2019).

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

57 Commerce Commission "Transpower's individual price-quality path for the next regulatory period – Draft decisions and reasons paper" (29 May 2019).

58 In its submission on our Draft decisions and reasons paper, the ENA noted its belief "that the ability of its members to properly scrutinise Transpower's IPP is significantly constrained by the timing of this consultation, which coincides with the reset of the default price-quality path (DPP) for electricity distribution businesses." ENA "Transpower's individual price-quality path from April 2020: Submission to the Commerce Commission" (27 June 2019), at 3-4. In preparing for the next DPP and IPP resets, we will consider options for staggering the release dates for key deliverables.

59 *[DRAFT] Transpower Individual Price-Quality Path Determination 2020* [2019] NZCC [XX] – available at: https://comcom.govt.nz/__data/assets/pdf_file/0029/153866/DRAFT-Transpower-Individual-Price-Quality-Path-Determination-2020-14-June-2019.PDF.

1.12 We have consulted on other more targeted matters throughout the process, as detailed in the process timeline presented in Attachment C. Throughout the reset process, we have also asked Transpower for additional information in certain areas when conducting our evaluation. A list of the requests for information we have made to Transpower during the IPP process is available on our website.[60]

1.13 We now, in this paper, present our final decisions and reasons. The remaining steps in our process for setting the IPP are explained at the end of this chapter.

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

1.14 In reaching our decisions, we have had regard to, amongst other things, independent experts' reports.

1.15 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.[61]

1.16 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. The Verifier's terms of reference is reproduced in Attachment M of this paper.

1.17 We also engaged Energy Market Consulting associates (**EMCa**) to assist with our evaluation of Transpower's proposed information and communication technologies (**ICT**) expenditure.[62] We published the report from EMCa (**EMCa report**) on 14 June 2019, and a supplementary report from EMCa today alongside this decisions paper. The EMCa reports are discussed further at paragraph 1.25 and in Attachments G and I.

1.18 While the expert reports have assisted our evaluation of Transpower's proposal, they have not substituted for our own judgement in reaching our decisions.

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[60] Available at: https://comcom.govt.nz/regulated-industries/electricity-lines/electricity-transmission/transpowers-price-quality-path/setting-transpowers-price-quality-path-from-2020.

[61] Commerce Commission, Transpower, Synergies "Tripartite verification deed" (20 April 2018), available on Transpower's website at: https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/Verification%20Deed%20%28REDACTED%29.pdf.

[62] 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.

What this paper does not cover

1.19 The following matters are not covered by this paper:

1.19.1 Final decisions in respect of the mechanics and drafting of the IPP determination and information gathering notices. The IPP determination and information gathering notices will be finalised in November 2019, following consultation on the revised draft determination and draft information gathering notices published today.

1.19.2 A decision on the IRIS baseline adjustment term. As discussed further below, this decision will be made prior to the determination of the IPP in November 2019.

1.19.3 A determination of the weighted average cost of capital (**WACC**) that will apply to the IPP determination. That WACC will be published in October 2019 and then be reflected in the IPP determination that we set in November 2019.

1.19.4 An explanation of the input methodology (**IM**) amendments we determined yesterday to support the IPP reset. These are set out in two IM amendment determinations, and explained in a supporting reasons paper, published yesterday.[63]

1.19.5 Consultation on IM amendments relating to the treatment of operating lease payments. These are the subject of a separate consultation with submissions due by 18 September 2019 and cross-submissions due by 2 October 2019.[64]

1.19.6 Future approvals of major capex projects and base capex listed projects.[65]

1.19.7 The transmission pricing methodology (**TPM**) – this is the responsibility of the Electricity Authority.

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[63] Commerce Commission "Amendments to input methodologies for Transpower New Zealand Limited: Reasons paper" (28 August 2019); *Transpower Capital Expenditure Input Methodology Amendments Determination 2019* [2019] NZCC 11; *Transpower Input Methodologies Amendments Determination 2019* [2019] NZCC 10, 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.

[64] Our draft decision on the treatment of operating leases was published yesterday for consultation. The draft determination that would give effect to that draft decision will follow shortly. Commerce Commission "Treatment of operating leases: Draft decisions and reasons paper" (28 August 2019).

[65] This is done on a project by project basis in accordance with the Capex IM.

1.19.8 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

1.20 Table 1.1 below provides an overview of what is covered by each of the chapters and attachments of this paper.

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, the process we followed in reaching our decisions, and next steps.
Chapter 2	Context and priorities for RCP3 and beyond	Discusses the overarching contextual issues which have informed our decisions.
Chapter 3	Key decisions for RCP3	Sets out a brief summary of our 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 decisions for the IPP reset.
Attachment C	Key steps in the IPP process	Lists the key steps in the IPP process to date.
Attachment D	How we have implemented the outcomes from the IM review and the Capex IM review	Explains how our RCP3 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	High-level description of updates to the Transpower 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 decisions relating to quality standards and grid output measures for the IPP reset, and explains our reasons for those decisions.
Attachment G	Base capex	Sets out our decisions relating to base capex for the IPP reset, and explains our reasons for those 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 decisions.
Attachment I	Opex	Sets out our decisions relating to opex for the IPP reset, and explains our reasons for those decisions.
Attachment J	Revenue-path design	Sets out our decisions for setting Transpower's revenue path and various related disclosure requirements and explains our reasons for those decisions.
Attachment K	Customer consultation	Sets out our decisions relating to customer consultation by Transpower and explains our reasons for those decisions.
Attachment L	Asset management	Sets out our decisions relating to asset management and explains our reasons for those decisions.
Attachment M	Verifier terms of reference	Sets out the terms of reference for the Verifier.

Material accompanying this paper

Revised draft IPP determination

1.21 Alongside this paper we have published an update of our Draft IPP determination published on 14 June 2019. This is a further draft of the s 52P determination intended to give effect to the IPP decisions set out in this paper (**revised draft IPP determination**).[66] We welcome submissions on whether the revised draft IPP determination will accurately give effect to the decisions explained in this paper. More detailed instructions for submitting on the revised draft IPP determination are provided at the end of this chapter.

Draft information gathering notices

1.22 We have also published copies of the three draft notices we intend to issue to Transpower under s 53ZD of the Act, which include various requirements that we previously included in the Draft IPP determination:

1.22.1 **Draft asset health and risk information gathering notice:** includes requirements to produce an asset health and network risk modelling roadmap, requirements for an annual update, and a requirement for a mid-RCP3 independent expert opinion on the further development of asset and network risk modelling (replacing clause 21 of the Draft IPP determination);[67]

1.22.2 **Draft customer engagement information gathering notice:** includes requirements to produce a customer engagement plan, to provide information each year on aspects of its customer consultation relating to its base capex spend, to provide a report on post-project reviews of significant capex projects, 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, and to provide each year a report on post-interruption event survey results of affected customers (replacing clauses 18.1.5 and 22 of the Draft IPP determination);[68] and

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[66] *[REVISED DRAFT] Transpower Individual Price-Quality Path Determination 2020* [2019] NZCC [XX], available at: https://comcom.govt.nz/regulated-industries/electricity-lines/electricity-transmission/transpowers-price-quality-path/setting-transpowers-price-quality-path-from-2020.

[67] Commerce Commission "DRAFT Notice to supply information to the Commerce Commission under section 53ZD(1)(d), (e), and (f) of the Commerce Act 1986 - Requirements for asset health and risk modelling information" (29 August 2019).

[68] Commerce Commission "DRAFT Notice to supply information to the Commerce Commission under section 53ZD(1)(d), (e) and (f) of the Commerce Act 1986 – Customer consultation information" (29 August 2019).

1.22.3 **Draft cost estimation information gathering notice:** includes a requirement to provide information each year on variances in cost estimation for projects over $5m, plus information at the end of the Regulatory Control Period (**RCP**) regarding variances in cost estimation for programmes over $20m (replacing clause 23 of the Draft IPP determination);[69]

(together, **draft information gathering notices**).

1.23 We intend to seek this information under s 53ZD instead of s 53N or s 53C because this information is not strictly for monitoring of compliance with the RCP3 price-quality path and may not meet the purpose of information disclosure. Rather, the information is intended to assist us in our evaluations of various capex approvals during RCP3 and to give us confidence in the evaluation process for RCP4.

1.24 We welcome submissions on whether the draft information gathering notices will accurately give effect to relevant decisions explained in this paper. More detailed instructions for submitting on the draft information gathering notices are provided at the end of this chapter.

Supplementary EMCa report

1.25 Today we have also published a supplementary report by EMCa in relation to Transpower's proposed ICT expenditure.[70] EMCa has produced this supplementary report, which builds on its earlier report that informed our draft decisions, in order to reflect new information and feedback provided by Transpower.[71] The supplementary report published today has informed our final decisions on Transpower's ICT expenditure.

Updated list of information requested from Transpower

1.26 As noted at paragraph 1.12, today we have also published on our website an updated list of the information requests we have made to Transpower in the course of the RCP3 reset process.[72]

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[69] Commerce Commission "DRAFT Notice to supply information to the Commerce Commission under section 53ZD(1)(e) of the Commerce Act 1986 – Cost estimation information" (29 August 2019).

[70] EMCa "Transpower Individual Price-Quality Path 2020-25: Review of aspects of Transpower's response to the Draft Decisions and Reasons Paper – ICT" (August 2019).

[71] See, for example: Transpower "Submission on Transpower's individual price-quality path from 1 April 2020: draft decisions and reasons paper" (27 June 2019), at 8-18.

[72] Above n 60.

Next steps

1.27 This paper presents our final decisions on the matters we are required by the Transpower Capital Expenditure Methodology (**Capex IM**) to determine by 30 August 2019.[73, 74] Outside of those matters, a number of decisions remain before we finalise the IPP determination for RCP3 in November 2019.

Overview of remaining process steps

1.28 The indicative dates for the remaining steps in our IPP reset process are provided in Table 1.2 below.[75] Further detail about these steps follows the table.

[73] *Transpower Capital Expenditure Input Methodology Determination 2012* [2012] NZCC 2, as amended and consolidated as at 1 June 2018, at [2.2.2].

[74] Although under the IMs, the RCP3 opex allowance for the setting of the price path is not required to be determined at this time, it is desirable to do so – under the IPP we allow fungibility of expenditure within opex and within capex, and between opex and capex. Also, the aligned opex and capex incentive rates set for Transpower promote fungibility between opex and capex. Hence our conclusion that the opex allowance should be set alongside the base capex allowance and the grid output measures and our view that Transpower is not restricted in reprioritising the spending of the effective combined approved opex and capex expenditure envelope in RCP3. However, because there is ongoing consultation on the treatment of operating lease payments and the IRIS baseline adjustment term, both of which are expected to result in a final decision in November 2019, it is possible that the final determination of the opex allowance may differ from the treatment we have adopted in making our decision in this paper. The final values of the opex allowances for the RCP3 price path and the IRIS incentive will therefore be determined in the IPP determination in November 2019. The opex allowance values set out in this reasons paper may change, for instance, if we identify any material differences from our consultations on the operating lease payments and the IRIS baseline adjustment term.

[75] For ease of reference, Table 1.2 also includes the indicative dates associated with IM amendments processes relevant to the IPP reset.

Table 1.2 Indicative dates for remaining steps in the IPP reset process

Indicative date	Process step
5 September 2019	Cross-submissions due on IRIS baseline adjustment term draft decision
12 September 2019	Provide draft information request to Transpower to calculate the forecast building blocks revenue (**forecast MAR**) and the smoothed maximum allowable revenue (**forecast SMAR**) for each pricing year of RCP3
12 September 2019	Submissions due on revised draft determination and draft information gathering notices
18 September 2019	Submissions due on proposed IM amendments relating to the treatment of operating lease payments
2 October 2019	Cross-submissions due on proposed IM amendments relating to the treatment of operating lease payments
3 October 2019	Issue information request to Transpower to calculate the building blocks forecast MAR and forecast SMAR for each pricing year of RCP3
10 October 2019	Publish WACC for the RCP3 reset
31 October 2019	Transpower to provide us with the values for the forecast MAR and forecast SMAR for each pricing year of RCP3
13 November 2019	Decision on any IM amendments relating to the treatment of operating lease payments
14 November 2019	Publish decision on IRIS baseline adjustment term
14 November 2019	Publish final IPP determination, final information gathering notices and companion paper
28 November 2019	Last statutory date to publish IPP determination

Request to Transpower for information for calculation the price path

1.29 On 3 October 2019, we expect to issue an information request to Transpower to calculate the building blocks forecast MAR and forecast SMAR for each pricing year of RCP3. These forecasts will then be used in our final determination of the price path in November 2019.

IRIS baseline adjustment term

1.30 We published our draft decision on the Incremental Rolling Incentive Scheme (**IRIS**) baseline adjustment term for Transpower on 12 July 2019 (two weeks following the publication of our main Draft decisions and reasons paper).[76] Submissions were due on 22 August 2019, and cross-submissions are due on 5 September 2019.

[76] Commerce Commission "Transpower's individual price-quality path from 1 April 2020 – IRIS baseline adjustment term: Draft decisions and reasons paper" (12 July 2019).

1.31 We are undertaking this consultation as part of the IPP reset process as we will build the forecast IRIS recoverable cost (ie, the opex incentive amount) into the smoothed price path for RCP3.[77] A smoothed price path requires the forecast recoverable costs (ie, including the opex incentive amount) to be estimated when setting the IPP.

1.32 Following the consultation, we will make a decision on the estimate of the baseline adjustment term that will form part of the calculation of the smoothed price path in the IPP for RCP3.[78] In the meantime, this decisions paper includes Transpower's forecast IRIS baseline adjustment term.[79] We note that our draft decision on the IRIS baseline adjustment term was approximately $110m lower over the RCP3 period than Transpower's forecast. If adopted as our final decision, our draft decision would result in an approximately $110m reduction in the maximum revenue that Transpower can earn over RCP3 after the smoothing mechanism is applied.[80]

Weighted average cost of capital for RCP3

1.33 In October 2019, we will publish the WACC that will apply to the RCP3 reset.[81] That WACC will then be reflected in the final IPP determination that we set in November 2019.

Possible IM amendments relating to the treatment of operating lease payments

1.34 As indicated above, yesterday we determined IM amendments to support the IPP reset.[82] We are still considering IM amendments in respect of the treatment of operating lease payments, having published our draft decision on this yesterday.[83] We expect to make a final decision in November 2019. Any changes to the IMs with respect to the treatment of operating lease payments would then be reflected in our final IPP determination in November 2019.[84]

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77 The baseline adjustment term is an input to the opex incentive amount.

78 The final baseline adjustment term value is not required until the first year of RCP3 (when actual expenditure numbers over the whole of RCP2 will be available).

79 The actual opex incentive amount will be washed up for actual values when the final baseline adjustment term is determined in the first year of RCP3.

80 Above n 76, at 8.

81 Pursuant to *Transpower Input Methodologies Determination 2010* [2012] NZCC 17, as amended and consolidated as at 10 June 2019, at [3.5.1]-[3.5.6].

82 Above n 63.

83 Above n 64.

84 For illustrative purposes, in our revised draft IPP determination we have applied our draft decision on the treatment of operating leases, which has the effect of increasing the opening RAB value for RCP3 and decreasing the opex allowance.

The IPP determination and information gathering notices

1.35 As indicated above, we have today published a revised draft IPP determination and draft information gathering notices for consultation. See below for more information about submitting on the revised draft IPP determination and information gathering notices.

1.36 Our final IPP determination will be published in November 2019, concluding the RCP3 reset process.

How to submit on the revised draft IPP determination and draft information gathering notices

1.37 You are invited to provide your written views on the revised draft IPP determination and the draft information gathering notices by **5pm, Thursday 12 September 2019**. We do not intend to call for cross-submissions.

1.38 Submissions should focus on whether the revised draft IPP determination combined with the draft information gathering notices will accurately give effect to the decisions explained in this paper.

1.39 Please address your responses to:

Dane Gunnell (Manager, Price-quality Regulation)
c/o regulation.branch@comcom.govt.nz

1.40 Please include "Transpower IPP 2020 – Revised draft determination and draft information gathering notices" 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

1.41 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:

1.41.1 If it is necessary to include confidential material in a submission, the information should be clearly marked, with reasons why that information is confidential.

1.41.2 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.

1.41.3 Both confidential and public versions of the submission should be provided.

1.41.4 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.[85]

1.42 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'.

[85] 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.

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 decision, issues we considered, and the priorities which have informed our decision.

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 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 Transpower's proposed expenditures;
  - 2.3.3.3 evaluation of Transpower's proposed base capex allowance; and
  - 2.3.3.4 evaluation of Transpower's proposed opex allowance; and
- 2.3.4 Introductions to our decisions on the key focus areas we identified in our Issues paper and our Draft decisions and reasons 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 IPP decisions

Our approach to assessing Transpower's proposal – at a high level

2.5 On 23 November 2018 we received Transpower's proposal and the Verifier report.

2.6 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 Capex IM.

2.7 In assessing Transpower's proposed expenditure, 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.[86]

2.8 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**).[87, 88]

2.9 Assessing Transpower's proposed expenditure is only one aspect of the decisions we face in setting the IPP. Attachment B provides more detail about the framework and evaluation approach we have applied in reaching our IPP decisions.

RCP3 and beyond

2.10 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.

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[86] Clause 6.1.1(2)(b) of the Capex IM.

[87] '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].

[88] The Code is available at: https://www.ea.govt.nz/code-and-compliance/the-code/.

2.11 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.

2.12 We also recognise other matters that are relevant context for our IPP decisions. For example:

2.12.1 pricing and other issues raised in the Electricity Price Review that could potentially affect Transpower's future investments;[89]

2.12.2 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;

2.12.3 the desire by interested parties for greater participation with Transpower in the setting of its investment priorities; and

2.12.4 Transpower's response to emerging workforce constraints and what that means for the need for increases in Transpower's expenditure efficiency.

2.13 Although the main focus of this paper is necessarily on the issues we needed to address to make our decisions for the setting of the RCP3 price-quality path,[90] we have considered some implications for RCP3 of the longer-term challenges. For example, we also discuss in this paper:

2.13.1 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;

2.13.2 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;

2.13.3 providing opportunities for Transpower's customers to participate earlier in RCP3 on the settings that Transpower will propose in its RCP4 proposal;[91]

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

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

91 Transpower's RCP4 proposal will be due to us from Transpower by November 2023.

2.13.4 the implications of the expected ramp up in asset replacement and renewal expenditure in RCP4 and beyond for Transpower's asset management capability; and

2.13.5 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.

2.14 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 Transpower being 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.[92]

The remainder of this chapter

2.15 In the rest of this chapter we explain our approach and how it is applied in setting our decisions across the following areas. Each of the following areas is also then dealt with in detail in the attachments to this paper:

2.15.1 Quality standards and grid output measures (Attachment F);

2.15.2 Forecast IPP expenditure:

2.15.2.1 Our tools used in assessing Transpower's forecast expenditures;

2.15.2.2 The role of the Verifier;

2.15.2.3 The decision on the base capex allowance (Attachment G);

2.15.2.4 The decision on the opex allowance (Attachment I);

2.15.3 Our approach to decisions for the following focus areas:

2.15.3.1 Customer engagement (Attachment K);

2.15.3.2 The revenue path (Attachment J);

2.15.3.3 Asset management (Attachment L); and

2.15.3.4 Cost estimation (Attachment H).

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[92] Vector "Draft Decision for Transpower RCP3 Individual Price Path" (27 June 2019) supported our approach in this regard on our draft expenditure decisions.

Quality standards and grid output measures

Legal framework

2.16 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.

2.17 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.

2.18 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. Non-revenue-linked measures may be used to better understand Transpower's performance.

2.19 In applying this framework, there are three main types of incentive measures that we can set for Transpower's RCP3 quality measures:

2.19.1 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.

2.19.2 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.

2.19.3 Reporting-only measures which are information disclosure requirements with no link to revenue-linked incentives or applicable quality standards.

2.20 For any revenue-linked grid 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.[93]

2.21 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.

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[93] 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.

2.22 For the revenue-linked grid output measures, Transpower will receive a revenue reward for outperforming the performance targets via an increase in its maximum revenues, while receiving a revenue penalty for underperforming via a decrease in its maximum revenues under the incentive scheme.[94] If a quality standard is breached, statutory penalties under s 87 of the Act as well as the negative revenue adjustments described above could apply for that underperformance.

2.23 The combined effect of the grid output measure revenue adjustments and statutory penalties will depend on the relationship for each measure between the values set for the target and the collar under the grid output measure and the value used to set the quality standard. For example, quality standards for Transpower in RCP2 were set at the target level, whereas for RCP3 we have set the quality standards at levels that differ from the targets.

2.24 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).[95]

2.25 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 further financial incentive would apply.[96]

2.26 The Capex IM requires Transpower to propose specified types of quality incentive measures (known as grid output measures), and allows it to propose others. Transpower is not required to propose the quality standards to be associated with (or independent of) the grid output measures it proposes. It is the Commission that determines the quality incentive measures that apply to Transpower, and the quality standards, and it is open to the Commission to set a quality standard that relates to a grid output measure that was not proposed by Transpower.[97]

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

[95] As discussed below in Attachment F, we have applied a pooling approach to setting quality standards for the grid performance quality measures.

[96] As discussed below in Attachment F, we have applied a deadband approach to setting quality standards for the asset performance quality measures.

[97] Section 53M(3) of the Act.

Broad economic quality framework

2.27 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.

2.28 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.

2.29 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.

2.30 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.[98]

2.31 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.

2.32 Ex-ante, one would not expect suppliers acting consistently with GEIP to earn less than a normal return due to negative revenue adjustments from the quality incentive scheme (or quality standard contravention penalties) 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.

2.33 Ideally, quality incentive schemes should be designed to minimise the risk of windfall gains or losses to Transpower due to circumstances outside its control.[99]

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[98] Section 52A(1)(b) of the Act.

[99] Attachment F explains that we have introduced a normalisation mechanism for revenue-linked grid output measures.

Evaluation of the quality standards and the proposed grid output measures

2.34 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 stated that this reflects its consultation with customers and stakeholders.

2.35 We have built on RCP2 to incentivise behaviours around risk assessment and quality to ensure the best outcomes for consumers. In our decisions for RCP3, pooling of measures is adopted in some cases, and the quality standards are set in other cases beyond the incentive regime. We have decided on new reporting requirements and mechanisms through the RCP3 period.

2.36 Based on our legal framework, there is 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 decisions on quality are described in detail in Attachment F.

2.37 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.

2.38 The regime has matured significantly over the first two regulatory control periods and we have aimed to continue improving it for RCP3.

2.39 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.

2.40 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).

2.41 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.

2.42 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.[100]

2.43 As explained at paragraph 2.18, the Capex IM provides for two types of grid output measures: revenue-linked, and non-revenue-linked.

2.44 For the revenue-linked grid output measures, we have made decisions on:[101]

2.44.1 quality standards, that are part the price-quality requirements for purposes of s 87 of the Act;

2.44.2 grid output targets;

2.44.3 caps – to limit the amount of positive revenue adjustment;

2.44.4 collars – to limit the amount of negative revenue adjustment;[102] and

2.44.5 grid output incentive rates – the amount of money at risk for each unit of output between the cap and the collar.

2.45 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 Grid Reliability Standards (**GRS**) in the Code.

2.46 For non-revenue-linked measures we may also link the quality standard to a non-financial incentive mechanism, such as special purpose reporting requirements.[103]

2.47 Any non-revenue-linked measures that are not linked to quality standards are simply an information disclosure requirement.

Interaction with other incentives

2.48 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.

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[100] We must also apply the criteria in Schedule A clause A5-A7 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.

[101] Clause 2.2.2(1)(d) of the Capex IM.

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

[103] For example, s 53M(2)(d) of the Act.

Forecast IPP expenditure

2.49 We have made 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.

2.50 In the following sections, we outline:

2.50.1 the tools we used in assessing forecast expenditures;

2.50.2 how we used the outcomes of Transpower's verification process in our assessment of Transpower's forecast expenditures; and

2.50.3 the process of setting the expenditure allowances for RCP3.

2.51 The process of setting expenditure allowances for Transpower in RCP3 comprised four major stages:

2.51.1 The 'proposal stage', covering Transpower's process of preparing and submitting forecast expenditure proposals as part of its RCP3 application;

2.51.2 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:

2.51.2.1 we were not wholly satisfied with the Verifier's conclusions;

2.51.2.2 the Verifier considered that an expenditure forecast did not meet the expenditure outcome; or

2.51.2.3 a forecast was not subject to verification scrutiny;

2.51.3 The draft 'determine stage', at which we determined 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

2.51.4 The final 'set stage', at which we aggregated the expenditure forecasts determined at the previous stage into expenditure allowances.

2.52 Between our draft and final decisions we reiterated the third 'determine' step to the extent that submissions raised questions about our draft expenditure decisions, and the fourth 'set' step.

Our tools used in assessing Transpower's forecast expenditures

2.53 In defining the scope, covering both the breadth and depth of our reviews, we applied proportionate scrutiny to Transpower's forecast RCP3 expenditures.

2.54 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.

2.55 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.

2.56 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.

2.57 The Verifier report helped define:

2.57.1 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

2.57.2 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.

2.58 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.

2.59 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 Attachment B of this paper.

2.60 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.

2.61 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.

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

2.62.1 *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.

2.62.2 *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:

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

2.62.2.2 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.

2.62.2.3 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.

2.62.2.4 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.

2.62.2.5 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

2.63 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:[104]

2.63.1 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;

[104] Above n 50, at Attachment B.

2.63.2 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;

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

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

2.63.5 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

2.63.6 give us insight into how effective a verification process could be as a possible permanent future feature of the Capex IM.

2.64 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:

2.64.1 provided many of the benefits we identified in the Process paper;

2.64.2 identified key areas for us to focus on in our review of Transpower's base capex proposal;

2.64.3 identified issues we want Transpower to focus on as it continues to improve its asset management and planning processes during RCP3; and

2.64.4 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.

Testing the Verifier's findings

2.65 In our Process paper, we set out factors we would consider in assessing the Verifier's conclusions. These included:

2.65.1 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**);

2.65.2 the extent to which the Verifier has tested Transpower's proposal's compliance with the relevant IMs (**Proposal compliance with IMs tested**);

2.65.3 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**);

2.65.4 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

2.65.5 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

2.66 The Verifier's general approach to assessing the RCP3 base capex proposal was guided by the Commission's Terms of Reference (**Verifier TOR**)[105] 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.

2.67 For guidance on whether the forecast expenditure satisfied the definition of GEIP, the Verifier applied the prudency and efficiency tests from the TOR, while having regard to the interpretation of GEIP in both the Australian and New Zealand jurisdictions.[106]

2.68 For example, the Verifier considered base capex forecasts were:[107]

2.68.1 prudent if they met Transpower's ongoing legal and regulatory obligations or contracts with customers, which includes service quality standards approved by the Commission;

2.68.2 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 demonstrated as desired by customers or required by the Electricity Authority;

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[105] The Verifier TOR are provided in Attachment M.

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

[107] Above n 53, at 32-33.

2.68.3 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

2.68.4 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.

2.69 Also, the Verifier considered the opex forecasts were:

2.69.1 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

2.69.2 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.

2.70 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

2.71 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:

2.71.1 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

2.71.2 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).

2.72 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.

2.73 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.[108]

2.74 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.

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

2.75 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.

2.76 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.

2.77 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.

2.78 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

2.79 In the verification TOR, we defined the expenditure outcome as one which represents the efficient costs of a prudent supplier having regard to:

2.79.1 GEIP as reflecting the appropriate planning and performance standards for a prudent supplier;

2.79.2 the evaluation criteria in Attachment A of the Capex IM, for base capex; and

2.79.3 the evaluation criteria in Attachment A of the Capex IM where applicable, for opex.

[108] Our general evaluation approach is outlined in our Process paper (above n 50, at Attachment E).

2.80 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.[109]

2.81 The Verifier rigorously tested the prudency 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.

2.82 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.

2.83 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.

2.84 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

2.85 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.

2.86 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.

2.87 Specifically, the Verifier:

2.87.1 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;

[109] Above n 50, at 35.

2.87.2 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;

2.87.3 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;

2.87.4 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

2.87.5 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

2.88 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.

2.89 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.

2.90 The exception related to the step change in insurance costs. Although the Verifier commented on the prudency of the insurance costs, it considered that expert actuarial advice was necessary to assess the efficiency of the opex. As indicated by the Verifier,[110] Transpower obtained an actuarial opinion to support this aspect of its forecast and this opinion, as well as a report from its insurance broker, which was provided to us at the time it submitted its RCP3 proposal.

[110] Above n 53, at 389.

2.91 Although the Verifier's review of the ICT capex programme concluded that verification had improved Transpower's ICT business case processes, especially for the reported benefits-driven ICT projects, after we evaluated the work done by the Verifier on ICT capex and ICT opex, we concluded that further investigation was necessary before we could make decisions on these expenditure areas. The main reasons for this were:

2.91.1 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;

2.91.2 ICT capex and opex appear to be highly fungible;

2.91.3 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

2.91.4 we were not fully confident about the adequacy of Transpower's proposed expenditure on cybersecurity in RCP3, which is a key infrastructure risk.

2.92 We therefore engaged EMCa, a consultancy with specialist ICT expertise, to test the ICT capex and opex programmes as a whole. In particular, we sought EMCa's 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. We discuss our evaluation of Transpower's proposed ICT expenditure in detail in Attachments G and I.

Verifier recommendations on other further work we should carry out

2.93 The Verifier identified particular areas of interest that it considered we should focus our attention 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.

2.94 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:

2.94.1 asked questions in our Issues paper seeking submitter views on aspects of Transpower's proposal;

2.94.2 sought further supporting information from Transpower using RFIs; and

2.94.3 carried out analysis of the RFI information to decide next steps.

Verifier independence and contracting arrangements

2.95 Meridian submitted that it would be much more appropriate for verifiers to be contracted by the Commission than by the regulated supplier. Meridian also raised concerns regarding the Verifier's use of subcontractors and management of conflicts of interest.[111, 112]

2.96 We agree with Meridian's sentiment regarding the critical importance of the Verifier's independence. We took a number of actions to ensure the Verifier's independence, including:

2.96.1 While the Verifier was contracted by Transpower, we required the Verifier to enter into a tripartite deed with us and Transpower whereby the Verifier made the following undertaking:[113]

> **Duty of care:** Verifier acknowledges that, in carrying out the Verification, Verifier owes a duty of care to the Commission (as well as to Transpower) to act as an independent expert and with reasonable care.

2.96.2 We agreed the terms of reference for the Verifier's engagement with Transpower, which formed the core of the engagement agreement between Transpower and the Verifier.

2.96.3 We also reviewed the remainder of the engagement agreement between Transpower and the Verifier before we entered into the tripartite deed. As a further protection, we specified in the tripartite deed that:[114]

> **Conflict:** Verifier's and Transpower's obligations in favour of the Commission in this Deed must be complied with even where they conflict with any rights or obligations of Verifier and Transpower in the Engagement Agreement.

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111 Meridian "Transpower IPP 2020 – Issues Paper" (28 February 2019).

112 Meridian "Transpower IPP 2020 – Draft decisions" (27 June 2019).

113 Above n 61, at [2.1].

114 Above n 61, at [1.3].

2.96.4 We required Transpower to provide information about the candidates it shortlisted for the verifier role, with a particular focus on information relating to any potential conflicts of interest. We considered not only potential conflicts relating to the consulting firms and any subcontractors, but also any potential conflicts relating to the individual personnel from those firms proposed to be involved in the verification work. In the case of the Synergies Economic Consulting and GHD Advisory, we considered there were no material conflict risks that could not be managed. The key personnel that constituted the verification team were specified in the engagement agreement between Transpower and the Verifier, and the tripartite deed contained a clause preventing changes to the key personnel without the Commission's consent.[115]

2.97 As noted in paragraphs 1.18 and 2.65 above, while the Verifier's report has assisted with our evaluation of Transpower's proposal, it has not substituted for our own judgement in reaching our decisions.

2.98 As indicated above, the verification process for RCP3 was agreed to on a voluntary basis by Transpower. When we next review the Capex IM, we anticipate considering whether verification should be made mandatory and the verification requirements specified in the Capex IM. This would provide stakeholders a further opportunity to provide their views on the verification arrangements ahead of the next IPP reset.

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.[116]

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.[117]

2.101 In applying this concept, we consider that a 'prudent supplier' is a supplier whose planning and performance standards reflect GEIP.

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[115] Above n 61, at [4.2].

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

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

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).

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**)[118] 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.

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[118] *Transpower Input Methodologies Determination 2010* [2012] NZCC 17, as amended and consolidated as at 10 June 2019.

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 decision on the forecast base capex are described in detail in Attachment G.

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 decisions on the forecast opex are described in detail in Attachment I.

Our approach to 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 account (**EV account**) and other calculations.

2.124 Transpower proposed nominal total forecast revenue of $4,419 million for RCP3, which in nominal terms represented a 6.6% reduction from its total revenue in RCP2. This reduction was 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 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 had 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 has a downward step change between RCP2 and RCP3 as well as a step up between RCP3 and an indicative revenue path for RCP4 for, 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 saw 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 would reduce IPP compliance costs and further contribute to pricing predictability during RCP3. As this is a change that involves an IM amendment, we have consulted separately on this change. Our final decision to adopt Transpower's proposal is set out in the final IM amendments reasons paper.[119]

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 addressed this by:

2.134.1 requiring Transpower to annually disclose 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 TPM; and

2.134.2 introducing into the Transpower IM Determination 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.[120]

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

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[119] Above n 63.

[120] The mechanism to reopen the RCP3 price path required a combination of drafting in the IPP determination and an amendment to the price path reconsideration provisions of the Transpower IM Determination. Our final decision on the IM amendments that give effect to our decision is set out in our IM amendments reasons paper (above n 63).

Customer consultation

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

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.[121]

2.139 We set out in our Issues paper our views on:[122]

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.

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[121] Above n 55.

[122] Above n 55, at Chapter 4.

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 Submitters on our Issues paper and Draft decisions and reasons paper generally 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 have decided, in line with our draft decisions, to introduce new information reporting requirements on Transpower regarding customer consultation. These requirements are set out in an information gathering notice published in draft alongside this paper, and explained in Attachment K. In short, we have introduced these requirements 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 Open and transparent customer engagement also provides opportunities for the identification and consideration of transmission alternatives, which can result in greater consideration being given to investment options that improve network utilisation.[123]

[123] As noted at paragraph A7.2, this is consistent with s 54Q of the Act.

Asset management

2.145 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.[124]

2.146 The two key inputs to an asset management approach that informs a risk-based investment decision-making framework are asset health and asset criticality.

2.147 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.

2.148 Asset criticality modelling is about understanding the supply security consequences and outage implications of an asset within the context of the wider network.

2.149 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.

2.150 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

2.151 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.

2.152 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.

2.153 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.

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[124] Above n 50, at [4.19]-[4.20].

2.154 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

2.155 We consider that asset criticality understanding is also a key input to effective asset management because:

2.155.1 it can provide timely, risk-based signals for refurbishment/replacement investment decisions that reliability outcomes may not provide;

2.155.2 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);

2.155.3 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

2.155.4 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.

2.156 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.

2.157 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:

2.157.1 lacked confidence in the level of data Transpower had in several asset classes;

2.157.2 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);

2.157.3 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

2.157.4 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.

2.158 The Verifier made recommendations for asset health and criticality modelling improvements.

2.159 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.

2.160 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 key secondary asset classes.

2.161 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.

2.162 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.

2.163 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.

2.164 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:

2.164.1 financial (dis)incentives using a regulatory compliance mechanism during RCP3 (2020-2025);

2.164.2 independent review and reporting, for example, at the mid-point of RCP3 (which is our preferred option); and

2.164.3 annual Transpower self-disclosure on progress using a regulatory compliance mechanism during RCP3.

2.165 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:[125]

> 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.

2.166 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.

2.167 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.

2.168 The modelling may be complex but 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.

2.169 Our evaluation, stakeholder submissions on our draft decision, and decision on asset management are described in detail in Attachment L.

Cost estimation

2.170 The main reason for addressing this issue is that we require more relevant information to improve our level of confidence on major capex, listed project allowances and enhancement and development (**E&D**) project base capex we may be called on to approve during RCP3 and for future regulatory periods and for more accurate estimate of costs for the RCP4 base capex proposals.

2.171 The Capex IM requires us to assess cost estimates and set appropriate levels of allowances for base capex, listed projects and major capex projects.

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

2.172 In response to our 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.

2.173 Most non-volumetric projects have two components to their costs – standard scope applicable to all similar projects and project specific scope of work.[126] 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.

2.174 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:

2.174.1 Bunnythorpe Haywards – FEC $74.8m (approved Major Capex Project $160m);

2.174.2 Central Park – Wilton B line – FEC $7.9m (approved Listed Project $11.6m); and

2.174.3 Oteranga Bay – Haywards – FEC $23.6m (approved Listed Project $23.5m).

2.175 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.

2.176 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.[127] 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.

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

[127] 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.

2.177 We need to build stakeholder confidence that the capex allowances we set are reasonable estimates of cost of the proposed projects and programmes:

2.177.1 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;[128] and

2.177.2 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.

2.178 To address these concerns, we will require in a notice under s 53ZD of the Act that Transpower is to provide information to the Commission:

2.178.1 annually, after the end of each disclosure year in RCP3, on the variances between cost estimates in the proposal, those in the delivery business case and actual costs for all projects whose estimated cost is greater than $5 million, and that were completed during the disclosure year; and

2.178.2 after the end of the final disclosure year of RCP3, on the variances between cost estimates in the RCP3 proposal and actual costs for all completed base capex programmes whose cost is greater than $20 million in the regulatory period.

2.179 This topic and our decision on cost estimation are discussed in more detail in Attachment H.

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

Chapter 3 Key decisions for RCP3

Purpose of this chapter

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

Key decisions relating to the price-quality path

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

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

Decision for RCP3	Change from RCP2	Reasons	Deliverable
		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.	Revised draft IPP determination
		WACC used for decision	
4.87% WACC estimate for indicative purposes (final WACC rate to be set in October 2019)	N/A	We have assumed a WACC of 4.87% will apply to RCP3. This is the WACC Transpower will use for information disclosure purposes for disclosure year 2020. The WACC is not set as part of the decision in this paper, but will be determined separately, in October 2019. However, using a WACC estimate helps provide additional illustrative information about the implications of our revised draft IPP determination.	Cost of capital determination for Transpower's IPP from 1 April 2020 (to be published in October 2019)
		Quality standards and grid output measures	
Set quality standards and grid output measures for the GP1 and GP2 measures of grid performance	Modified feature	Change from the RCP2 measures, to measure interruption duration and outage across point of service 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.	Revised draft IPP determination
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.	Revised draft IPP determination

Decision for RCP3	Change from RCP2	Reasons	Deliverable
Adopt a "pooling" approach to setting quality standards for measures of grid performance GP1 and GP2	New feature	Pooling measures will help effectively increase the sample size and reduce the risk of breach due to setting standards based on points of service with small numbers of data points. Pooling across time will help filter out single-year performance issues while highlighting potential deterioration in performance over multiple years. See Attachment F.	Revised draft IPP determination
Adopt a "deadband zone" approach to setting quality standards for measures of asset performance AP1 and AP2	New feature	The deadband provides a wider range for the quality standard, as AP measures are not being pooled. This will better reflect Transpower's historical performance. See Attachment F.	Revised draft IPP determination
Adopt a normalisation approach for measures of grid performance GP1 and GP2, and for measures of asset performance AP1 and AP2	New feature	The normalisation of events beyond the reasonable control of Transpower will better ensure the measures reflect Transpower's actions and decisions rather than external causes. See Attachment F.	Revised draft IPP determination.
Set the GP-M measure of grid performance, the number of unplanned interruptions of less than one minute's duration, as a non-revenue-linked reporting measure	Modified feature	This measure is a development of the RCP2 measure PMD6 (energy not supplied for each point of service for each unplanned interruption). 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. See Attachment F.	Revised draft IPP determination

Decision for RCP3	Change from RCP2	Reasons	Deliverable
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**	New feature	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. Setting quality standards will incentivise Transpower to maintain minimum asset health levels and will also act as an intermediate step towards functional risk modelling. See Attachment F.	Revised draft IPP determination
Set revenue at risk cap across all grid output measures at +/- 1.40% of RCP3 revenue (including service performance measures)	Modified feature	Total revenue at risk cap is a decrease (in percentage terms) compared to RCP2. Annual revenue at risk for the service performance measures (GP and AP) remains capped at 1.40%, with the decrease in total revenue at risk attributable to the fact that asset health is no longer revenue linked. The amount of revenue at risk balances the incentive effect against the extent to which customers are willing to pay for increased quality. See Attachment F.	Revised draft IPP determination

Decision for RCP3	Change from RCP2	Reasons		Deliverable
		Capex		
Approve total base capex of $1166.4m, comprised of:[129]	Increase of $22.8m over RCP2 spend (and forecast spend) of $1,143.6m ($2017/18), comprised of:	Decrease of $36.1m from Transpower's proposal of $1202.4m	Assessment of the consistency of Transpower's proposed base capex with: - 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.	Revised draft IPP determination
• **Renewal capex – AC Substations of $180.4m**	Decrease of $121.3m from RCP2 expenditure of $301.7m	No change from Transpower's proposal	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.	
• **Renewal capex – ACS Buildings and Grounds of $39.5m**	Increase of $8.1m from RCP2 expenditure of $31.4m	No change from Transpower's proposal	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.	
• **Renewal capex – Transmission Lines of $452.7m**	Increase of $101.4m from RCP2 expenditure of $351.3m	No change from Transpower's proposal	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	

[129] Transpower has also identified approximately $2m (nominal) of capitalised operating leases (due to replacement of existing leases terminating during the period), in addition to the leases that will be capitalised to the RAB prior to RCP3. The treatment of operating leases is discussed at paragraphs I160 to I162, and I180 to I182.

Decision for RCP3	Change from RCP2		Reasons	Deliverable
• **Renewal capex – HVDC and Reactive Assets of $104.1m**	Increase of $67.3m from RCP2 expenditure of $36.8m	No change from Transpower's proposal	further issues raised after the verification, sought additional information and performed additional analysis. We sought additional expert advice in reviewing the ICT capex programme, which resulted in a decision to reduce the approved amount by $18.7m. We considered the uncertainty surrounding the E&D capex programme and have made a decision to approve Transpower's low-expenditure scenario amount. Amendments to the Transpower IM now enable us to reopen the price path and approve additional E&D base capex. We consider that this approach will assist in appropriately balancing the risks to consumers and to Transpower. See Attachment G for discussion of base capex.	
• **Renewal capex – Secondary Assets of $200.2m**	Increase of $75.2m from RCP2 expenditure of $125m	No change from Transpower's proposal		
• **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		
• **ICT Capex of $127.5m**	Decrease of $42m from RCP2 expenditure of $169.5m	Reduction of $18.7m from Transpower's proposed amount of $146.1m		
• **Business Support Capex of $17.1m**	Decrease of $13.3m from RCP2 expenditure of $30.4m	No change from Transpower's proposal		
• **Adjustment for PQ and grid-related ICT benefits of -$14.0m**	New feature	No change from Transpower's proposal		

Decision for RCP3	Change from RCP2	Reasons	Deliverable
		Opex	
Approve total RCP3 opex allowance of $1,278.4m ($2017/18), based on the proposed amounts for specific expenditure categories as below: [130]	Decrease of $27.2m from Transpower's RCP2 forecast expenditure of $1305.6m (2017/18 constant)	Reduction of $64.5m from Transpower's proposed amount of $1,342.9m	In assessing the opex, we were guided by (a) the extent to which the opex Transpower proposed will promote the purpose of Part 4 of the Act and (b) where they can be usefully applied to opex, the base capex evaluation criteria. In considering the extent to which Transpower's 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" and the evaluation criteria set out in the Capex IM. 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 proposed opex.	Revised draft IPP determination
• **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		
• **Accept Transpower's proposed deliverability adjustment of -$29.1m**	N/A	No change from Transpower's proposal	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	

[130] Note that the RCP3 approved amount does not include payments relating to operating leases now capitalised under NZIFRS 16, which were opex for RCP2. Including these amounts as opex for RCP3 would result in a total approval of $1,327.7m, which is an increase of $22.1m from RCP2 and a decrease of $15.2m from Transpower's RCP3 proposal. The proposal also included amounts for two costs which are now treated as a pass-through cost and a recoverable cost.

Decision for RCP3	Change from RCP2	Reasons	Deliverable
• **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	after the verification, sought additional information and performed additional analysis. See Attachment I for discussion of opex.	
• **Approve Business Support opex of $209.1m**[131]	Decrease of $28.2m from Transpower's RCP2 forecast expenditure of $237.3m	Decrease of $17.4m from Transpower's proposal		
• **Approve ICT opex of $168.3m**[132]	Decrease of $23.3m from Transpower's RCP2 forecast expenditure of $191.6m	Decrease of $27.6m from Transpower's proposal		
• **Approve Insurance opex of $82.0m**	Increase of $9.9m from RCP2 expenditure of $72.1m	Reduction of $6.0m from Transpower's proposed amount of $88.0m		

[131] Per footnote 130 above, including payments relating to operating leases within this category results in an approval of $226.5m, down $16.7m from RCP2, and representing no change from Transpower's proposal.

[132] Per footnote 130 above, including payments relating to operating leases within this category results in an approval of $195.9m, up $4.3m from RCP2, and representing no change from Transpower's proposal.

Decision for RCP3	Change from RCP2	Reasons	Deliverable
• **No allowance at this stage for costs of implementing new TPM**	N/A	The cost and timing of moving to a new TPM is unknown. Costs incurred may be opex, capex or a mixture of both. 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.	N/A
		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.	Revised draft IPP determination and Transpower IM amendments determination
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.	Transpower IM amendments determination
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.	Revised draft IPP determination and Transpower IM amendments determination
Variance between these forecast building block 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.	Revised draft IPP determination and Transpower IM amendments determination
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.	Transpower IM amendments determination

Decision for RCP3	Change from RCP2	Reasons	Deliverable
Mechanism within the Transpower IM to reopen the price path and recover some of the EV account balance in RCP3, if recovery of the balance over only RCP4 is forecast to give rise to a price shock effect in the step change between regulatory periods	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.	Transpower IM amendments determination

Summary of key decisions relating to reporting requirements and information gathering notices

3.3 Table 3.2 sets out our decisions relating to reporting requirements and information gathering notices.

Table 3.2 RCP3 reporting requirements

Information provision requirement	Change from RCP2	Reason	Deliverable
Annual compliance reporting			
Annual compliance statement (ex-post) – statement of compliance with quality standards, incentive calculations, and wash-up calculations. **Reporting date 105 working days from end of period.[133] (Changed from the end of the 3rd week of October).** **Transpower may apply to the Commission to extend the time limit for reporting if the application is made not later than 15 working days before the expiry of the 105 working days.**	Existing requirement-change to timing of providing information	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.	Revised draft IPP determination

[133] Transpower "Submission on Transpower's individual price-quality path from 1 April 2020: draft decisions and reasons paper" (27 June 2019) submitted on our draft decisions that the increased reporting we proposed (which are now specified in the s 53ZD notices) made it not practical to carry out the reporting requirements within 80 working days of the disclosure year. It proposed 120 working days. MEUG "Transpower IPP 2020 – cross-submission" (11 July 2019) submitted that the proposal of 120 days was inconsistent with the objective of visibility of information. We have concluded that Transpower's proposal of 120 working days could impact on the transparency of the disclosed information, being so close to the normal Christmas break. We have therefore decided the standard reporting date for reporting requirements in this decision should be 105 working days following the end of the disclosure year to provide Transpower with adequate time to complete the necessary reporting. In the case of the reopening of the price path we have retained the 80 working day requirement, which would enable us to make our price path decision in time for Transpower to set its annual pricing in November.

Information provision requirement	Change from RCP2	Reason	Deliverable
Statement of reasons for any non-compliance with the price path.	Existing feature	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. Information on non-compliance will help us assess the extent to which any enforcement action is warranted.	Revised draft IPP determination
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.	Existing feature	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. Information on non-compliance will help us assess the extent to which any enforcement action is warranted.	Revised draft IPP determination
Performance and Breach reporting			
Report breach of service performance measures (GP1 and GP2) at the same time as Annual Compliance Statement.	Compliance	Information on non-compliance with quality standards will be used to assess the extent to which enforcement action is warranted. Revised draft IPP determination provides detail of breach reporting requirements.	Revised draft IPP determination
Report breach of availability measures (AP1 and AP2) at the same time as Annual Compliance Statement.	Compliance	Information on non-compliance with quality standards will be used to assess the extent to which enforcement action is warranted. Revised draft IPP determination provides detail of breach reporting requirements.	Revised draft IPP determination

Information provision requirement	Change from RCP2	Reason	Deliverable
Reporting related to service performance measures (GP1 and GP2). **Reporting requirement when annual service performance quality standard is not met.**[134] **Transpower to provide reporting at the same time as Annual Compliance Statement.**	Reporting	Information will be used to understand reasons why the quality standard has not been met.	Revised draft IPP determination
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.**	Reporting	Information will be used to understand reasons for performing below the collar. Reporting also to assess the reasonableness of the collar and quality standard settings.	Revised draft IPP determination
Reporting related to service performance measures (GP1 and GP2). **Comprehensive reporting requirement for interruptions that last 12 hours or more, and interruptions causing a loss of supply of more than one system minute. Transpower to publicly report within 42 working days following each interruption.** **Transpower to provide annual summary report of all events at the same time as Annual Compliance Statement.**	Reporting	Reporting will include cause(s) of the interruption, interruption date and time, duration of the interruption, impact on Transpower's customers, grid exit points (**GXPs**) affected, actions that Transpower has taken to restore supply, and lessons learned for the future.	Revised draft IPP determination

[134] For service performance GP1 and GP2, the quality standards and collars are the same.

Information provision requirement	Change from RCP2	Reason	Deliverable
Reporting related to service performance measure (GP-M). **Simple reporting to disclose momentary interruptions that affect customer supply at the same time as Annual Compliance Statement.** **Commission to extend the time limit for reporting if the application is made not later than 15 working days before the expiry of the 105 working days.**	Reporting	Reporting will include cause(s) of the interruption, interruption date and time, GXPs affected, and any reasons for not meeting the quality standard.	Revised draft IPP determination
Report on availability – estimated return to service times (AP3) and communication of delays to planned outage return times (AP4) at the same time as Annual Compliance Statement.	Reporting	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. 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). 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. See Attachment F.	Revised draft IPP determination
Reporting related to asset availability measure (AP5). **Simple reporting to disclose the extent to which Transpower places customers on N-security at the same time as Annual Compliance Statement.**	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.	Revised draft IPP determination
Report to disclose post-interruption event survey results of affected customers to assess timeliness of Transpower information provision following event (CS1) at the same time as Annual Compliance Statement.	Reporting	Information considered of value to stakeholders. This is a trial measure that we may set as a quality standard in future.	Draft customer engagement information gathering notice

Information provision requirement	Change from RCP2	Reason	Deliverable
Wash-ups and other technical price path reporting			
Publishing the forecast MAR and forecast SMAR used for the pricing year.	Modified feature	These requirements will increase transparency and help assist interested persons to form a view of Transpower's performance against its price-quality path.	Revised draft IPP determination
Publishing summary of pass-through costs and recoverable costs.	Existing feature		Revised draft IPP determination
Publishing explanations for any voluntary revenue reductions made by Transpower when setting its prices or carrying out its wash-up calculations.	Existing feature		Revised draft IPP determination
Publication of the rolled forward EV account balance.	New feature		Revised draft IPP determination
Publication of approved base capex commissioned/spend.	New feature		Revised draft IPP determination
Publishing wash-up calculation resulting in EV account entry.	Existing feature		Revised draft IPP determination
Publishing EV account summary.	Existing feature		Revised draft IPP determination
Updated forecast summary of the EV account that demonstrates the forecast balance at the start of the next RCP.	Modified feature	This will help inform interested persons about the potential impact on prices in RCP4.	Revised draft IPP determination
Publication of forecast EV adjustment calculations (where a large EV account build-up triggers reopening).	Modified feature	This will increase transparency and help assist interested persons to form a view of Transpower's performance against its price-quality path.	Revised draft IPP determination
Provision 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).	New feature	This will increase transparency and help assist interested persons to form a view of Transpower's performance against its price-quality path.	Section 53ZD notice for final calculations
Transpower to annually publish and explain 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.	Revised draft IPP determination

Information provision requirement	Change from RCP2	Reason	Deliverable
Major capex projects and listed projects reopeners			
Transpower to provide and publish director-certified 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 price path reopener.	Modified feature	As the forecast MAR will no longer be annually updated, the requirement to provide certified 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.	Revised draft IPP determination
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.	Revised draft IPP determination
Other price-quality path reopeners			
Transpower to provide and publish updated forecast MAR and forecast SMAR values for remaining complete pricing years in RCP3 if it proposes that the Commission apply any other reopener provision in the Transpower IM. Reporting date 80 working days from end of preceding period. (Changed from end of the 3rd week of October).	Modified feature	As the forecast MAR will no longer be annually updated, the requirement to provide certified updated forecasts can be restricted to when an event has occurred that meets the requirements of the Transpower IMs. The resulting update ensures that the revenue impact from these events is appropriately recognised.	Revised draft IPP determination

Information provision requirement	Change from RCP2	Reason	Deliverable
Asset health developments reporting			
Transpower to produce a roadmap for developing asset health models, risk-based decision-making frameworks, and asset life-extension models[135] for RCP3 within 105 working days after the end of the last disclosure year of RCP2.	New feature	These reporting requirements will help incentivise Transpower to continue to improve data quality and maintain asset health. Improved understanding of asset health will help ensure that Transpower's RCP4 forecasts can be relied upon.	Draft asset health and risk information gathering notice
Transpower to report annually on its progress towards implementing the roadmap.[136]	Modified feature	We consider Transpower should continue to develop its asset health models in line with the verification report recommendations and as discussed in Attachment G.	Draft asset health and risk information gathering notice
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.	Draft asset health and risk information gathering notice
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).	Draft asset health and risk information gathering notice
Disclosure of how Transpower would have performed in relation to the proposed revenue-linked asset health scheme (asset health pilot scheme), had the scheme existed.	New feature	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).	Draft asset health and risk information gathering notice

[135] For substation management system assets.

[136] Including a risked-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.

Information provision requirement	Change from RCP2	Reason	Deliverable
Cost estimation			
Transpower to report annually for completed projects over $5m 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/programmes that exceed 30% from their estimated costs.** **Transpower to provide report within 105 working days from the end of the disclosure year to which it relates.**	New feature	We are seeking this information to improve our level of confidence about Transpower's future RCP expenditure forecasts and cost estimates for listed projects and major capex proposals. Some of this information will be disclosed to the Commission only, for commercial reasons.	Draft cost estimation information gathering notice
Transpower to report following the end of RCP3 on variances in cost estimation in relation to base capex programmes over $20m. **Transpower to provide report within 105 working days after the end of the last disclosure year of RCP3.**	New feature		Draft cost estimation information gathering notice

Information provision requirement	Change from RCP2	Reason	Deliverable
Customer consultation			
Transpower to produce customer engagement plan for RCP3 within 105 working days after the end of the last disclosure year of RCP2. **Transpower to provide its proposed high-level scope for the customer engagement plan by 15 May 2020.**	New feature.	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.	Draft customer engagement information gathering notice
Transpower to report annually on the extent and effectiveness of its consultation with customers in relation to actual base capex. **Transpower to provide report within 105 working days from the end of the disclosure year to which it relates.**	New feature.		Draft customer engagement information gathering notice
Transpower to undertake a post-project review for significant capex projects upon the completion of the project. **Transpower to provide a report on that post-project review within 105 working days from the end of the disclosure year to which it relates.**	New feature.		Draft customer engagement information gathering notice
Transpower to obtain a mid-period independent expert report on its proposed engagement process leading up to its RCP4 proposal. **Transpower to provide this report on or before the day on which it provides its annual compliance statement for the 1 July 2021 to 30 July 2022 disclosure year.**	New feature	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.	Draft customer engagement information gathering notice

IM changes to support our IPP decisions

3.4 To give effect to some of our RCP3 decisions, we considered that some amendments to the Transpower IM Determination and Capex IM were required. We have determined:[137]

3.4.1 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;

3.4.2 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, being the approved scheme under the Electricity Industry Act 2010;

3.4.3 the introduction of a new recoverable cost for Fire and Emergency New Zealand (**FENZ**) levies in the Transpower IM Determination;

3.4.4 amendments to the IRIS IMs in the Transpower IM Determination to correct implementation errors;

3.4.5 an amendment to the 'base capex standard incentive rate' in the Transpower Capex IM where the rate is changed from being a set value of 33% to being based on a formula that is consistent with the opex incentive rate (as set out in the Transpower IM Determination);[138]

3.4.6 changes to the specification of price provisions of the Transpower IM Determination to allow an EV account balance to be carried forward between regulatory periods (eg, from RCP2 to RCP3 and from RCP3 to RCP4); and

3.4.7 the introduction of a new price-quality path reconsideration provision to allow for an additional allowance for E&D base capex during a regulatory period (ie, RCP3 or later period).

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[137] Above n 63.

[138] The base capex standard incentive rate has been changed to be consistent with opex incentive rate under the Transpower IM Determination. The opex rate is determined using an estimate of the WACC to reflect the time value of money. Based on the most recently available WACC estimate (as at 31 July 2019), the opex incentive rate is 25%. The WACC determination can be found at: https://comcom.govt.nz/__data/assets/pdf_file/0016/163213/2019-NZCC-8-Cost-of-capital-determination-Transpower,-GPBs-and-Airports-ID-31-July-2019.PDF.

3.5 We have also amended the Transpower IM Determination to determine that pecuniary penalties cannot be treated as 'operating costs'.[139]

[139] Above n 63.

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 Electricity Distribution Businesses (**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,[140] and according to the requirements of the Code.

How Transpower is regulated

A4 Both the Commission and the Electricity Authority have a role in regulating the electricity lines services provided by Transpower.[141]

How we regulate Transpower

A5 We regulate Transpower under Part 4 of the Act, which "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."[142]

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[140] 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/.

[141] 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.

[142] Section 52 of the Act.

A6 The purpose of Part 4 is:[143]

> … 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
>
> © 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 regulation of Transpower under Part 4. 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:[144]

A7.1 loss reductions are included as a market benefit under our quantitative investment test for major capex.[145] 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.[146] 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.

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[143] Section 52A of the Act.

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

[145] 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).

[146] 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:[147] 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 minimum quality standards it must meet, for each year of each five-year regulatory period.[148] 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. We will publish the IPP determination for RCP3 in November 2019, at the conclusion of this current reset process.[149]

A8.2 Information disclosure (**ID**) regulation:[150] 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.[151] 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 10 June 2019 (ie, the Transpower IM Determination). This determination was reviewed as part of the 2015/16 IM review.[152] It sets out methodologies for:

A9.1.1 Cost allocation;

A9.1.2 Asset valuation;

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

148 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.

149 A revised draft RCP3 IPP determination has been published with this paper for technical consultation.

150 Section 54F of the Act.

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

152 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.

A9.1.3 Treatment of taxation;

A9.1.4 Cost of capital;

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:

A9.2.1 the process for submitting, assessing, and approving Transpower's base capex proposals (including the identification and the approval of listed projects);

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 which 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.[153] 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.[154]

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.[155] 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**).[156] The GRS are a set of standards against which the reliability performance of the existing grid (or future developments of 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 consulting on an update of the TPM guidelines.[157]

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[153] 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.

[154] 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 144, at [2.4.14].

[155] See: http://www.ea.govt.nz/.

[156] The GRS are set out in Schedule 12.2 of the Code.

[157] The Electricity Authority is currently consulting on an issues paper and proposed updated TPM guidelines. See Electricity Authority "Transmission pricing review: 2019 issues paper" (23 July 2019).

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.[158]

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.

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.[159]

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 referenced in our definition of 'major capex' as well as the investment test we apply when assessing major capex proposals.[160]

[158] Subpart 6 of Part 12 of the Code.

[159] 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.

[160] Clause 1.1.5 and Schedule D of the Capex IM.

A14.2 The Electricity Authority's concept of GEIP is referenced in the Capex IM as follows:[161]

A14.2.1 as a factor we may consider when evaluating a major capex proposal;[162]

A14.2.2 Transpower must demonstrate how a proposed major capex investment reflects GEIP;[163] and

A14.2.3 under the investment test for major capex, Transpower must quantify its project costs using GEIP.[164]

A15 GEIP is also relevant to our assessment of Transpower's IPP proposals. We consider that GEIP reflects the appropriate planning and performance standards for a prudent supplier. As such, we had regard to GEIP when considering whether Transpower's 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.[165, 166]

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[161] '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].

[162] Clause C2(a)(i) of the Capex IM.

[163] Clause G5(12) of the Capex IM.

[164] Clause D6(6) of the Capex IM.

[165] Clause 6.1.1(2)(b) of the Capex IM.

[166] Meridian questioned how holding Transpower to the GEIP standards can produce outcomes consistent with outcomes produced in competitive markets. Meridian "Transpower IPP 2020 – Draft decisions" (27 June 2019). See Attachment B, paragraphs B17 to B18 for our response to this submission.

A16 As noted at paragraph A12.2.2, the Electricity Authority is currently considering new TPM guidelines that would lead to a change in the way transmission charges are shared among transmission customers.[167] The Electricity Authority is considering changing the TPM guidelines to make transmission charges more service-based and cost-reflective. If the Electricity Authority ultimately changes the TPM guidelines in the manner set out in its July 2019 issues paper,[168] we expect this would heighten the interest of parties that would benefit from (and pay for) specific transmission investments in our processes for assessing Transpower's capex proposals.

[167] See: http://www.ea.govt.nz/development/work-programme/pricing-cost-allocation/transmission-pricing-review/.

[168] Above n 157.

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 decisions for the IPP reset. It explains:

B1.1 the relevant requirements under the Act;

B1.2 the IMs we must follow in assessing Transpower's proposal and in reaching 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.[169] For an overview of the regulation applying to Transpower, see Attachment A.

B3 Transpower is subject to IPP regulation under Part 4.[170] Transpower is also subject to ID regulation under Part 4.[171]

B4 We are required to set an IPP for Transpower for RCP3 by 28 November 2019.[172] The IPP must set out:[173]

B4.1 the maximum revenue which Transpower can charge for each pricing year of RCP3;[174]

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[169] Section 52 of the Act.

[170] 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.

[171] Section 54F of the Act.

[172] The Capex IM (clause 2.2.2) requires us to determine certain key aspects of the IPP by 30 August 2019.

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

[174] 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.

B4.2 the minimum quality standards that will apply to Transpower, some of which may be revenue-linked;[175] and

B4.3 the regulatory period, which, for RCP3, we have decided to set as 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:[176]
>
> (b) section 53ZB.[177]

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;[178] and

B6.2 The Capex IM,[179] 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

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

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[175] Clause 2.2.1 of the Capex IM.

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

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

[178] Above n 118.

[179] Above n 73.

B7 In 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.

B8 In determining the IPP, we must also take into account s 54Q of the Act:[180]

> The Commission must promote incentives, and must avoid imposing disincentives, for suppliers of electricity lines services to invest in energy efficiency and demand side management, and to reduce energy losses, when applying this Part in relation to electricity lines services.

Assessing Transpower's base capex proposal

B9 In assessing Transpower's base capex proposal, we have been guided by whether the proposal is consistent with an expenditure outcome which represents the efficient costs of a prudent supplier.[181]

B10 We consider this concept to be consistent with the Part 4 purpose, which is a required consideration under the capex evaluation criteria.[182]

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[180] See paragraph A7.

[181] See paragraph 2.7 above; and n 116, at [A15].

[182] Clause 6.1.1(2)(b) of the Capex IM.

B11 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**).[183, 184]

B12 In evaluating the base capex expenditure proposal in Transpower's proposal, we must apply the evaluation criteria in the Capex IM, being:

B12.1 the general evaluation criteria set out in clause 6.1.1(2) of the Capex IM (**general capex evaluation criteria**); and

B12.2 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**).

B13 These are together referred to as the **capex evaluation criteria**.

B14 The general capex evaluation criteria are:[185]

B14.1 whether what is proposed is consistent with the Transpower IM Determination and the Capex IM;

B14.2 the extent to which what is proposed will promote the purpose of Part 4 of the Act; and

B14.3 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.

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[183] '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].

[184] Meridian questioned how holding Transpower to the GEIP standards can produce outcomes consistent with outcomes produced in competitive markets. Meridian "Transpower IPP 2020 – Draft decisions" (27 June 2019). See paragraphs B17 to B18 below for our response to this submission.

[185] Clause 6.1.1(2) of the Capex IM.

B15 The base capex evaluation criteria are specified in Schedule A of the Capex IM. They include:

B15.1 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;

B15.2 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;[186] and

B15.3 a list of evaluation techniques we may employ, such as process benchmarking, and process and functional modelling.

B16 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,[187] 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.

The expenditure outcome and the Part 4 purpose

B17 Meridian questioned whether testing Transpower's proposed expenditure against the expenditure outcome is completely consistent with the Part 4 purpose, and whether the expenditure outcome captures all aspects of the Part 4 purpose.[188, 189] Meridian gave the example of the phrase "promoting outcomes that are consistent with outcomes produced in competitive markets" from s 52A(1) of the Act as being one aspect of the Part 4 purpose not captured by the expenditure outcome.

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[186] 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 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.

[187] Clause 2.2.1(3) and Part 7 of the Capex IM.

[188] Meridian "Transpower IPP 2020 – Draft decisions" (27 June 2019); Meridian "Transpower IPP 2020 – Issues Paper" (28 February 2019).

[189] The expenditure outcome is defined in paragraph 2.7 above.

B18 In response, we make the following points:

B18.1 We promote the interests of consumers of the regulated service by promoting the s 52A(1)(a)-(d) outcomes consistent with what would be produced in workably competitive markets.[190] Our focus is not on promoting all the potential outcomes of workably competitive markets per se, but rather with specifically promoting the s 52(1)(a)-(d) outcomes for the long-term benefit of consumers consistent with the way those outcomes are promoted in workably competitive markets.

B18.2 In setting the IPP, we seek to promote all four outcomes listed in s 52A(1)(a)-(d). Different aspects of the decisions we face in setting the IPP can contribute towards promoting different of the (a) to (d) outcomes.[191]

B18.3 We consider the expenditure outcome a useful guide in promoting those limbs of the Part 4 purpose that can be influenced through the assessment of proposed expenditure. Specifically, application of the expenditure outcome to proposed expenditure guides us in promoting s 52A(1)(d), (b) and, to a lesser extent, (a). However, as illustrated above, assessing proposed expenditure is only one aspect of the decisions we face in setting an IPP that promotes all four limbs of s 52A(1) within the broader context of promoting the long-term benefit of consumers.

Assessing Transpower's opex proposal

B19 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.

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[190] *Wellington International Airport Ltd & Ors v Commerce Commission* [2013] NZHC [December 2013], at [10], [27]. See also: Commerce Commission "Input methodologies review decisions: Framework for the IM review" (20 December 2016), para 10; Commerce Commission "Input methodologies (electricity distribution and gas pipeline services): Reasons paper (December 2010), paras 2.4.8, 2.6.3.

[191] For example, in setting Transpower's Grid Output Measures (one aspect of setting an IPP), we can promote the quality aspect of s 52A(1)(b). Through our assessment of Transpower's proposed opex and capex expenditure (another aspect of setting an IPP), we can promote outcomes (d), (b) and, to a lesser extent, (a). In assessing Transpower's proposed expenditure, we have limited ability to influence (c) – the sharing of efficiency gains with consumers; it is other aspects of our IPP decisions, such as the design of the revenue path and incentive mechanisms, through which we promote that outcome.

B20 Therefore, consistent with our approach to assessing base capex, in assessing opex we have been guided by:

B20.1 the extent to which what Transpower proposes will promote the purpose of Part 4 of the Act; and

B20.2 where they can be usefully applied to opex, the base capex evaluation criteria.

B21 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).

Assessing Transpower's proposed grid output measures

B22 As defined in the Capex IM, a 'grid output measure':[192]

> 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**;

B23 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.[193]

B24 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):[194]

B24.1 the extent to which a measure is a recognised measure of either or both:

B24.1.1 risk in the supply of electricity transmission services; and

B24.1.2 performance of the supply of electricity transmission services; and

B24.2 the relationship between the grid output measure and expenditure by Transpower.

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[192] Clause 1.1.5 of the Capex IM.

[193] Clause 2.2.2 of the Capex IM.

[194] Clauses A5-A7 of the Capex IM.

B25 The Capex IM provides for two types of grid output measures: revenue-linked and non-revenue-linked.[195]

B26 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 s 53M(2) of the Act.

B27 For the revenue-linked grid output measures, we have determined:[196]

B27.1 grid output targets;

B27.2 caps – to limit the amount of positive revenue adjustment;

B27.3 collars – to limit the amount of negative revenue adjustment; and

B27.4 grid output incentive rates – the amount of money at risk for each unit of output between the cap and the collar.

B28 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 set by the Electricity Authority.[197]

[195] Clause 2.2.2 of the Capex IM.

[196] Clause 2.2.2(1)(d) of the Capex IM.

[197] Sections 53M(3) and 54V(6) of the Act.

Attachment C Key steps in the IPP process

C1 The purpose of this attachment is to summarise the key steps in the IPP process to date (Table C1). For ease of reference, Table C1 also includes relevant IM amendments processes.

C2 The indicative dates for remaining steps in the IPP reset process are set out in Table 1.2 in Chapter 1.

Table C1 Summary of key steps in the IPP process to date

Date	Process step
11 May 2018	Published the terms of reference and tripartite deed for verification
8 June 2018	Issued information gathering notice to Transpower for information to be included in its RCP3 proposal
25 October 2018	Published our Process, framework and approach paper
15 November 2018	Submissions due on Process, framework and approach paper
26 November 2018	Transpower's RCP3 proposal and verification report published
7 February 2019	Published our Issues paper regarding Transpower's RCP3 proposal
1 March 2019	Submissions due on Issues paper
11 March 2019	Cross-submissions due on Issues paper submissions
3 April 2019	Published correspondence with Vector regarding the Issues paper
16 May 2019	Published a notice of intention to consider amendments to the Input Methodologies for Electricity Distribution Services and Transpower New Zealand Limited
29 May 2019	Published our Draft decisions and reasons paper Published questions for Transpower Published proposed amendments to input methodologies for electricity distributors and Transpower New Zealand Limited: Reasons paper Published [DRAFT] Transpower Input Methodologies Amendments Determination 2019 Published [DRAFT] Transpower Capital Expenditure Input Methodology Amendments Determination 2019 Published a notice of intention to consider further amendments to the Input Methodologies for Transpower New Zealand Limited
6 June 2019	Published Treatment of operating leases: Issues paper
14 June 2019	Published our Draft IPP determination Published a report from EMCa regarding Transpower's proposed ICT expenditure, along with an explanatory note from us, and Transpower's initial feedback on that report (including supporting letter from PricewaterhouseCooper (**PwC**))

Date	Process step
24 June 2019	Published questions from Major Electricity Users' Group (**MEUG**) and our responses
27 June 2019	Submissions due on our Draft decisions and reasons paper
3 July 2019	Published illustrative models for Treatment of Operating Leases Issues paper
5 July 2019	Submissions due on draft amendments to the Transpower IMs and Capex IM
10 July 2019	Submissions due on Treatment of Operating Leases Issues paper
11 July 2019	Submissions due on our Draft IPP determination Cross-submissions due on Draft decisions and reasons paper submissions
12 July 2019	Published draft decision on IRIS baseline adjustment term
18 July 2019	Proposed further amendments to input methodologies for Transpower New Zealand Limited: Draft decisions and reasons paper (new reopeners and EV account balance carry forward)
19 July 2019	Cross-submissions due on draft amendments to the Transpower IMs and Capex IM
24 July 2019	Issued notices to supply information on operating leases to EDBs and Transpower
1 August 2019	Submissions due on proposed further amendments to input methodologies for Transpower New Zealand Limited: Draft decisions and reasons paper (new reopeners and EV account balance carry forward)
22 August 2019	Submissions due on IRIS baseline adjustment term draft decision
28 August 2019	Published operating leases draft decisions and reasons paper
28 August 2019	Published Transpower IM amendments determination, Capex IM amendments determination and reasons paper
29 August 2019	Published this decisions and reasons paper Published revised draft IPP determination Published draft s 53ZD information gathering notices regarding asset health and risk modelling information, customer consultation information, and cost estimation information Published EMCa's supplementary reporting in relation to Transpower's proposed ICT expenditure Published updated list of information requests made to Transpower

Attachment D How we have implemented 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 have implemented 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;[198]
- D2.2 our changes to the price-quality path provisions to clarify the error reopener and materiality thresholds for reopening the price path;[199] and
- D2.3 our changes to the calculation methodology for the IRIS.[200]

D3 This attachment also explains how we have implemented the following Capex IM amendments:

- D3.1 our changes to the major capex incentives regime;[201]
- D3.2 our change to set a default incentive rate of 15% for major capex;[202]
- D3.3 our change to apply one of two incentive rates for base capex projects;[203]
- 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;[204]

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[198] Commerce Commission "Input methodologies review decisions: Report on the IM review" (20 December 2016), at [67]-[72], available at: https://comcom.govt.nz/__data/assets/pdf_file/0017/60533/Input-methodologies-review-decisions-Report-on-the-IM-review-20-December-2016.pdf.

[199] Above n 198, at [110]-[111].

[200] Above n 198, at [114]-[115].

[201] Commerce Commission "Transpower capex input methodology review: Decisions and reasons" (29 March 2018), at [74]-[103], available at: https://comcom.govt.nz/__data/assets/pdf_file/0033/79926/Transpower-capex-IM-review-Decisions-and-reasons-29-March-2018.PDF.

[202] Above n 201, at [120]-[129].

[203] Above n 201, at [140]-[156].

D3.5 our change to limit our ability to exclude expenditure from the base capex expenditure incentives in specific circumstances;[205]

D3.6 our change to the grid output adjustment;[206]

D3.7 our change to remove the base capex policies and processes adjustment;[207]

D3.8 our change to require Transpower to provide an estimate of transmission charge changes and benefits delivered by each base capex proposal (including listed projects);[208] and

D3.9 our changes to the information requirements in Schedule F.[209]

D4 We have not implemented for RCP3 our change to introduce the option for an expenditure adjustment mechanism for base capex E&D projects.[210] We have separately consulted on this mechanism and have implemented in its place a price-quality path reconsideration provision.[211]

Implementation of 2016 Transpower IM amendments

WACC calculation

D5 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.[212]

D6 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.

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[204] Above n 201, at [157]-[160].

[205] Above n 201, at [B22]-[B26].

[206] Above n 201, at [B29]-[B35].

[207] Above n 201, at [170]-[178].

[208] Above n 201, at [329]-[338].

[209] Above n 201, at [339]-[343].

[210] The "base capex allowance adjustment mechanism".

[211] Above n 63.

[212] Above n 198, at [67]-[72].

Price-quality path

D7 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:[213]

D7.1 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;

D7.2 add 'revenue-linked grid output measure' to the error event provisions for reconsideration of the IPP; and

D7.3 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.

D8 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 D7.3 above), quality standards or grid output measures.

D9 Because this reconsideration provision is self-contained in the Transpower IMs, it does not require any supporting drafting in the revised draft IPP determination.

IRIS

D10 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.[214]

D11 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.[215] 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.

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[213] Above n 198, at [110]-[111].

[214] Above n 198, at [110]-[111].

[215] We published a draft decision on the IRIS baseline adjustment term for RCP3 on 12 July 2019 (above n 76).

D12 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.

D13 The forecast opex incentive wash-up process for RCP3 is prescribed in the revised draft IPP determination.

Implementation of 2018 Capex IM amendments

Major capex incentive regime

D14 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).[216]

D15 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. Because the incentive mechanism is largely self-contained in the Capex IM, it does not require detailed drafting in the IPP determination.

D16 The RCP3 price path will not ordinarily be updated annually. The balance in the EV account will generally be carried forward for inclusion in the forecasting of the RCP4 price path, unless the 'Large build-up in EV account balance' reconsideration provision in the Transpower IM amendments determination is applied at any stage.[217]

Setting a default incentive rate of 15% for major capex

D17 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.[218]

D18 The incentive rates set out in the Capex IM will be applied to major capex projects that we approve during the course of RCP3.

D19 Because the incentive mechanism is largely self-contained in the Capex IM, it does not require detailed drafting in the IPP determination.

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[216] Above n 201, at [74]-[103].

[217] Above n 63.

[218] Above n 201, at [120]-[129].

Two incentive rates for large base capex projects

D20 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.[219]

D21 Yesterday, we determined a change to the base capex standard incentive rate in the Capex IM from being a set value of 33% to being based on a formula that is consistent with the opex incentive rate (as set out in the Transpower IM Determination).[220] This change is also reflected in the revised draft IPP determination.

Expenditure-based incentive mechanism

D22 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.[221]

D23 For RCP3 we have set two total forecast base capex numbers in the 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 revised draft IPP determination.[222]

D24 We are currently consulting on Transpower's treatment of operating lease payments under the IMs. We expect to make a final decision before we finalise the IPP determination in November 2019. For illustrative purposes, in our revised draft IPP determination we have reflected, in the expenditure basis of capex for incentive purposes, a treatment where we would exclude the capitalised operating lease capex for incentive calculation purposes.[223] This is not our final IM decision and is still subject to consultation.

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[219] Above n 201, at [140]-[156].

[220] Above n 63.

[221] Above n 201, at [157]-[160].

[222] Schedules C1 and C2 of the revised draft IPP determination for setting of the price-quality path and Schedules C3 and C4 of the revised draft IPP determination for incentive calculation purposes.

[223] Schedules C3 and C4 of the revised draft IPP determination.

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

D25 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:[224]

D25.1 Where expenditure on a base capex project has expanded in scope and has become a major capex project; or

D25.2 Where cost elements of base capex in the base capex allowance can vary significantly due to factors beyond the control of Transpower.

D26 Because the incentive mechanism is largely self-contained in the Capex IM, it does not require detailed drafting in the IPP determination.

Grid output adjustment

D27 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.[225]

D28 In its RCP3 proposal, Transpower complied with the amended requirements of the Capex IM. Attachment F of this paper sets out our decision that we have not revenue-linked the asset health grid output measures for RCP3.

Base capex policies and processes adjustment

D29 As a result of our 2017/18 Capex IM review, we amended the Capex IM to remove the base capex policies and processes adjustment.[226]

D30 As such, the revised draft IPP determination does not include this measure.

E&D base capex allowance adjustment mechanism

D31 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.[227]

D32 We have not included this mechanism in our decisions for RCP3, as we consider that some of the requirements for the mechanism have not been met.

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[224] Above n 201, at [B22]-[B26].

[225] Above n 201, at [B29]-[B35]

[226] Above n 201, at [170]-[178].

[227] The "base capex allowance adjustment mechanism". Above n 201, at [179]-[193].

D33 In our Draft decisions and reasons paper we noted that we would explore improving the workability of this mechanism through an amendment to the Capex IM.[228] However after further consideration, rather than further modifying the mechanism as a means to address uncertainty in the E&D base capex portfolio, we decided to instead determine a new price-quality path reopener provision under the Transpower IM.[229] This is consistent with other events that are outside of Transpower's reasonable control. Our views are set out in more detail in Attachment G.10.

Costs and benefits of base capex proposals

D34 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.[230]

D35 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

D36 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.[231]

D37 In its RCP3 proposal, Transpower complied with the amended requirements of the Capex IM.

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[228] Above n 57, at [D31] and Attachment G.

[229] Above n 63.

[230] Above n 201, at [329]-[338].

[231] Above n 201, at [339]-[343].

Attachment E High-level description of updates to the Transpower IPP 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 decisions in this paper; and

E1.4 how we will ask Transpower to update the financial model, using the finalised expenditure allowances in this paper, 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.

E3 Under the building blocks calculation in Schedule D, each building block input value is forecast on the basis of an estimate for each disclosure year ending 30 June in the regulatory period and the input values are then converted to the forecast MAR total for each related pricing year using cash flow timing factors.

E4 We have made a decision to incrementally build on the RCP2 Transpower IPP Determination in setting the revised draft IPP determination for RCP3, which includes the building blocks approach and use of an updated version of the RCP2 financial model.

E5 Consistent with the approach adopted for RCP1 and RCP2, Transpower maintains the financial model and we rely on assurance from an auditor and certification from directors of Transpower that the outputs of the model are compliant with the IMs and our information requests to Transpower. This approach has worked well for us in those earlier regulatory periods.

E6 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,[232] and these are subject to an assurance opinion by an independent auditor.[233] 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.

E7 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.

E8 Transpower maintains the financial model for any amendments to the Transpower IMs or the Transpower IPP Determination during the RCP.[234]

E9 Material changes to the way the price path is calculated and applied for RCP3 are included in our 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 smoothed annual amounts of maximum allowable revenue, which we now refer to as the 'forecast SMAR'.[235]

E10 Transpower published its financial model for interested persons with its RCP3 proposal.[236] This version of the financial model has been updated for changes in the price path between RCP2 and our price path decisions for RCP3.

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[232] In RCP3, the updates of the forecast MAR and the price path based on the financial model are required to be provided to us separately from the annual compliance statement within 80 working days of the end of the preceding disclosure year (clause 30 of the Transpower IPP Determination).

[233] In RCP3, both the updates of the price path (within 80 working days) and the annual compliance statement (within 105 working days) must include an auditor assurance opinion.

[234] For example, we are currently separately consulting on the appropriate regulatory treatment of changes to the GAAP accounting standards for operating lease payments. A further update to the model can be expected following our consultations and any final amendments to the Transpower IMs in this regard.

[235] The definition of the forecast SMAR 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 revised draft Transpower IPP Determination (published alongside this paper).

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

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

E11 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.

E12 Transpower also calculates incentive amounts for the disclosure year in accordance with the Capex IM and the Transpower IPP Determination.

E13 The results of the wash-ups and the incentive calculations are recorded in Transpower's EV account.

E14 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 was able to be updated in RCP2 for:

E14.1 further major capex approved by us since the forecast MAR was last updated;

E14.2 further approved base capex listed projects values set by us since the forecast MAR was last updated; and

E14.3 the EV account balance that is required to be returned to/recovered from Transpower's customers.[237]

Using the financial model to calculate the effects of our RCP3 decisions

E15 We have used a version of Transpower's RCP3 version of the financial model to calculate the estimated revenue effects of our decisions, as described in the Executive Summary of this paper.

E16 Our calculations based on the 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.

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[237] We have made changes to the Transpower IMs to modify the EV account price path 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 other RCP3 IPP and IM decisions.

E17 In order to apply the model for our decisions in this paper, we needed to make some simplified adjustment assumptions that we consider should not materially affect those estimated effects, including the application of an estimated WACC rate of 4.87% in place of the rate used by Transpower in its RCP3 proposal (5.5%).[238]

How Transpower will finalise the financial model for RCP3 by October 2019

E18 We plan to ask Transpower to update the financial model for our final expenditure and quality decisions set out in this paper by October 2019 to enable us to determine the RCP3 price-quality path in November 2019.

E19 That update of the financial model will include an adjustment to the model to reflect:

E19.1 updated opening values for the regulatory asset base (**RAB**) and other key inputs for 2020-21 based on the 2019 annual compliance statement numbers;

E19.2 the RCP3 price-quality WACC rate which will replace the estimated 4.87% rate used to make the decisions in this paper;[239]

E19.3 an adjustment to the price path to reflect our finalisation of the forecast IRIS baseline adjustment term for inclusion as a forecast recoverable cost amount in the setting of the RCP3 forecast MAR; and

E19.4 any adjustments for changes to reflect our decisions on the treatment of operating lease payments.

E20 The determination of the WACC will also enable us to finalise the forecast EV adjustments, which are used as in input into the RCP3 forecast MAR, and we will also incorporate any revised forecast of the EV account balance at the end of RCP2 when determining the forecast EV adjustments.

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[238] The 4.87% estimate of the RCP3 WACC rate is based on the information disclosure 67th percentile vanilla WACC rate for Transpower, which is the most recent estimate of the WACC, that we published on our web site on 31 July 2019 and is available at: https://comcom.govt.nz/__data/assets/pdf_file/0016/163213/2019-NZCC-8-Cost-of-capital-determination-Transpower,-GPBs-and-Airports-ID-31-July-2019.PDF. This replaces the RCP3 WACC rate estimate of 5.13%, used for our draft decision, which was based on the information disclosure rate for electricity distribution businesses (ie, local lines companies). This was the most recent estimate of the WACC at the time of our draft decision.

[239] 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. We are aiming to publish our WACC decision in October 2019.

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	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	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 to AP4)	Attachment F.1: Revenue-linked measures of grid performance	A **measure of grid performance** means measure that quantifies the level of service received by **consumers.** **Service performance** is also known as a measure of **grid performance.** **Grid performance** is a subset of an **asset performance measure** as this is, in part, an outcome of asset performance.
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	Grid output measures	A **revenue-linked grid output measure** means **grid output measure** to which the **grid output mechanism** applies. A **grid output mechanism** means the formula by which the **grid output adjustment** is calculated, as specified in the table in clause B2(1).
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	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- (a) positive number where an increase in **grid output** is intended to result in an increase in revenue; and (b) negative number where an increase in **grid output** is intended to result in a decrease in revenue.
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 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 to set quality standards in accordance with the Act.[240]

Our decisions

F4 Our decisions are:

F4.1 to set revenue-linked measures of grid performance (GP1 and GP2) and asset performance (AP1 and AP2) measures, all with associated quality standards;

F4.2 to cap total annual revenue at risk for Transpower across all grid output measures at +/-1.40% of RCP3 revenue;

F4.3 to set quality standards through a 'pooling' approach for measures of grid performance and through a 'deadband' zone approach for measures of asset performance;

F4.4 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:

F4.4.1 under s 53ZD(1)(e) of the Act, require Transpower to provide information on the asset health measures as if these were revenue-linked;

[240] Above n 50, at 16.

F4.4.2 under s 53ZD(1)(f) of the Act, require a limited scope mid-RCP3 expert opinion on Transpower's progress in developing its asset and network risk modelling; and

F4.4.3 to specify minimum asset health quality standards in the power transformer and outdoor circuit breaker asset classes set between the proposed trial asset health measures' collar values, and what this would be without intervention for each year of RCP3;

F4.5 to set a normalisation approach for the measures of grid performance (GP1 and GP2) and asset performance measures (AP1 and AP2) for certain events that are beyond the reasonable control of Transpower in circumstances where Transpower exercised Good Electricity Industry Practice;

F4.6 to set non-revenue-linked measures of grid performance (GP-M), asset performance (AP3, AP4 and AP5), and a measure for post-event communications (CS1), all with no associated quality standards;

F4.7 to include reporting requirements based on the time to restore supply, including either simple or comprehensive reporting;[241]

F4.8 to include reporting requirements for the measures of grid performance, explaining the reasons for Transpower being outside the collar of the incentive range for each POS category;

F4.9 to include reporting requirements for the measures of asset performance measures, explaining the reasons for Transpower being in the deadband between the collar value and quality standard;

F4.10 to require reporting whenever a quality standard for any grid output measure is breached.

[241] 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 learned for the future.

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

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Quality standard in RCP3	Explanation and reasoning
RCP3 **Reliability – Measure of Grid Performance (GP1)**	Symmetric incentive	Yes	Set at collar	• 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 Transpower Grid Outputs Report). • Change proposed 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. We accept Transpower's proposal on pooling: pool across all POS categories - 3 out of 6 POS pool in a 2 out of 3-year rolling time period – this alleviates sample size volatility.[242] • Set quality standard at the collar – our check of historical performance suggests this is appropriate.

[242] As explained further in Attachment F.1, for measures of grid performance 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 three 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?	Quality standard in RCP3	Explanation and reasoning
RCP3 **Reliability – Measure of Grid Performance (GP2)**	Symmetric incentive	Yes	Set at collar	• 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 Transpower 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. We accept Transpower’s proposal on pooling: pool across all POS categories - 3 out of 6 POS pool in a 2 out of 3-year rolling time period – this alleviates sample size volatility. • Set quality standard at collar - check of historical performance suggests this is appropriate.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Quality standard in RCP3	Explanation and reasoning
RCP3 **Reliability – Measure of Grid Performance (GP1, GP2 and GP-M)**	Reporting only (ID)	No	N/A	• Introduce reporting requirements for interruption events based on length of time to restore supply[243] • Introduce reporting requirement for interruptions that last 12 hours or more, and/or over one system minute. (GP1 and GP2) • Introduce 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 a reporting requirement for disclosure of momentary interruptions, including the cause, start date, grid exit point affected and trends. (GP-M) • Reporting to be submitted at the same time as the IPP annual compliance statement. (GP1 and GP2)
RCP2 **Reliability - Grid Performance (GP3)**				• RCP2 measure "Duration of 90th percentile unplanned interruptions by customer category". • Not proposed by Transpower in RCP3. We agree because GP3 is not necessary for RCP3 – GP2 measure will capture effect of most of the same interruptions.

[243] 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?	Quality standard in RCP3	Explanation and reasoning
RCP2 **Reliability – Development measure (PMD6)**				• 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.
RCP2 **Reliability – Development measure (PMD7)**				• RCP2 measure "Energy not supplied for each POS for each unplanned interruption" previously not linked to revenue. • Not proposed by Transpower in RCP3 because Transpower considered the information reporting (on energy not supplied) better served by reporting closer real-time information on Transpower's website.
RCP2 **Reliability – Development Measure (PMD9)**				• 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 Transpower already obligated to provide post-event reporting under connection contracts with customers.
RCP3 **Availability - Asset Performance Measure (AP1)**	Symmetric incentive	Yes	Set below collar with deadband	• RCP3 measure same as RCP2 measure - "% availability of HVDC" – planned and unplanned. • Set symmetric measure with targets, caps and collars. • Disagree with some of Transpower's reasoning for target based on historical data and inclusion of high impact low probability (**HILP**) event but agree with Transpower's 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?	Quality standard in RCP3	Explanation and reasoning
RCP3 Availability - Asset Performance Measure (AP2)	Symmetric incentive	Yes	Set below collar with deadband	• 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 Transpower Grid Outputs Report). • Set as symmetric measure with targets, caps and collars. Disagree with Transpower's target value. Historical data suggests that Transpower's proposed measures not challenging. Amend 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 Transpower 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	• Introduce 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 to be submitted at the same time as the IPP annual compliance statement.
RCP2 Availability – Development Measure (PMD4)				• RCP2 measure "Extent that Transpower meets planned outage restoration times". • PMD4 and PMD8 in RCP2 now AP4 measure in RCP3.

RCP2 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Quality standard in RCP3	Explanation and reasoning
RCP2 **Availability – Development Measure (PMD8)**				• 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.
RCP3 **Availability - Asset Performance (AP3)**	Reporting only (ID)	No	No	• 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 AP3 measure has value to customers and stakeholders so we have decided to retain it. • 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 to be submitted at the same time as the IPP annual compliance statement.
RCP3 **Availability - Asset Performance (AP4)**	Reporting only (ID)	No	No	• 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 AP4 measure has value to customers and stakeholders so we have decided to retain it. • 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 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Quality standard in RCP3	Explanation and reasoning
RCP2 **Availability – Development Measure (PMD5)**				• RCP2 measure "Extent that Transpower places customers on N-security". • PMD5 in RCP2 now AP5 measure in RCP3.
RCP3 **Availability - Asset Performance (AP5)**	Reporting only (ID)	No	No	• 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 to include when this occurs, how long customers are subject to reduced supply security, POS affected and notification outside of the Planned Outage Co-ordination Process (**POCP**) rules.
RCP2 **Customer Service – Development Measure (PMD1)**				• 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)**				• 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 and RCP3 measure	Type of measure in RCP3	Linked to revenue in RCP3?	Quality standard in RCP3	Explanation and reasoning
RCP2 **Customer Service – Development Measure (PMD3)**				• RCP2 measure "Accuracy of notified restoration times following unplanned interruptions". • PMD1, PMD2 and PMD3 in RCP2 now CS1 measure in RCP3.
RCP3 **Customer Service Measure (CS1)**	Reporting only (ID)	No	No	• 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. We have decided to run CS1 as a trial standard during RCP3. One submitter supported it as a 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 to 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?	Quality standard in RCP3	Explanation and reasoning
RCP3 **Asset Health (AH)**	Not revenue-linked	No	Set between Transpower proposed AH and "no-investment" estimate of AH for selected asset classes.	• RCP2 measures volumetric but were not met for variety of reasons (eg, asset condition assessment identified no replacement necessary, etc.) • RCP3 measures based on percentage of assets with AH score of 8 or greater (an AH index of 1 denotes best condition and 10 denotes worst condition) in each RCP3 year. • Do not revenue-link - not convinced Transpower has robust asset condition data for many assets in its fleet. Transpower's proposed asset health measures could face similar practical issues as the volumetric measures in RCP2. • Set quality standards for specific AH measures in 2 asset classes to act as a safety net in order to ensure that asset health will not degrade significantly over RCP3 and to act as a proxy risk model. • Set quality standard levels between the 'no investment' outcome[244] percentage of assets with an AHI score>8 and the 'forecast investment' outcome percentage of assets with an AHI>8, in each year for 2 asset classes in the asset health measures.

[244] 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.[245] 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.[246]

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:[247]

- 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;[248] 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).

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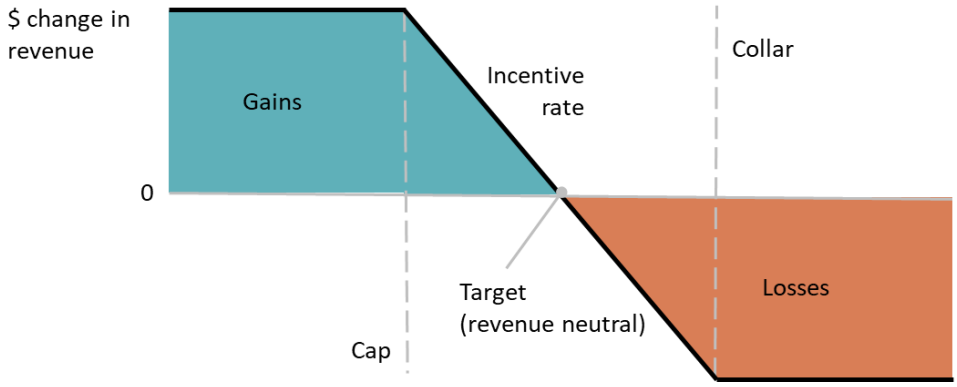
[245] Clause 2.2.2 of the Capex IM.

[246] We must also apply the criteria in Schedule A clause A5-A7 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.

[247] Clause 2.2.2(1)(d) of the Capex IM.

[248] 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.[249]

F12 We may also set reporting-only requirements that are not linked to quality standards. Examples of these for RCP3 are GP-M, 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.[250]

F14 The quality standards we have set for RCP3 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.[251]

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.[252] If a quality standard is breached, statutory penalties as well as negative revenue adjustments could apply for that underperformance.[253]

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[249] For example, s 53M(2)(d) of the Act.

[250] Section 53M(3) of the Act.

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

[252] The incentive revenue adjustment applies up until the cap or collar is reached and where no further revenue adjustment will apply.

[253] Section 54V of the Act.

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 negative revenue adjustment 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 grid output measure revenue adjustments 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 decisions, we considered the following matters:

F19.1 the legal framework;

F19.2 the broad economic quality framework;

F19.3 interaction of quality dimensions and Transpower's proposed measures with other incentives applying to Transpower;

F19.4 consideration of quality dimensions and quality scheme options; and

F19.5 consideration of the Transpower's proposed quality measures.

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.[254] During RCP2 we reviewed the package of incentive measures that apply to Transpower's capex.[255]

[254] *Setting Transpower's individual price-quality path for 2015 – 2020* [2014] NZCC 23 (29 August 2014), at 42 and Attachment B.

[255] Above n 116, at 28.

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.[256]

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.

F23.2 Quality standard only (can include a pooling approach across measures and/or across years). This may also have additional 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).

F24 A summary of the dimensions of quality we have applied are summarised in Table F3.

[256] 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 for RCP3

Category of quality dimension		Quality standards				Disclosure requirements	
Category	Measure	Quality incentive scheme		No quality incentive scheme		Pilot quality standard	Pilot revenue-linked
		Financial (revenue-linked)	Non-financial (reporting)	Pilot 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 negative revenue adjustments from the quality incentive scheme (or quality standard contravention penalties) 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.[257]

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.

[257] Attachment F.5 outlines our normalisation mechanism applying to the revenue-linked service performance measures to account for extreme events that are beyond the reasonable control of Transpower.

Incentive driver	Effect
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.
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

Quality setting	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).

Quality setting	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.[258] 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 (downside only)[259]	Standard = collar value	A downside-only scheme where Transpower would face a negative revenue adjustment 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 downside-only scheme where Transpower would face a negative revenue adjustment 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 downside-only incentive scheme, the principal difference is that each customer is compensated for interruptions they experience, rather than the negative revenue adjustments 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	Allows for different options to result in a breach: • 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 adjustments so that rewards in one measure might offset negative adjustments in another, but aggregate reward could be capped at zero (or at a lower amount than the negative adjustment).

[258] 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.

[259] A downside-only scheme only allows for negative revenue adjustments.

Quality setting	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?

Our 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 stated that this reflects its consultation with customers and stakeholders.[260]

F35 Our intention is to build on RCP2 to incentivise behaviours around risk assessment and quality to ensure the best outcomes for consumers. For RCP3, we have decided that pooling of measures will be adopted in some cases, and that the quality standards are set in other cases beyond the incentive regime. We have introduced 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.

[260] 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 undertook an engagement process in developing its quality measures proposed for RCP3. We have provided stakeholders (customers, consumers and others) opportunity for involvement in our process through our consultations on our Issues paper and Draft decisions and reasons paper.

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.[261]

F39 In RCP2, Transpower's measures of grid performance 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).[262] This meant that large, outlier events could directly lead to breaches of the quality standard. This is why we have introduced quality standards for RCP3 based on pooling of measures across grid performance POS sub-categories and over a rolling time period.[263]

F40 We have set the RCP3 quality standards that more 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 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 The service performance measures we have set 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).

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[261] 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 254, at [4.40]).

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

[263] 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 RCP3. This shows which measures we have retained (or discontinued) for RCP3 and which performance measure development initiatives we have rationalised into new measures. Table F6 describes what aspect of performance each of the codes (eg, 'GP1') measure.

F44 Transpower's proposed grid output measures were informed by its consultation with stakeholders to date.[264] The Verifier's opinion was that Transpower's consultation with its stakeholders on grid output measures has been moderately effective.[265]

F45 Transpower 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.[266] There was general support in submissions, apart from Contact Energy, for the removal of the GP3 measure.

F46 Transpower 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;[267] and

F46.4 availability development measure PMD5 discontinued for RCP3.[268]

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[264] 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.

[265] Above n 53, at 90.

[266] Above n 264, at 25.

[267] Transpower proposed to discontinue PMD6 as it did not consider it is an appropriate measure of performance because most momentary interruptions are outside of its control. Transpower also proposed to not continue with PMD7 because it 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.[269]

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 proposed collecting the relevant data and communicating the information through industry working groups.[270]

F49 MEUG suggested that PMD6 from RCP2 is a useful measure to understanding the number and trend of momentary interruptions over time. It also noted that identifying the cause of each incident would add value to the measure.[271]

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 Transpower's proposed measures add value for consumers.

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[268] 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 measures of grid performance 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.

[269] Above n 264, at 25.

[270] Transpower "Service Engagement Paper 2 (April 2017), at 18, available at: https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/Engagement%20Paper%202%20-%20April%202017.pdf.

[271] 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 Transpower's proposed measures cover the main dimensions of performance and carry over the key aspects from RCP2.[272] NZIER wanted a more detailed explanation of how the incentive rates had been calculated for the service performance measures.

Draft decision and submissions

F52 In our Draft decisions and reasons paper, we proposed to introduce non-revenue-linked measures relating to momentary interruptions (RCP2 measure PMD6) named GP-M for RCP3, and a measure for reporting on N-security (RCP2 measure PMD5) named AP5 for RCP3. We proposed that the GP-M measure should have an associated quality standard.

F53 In its submission on our draft decision, Transpower disagreed with our proposal to set a quality standard for momentary interruptions (GP-M) and to limit the reporting required on momentary interruptions.[273] On our proposed AP5 measure, Transpower stated that placing customers on N-security is not a leading indicator of deteriorating quality and unplanned interruptions will be picked up in the GP measures.[274]

Our view

F54 We generally agree with Transpower's proposed changes for RCP3 following its consultation process and consider that Transpower proposed the appropriate measures of quality.

F55 However, we have introduced reporting-only requirements relating to momentary interruptions (measure 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.

F56 We have also introduced reporting-only requirements for N-security reporting (RCP2 measure PMD5) and named this AP5 for RCP3. We consider that this information will be useful for consumers.

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

[273] Above n 71, at 9.

[274] Above n 71, at 27.

Capex IM requirements

F57 We considered the grid output measures against clause A5 of Schedule 1 of the Capex IM when setting grid performance measures GP1 and GP2, and asset performance measures AP1 and AP2. In particular those measures:

F57.1 are recognised and well understood measures of transmission network performance and availability defined by the number of grid interruptions, interruption durations, and asset availability per annum;

F57.2 are measures of transmission network performance that are being used increasingly by Transpower to inform risk-based investment decision making – as evidenced by Transpower's asset risk modelling informing the power transformer and outdoor circuit breaker investment strategies; and

F57.3 are measures that align with the business processes of Transpower because they reflect Transpower's understanding of how its investment strategies in many asset classes are likely to impact quality outcomes.

F58 The Commission is keen to see Transpower further develop its understanding of the link between its investment proposals and quality outcomes for more asset classes and to also take a network view of this risk.

F59 With this is mind we have set quality standards related to selected asset health measures as a proxy for functional asset risk modelling. Additionally, we have introduced requirements for Transpower to provide us with updated information about how it is progressing its asset and network risk modelling using s 53ZD notices.

Our decision

F60 For the grid output measures that will apply for RCP3, our decision is to:

F60.1 adopt Transpower's proposed service performance measures;[275]

F60.2 adopt Transpower's proposed asset health measures, being run as a pilot revenue-linked scheme, with some asset classes having associated quality standards;

F60.3 introduce reporting-only requirements to apply during RCP3 with no associated quality standards. These reporting requirements are discussed in Attachment F.3; and

[275] We have adopted 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.

F60.4 introduce reporting requirements for service performance measures.

Table F6 Our decision on service performance measure changes for RCP3

Category	RCP2			Our 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 90th 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 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
	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
	PMD5	Extent that Transpower places customers on N-security	No	AP5	Extent that Transpower places customers on N-security	No
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
	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			

Grid output measures

High-level approach

F61 We have introduced revenue-linked grid output measures with associated targets, caps, collars and incentive rates for each POS category of grid performance (**GP**), and for each measure of asset performance (**AP**).

F62 We considered the revenue-linked grid output measures against the requirements of the Capex IM. We consider that the revenue-linked grid performance measures GP1 and GP2, and revenue-linked asset performance measures AP1 and AP2, are consistent with the requirements of the Capex IM Schedule A clause A6 and clause A7 because:

F62.1 the grid outputs of grid performance and asset performance are revenue-linked grid output measures that have been consulted on and are largely supported by consumers;

F62.2 the revenue-linked grid output measures are quantifiable, controllable by Transpower to an extent, and are auditable and replicable over time;

F62.3 in considering the caps, collars, grid output incentive rates and grid output targets, with respect to each revenue-linked grid output measure;

F62.3.1 the value that consumers place on the relevant grid output measure and the relationship between this value and the proposed grid output incentive rate has been accounted for using value of lost load (**VoLL**);

F62.3.2 while the analytical relationship between base capex and each grid output appears to be developmental, the linkage to historical performance seems appropriate over RCP3;[276]

F62.3.3 natural asset degradation and grid loading effects, as they affect asset condition, are accounted for in Transpower's planning for asset replacement and renewals;

[276] Transpower asset health, asset risk and network risk modelling development will see this relationship strengthen for future resets.

F62.3.4 accommodating the effects of extreme weather events are accounted for by Transpower in its asset design policies and procedures, which inform asset investment decisions. We have introduced a normalisation mechanism that allows Transpower to remove the effects of extreme weather events that exceed economic asset design strategies, from the revenue-linked grid output measures;

F62.3.5 the plausible range, and the relationship between that range and the caps and collars of the relevant grid outputs, have been taken into account by considering the historical performance of each revenue-linked grid output measure; (clauses A7(d) and (e)); and

F62.3.6 the impact on the return on capital was considered low so was not considered.

F63 The revenue-linked grid output measures (service performance measures) are outlined in Table F7 and are explained further in subsequent sections of this attachment. It displays Transpower's proposed targets, caps, collars, incentive rates and $ at risk.

Table F7 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	335,714	2,350,000
N-1 security material economic consequence	7	24	41	41	40,294	685,000
N-security high economic consequence	4	6	8	8	250,000	500,000
N-security material economic consequence	9	23	37	37	41,786	585,000
N-1 security generator	5	9	13	13	62,500	250,000
N-security generator	6	12	18	18	41,667	250,000
GP2: average duration of interruption (min)					$ per min	
N-1 security high economic consequence	30	92	154	154	37,903	2,350,000
N-1 security material economic consequence	36	61	86	86	27,400	685,000
N-security high economic consequence	0	103	206	206	4,854	500,000
N-security material economic consequence	0	140	280	280	4,179	585,000
N-1 security generator	50	174	298	298	2,016	250,000
N-security generator	11	93	175	175	3,049	250,000
AP1: HVDC availability (%)					$ per 1%	
HVDC availability	99.75%	98.75%	97.75%	96.75%	5,00,000	5,00,000
AP2 HVAC availability (%)					$ per 1%	
HVAC availability (71 selected assets)	99.2%	99.0%	98.8%	98.6%	5,000,000	1,000,000
Total revenue at risk						
Revenue at risk (%)						1.75%
Revenue at risk cap (%)						1.40%

Note: Revenue amounts are in nominal $s

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

F64 We have also introduced non-revenue-linked (reporting only) service performance measures GP-M, AP3, AP4, AP5 and CS1 under ID. These measures have no associated quality standards attached. Our reasons are further explained later in this attachment.

F65 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 negative revenue adjustment for not doing so).

F66 Transpower 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 Attachment F.4.

F67 As shown in Table F7, our decision is to set a total annual revenue at risk cap of +/-1.40% before adjusting for tax and time value of money. After these adjustments, the maximum post-tax income at risk is approximately 1%.

F68 We note that the level of revenue at risk for EDBs under the default price-quality path (**DPP**) will combine with the revenue adjustment amounts from the IPP to affect electricity prices. Our draft DPP decision was 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

F69 We are required under the Capex IM to set revenue-linked and non-revenue-linked measures for Transpower.

Approach raised in the Issues paper

F70 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.

F71 Transpower 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.

F72 We discussed the Verifier's view on Transpower's proposed grid output measures and whether the Verifier could be satisfied that Transpower's proposed measures satisfied GEIP.

F73 We also provided our view of Transpower's proposed grid output measures and issues identified by the Verifier.

Response in submissions

F74 Submissions were generally supportive of Transpower's proposed measures and changes from RCP2.

Draft decision and submissions

F75 In our Draft decisions and reasons paper we outlined our proposed grid output measures including grid output measures, asset performance measures, non-revenue-linked measures and asset health measures. The revenue-linked measures gave a total revenue at risk of +/-1.40% (before adjusting for tax and time value of money).

F76 Submitters were generally supportive of our proposed grid output measures and the settings for the revenue-linked measures. We discuss each of the measures in further detail later in this attachment.

Further detail

F77 Further detail on our decisions, and our reasons for those decisions, is provided in the following sections of this paper:

F77.1 Attachment F.1 – measures of grid performance;

F77.2 Attachment F.2 – asset performance measures;

F77.3 Attachment F.3 – non-revenue-linked measures;

F77.4 Attachment F.4 – asset health measures;

F77.5 Attachment F.5 – normalisation approach for service performance measures;

F77.6 Attachment F.6 – level of revenue at risk for grid output measures; and

F77.7 Attachment F.7 – incentive rates for the service performance measures.

Quality standards for grid output measures

High-level approach

F78 Transpower is not required to propose quality standards. We set them as part of the IPP process.

F79 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.

F80 By contrast to RCP2, for RCP3 we have set quality standards that are not necessarily set at the incentive measure settings (ie, target, cap or collar).

F81 As a starting point, we based the revenue-linked (as well as non-revenue-linked) grid output measures on historical information and the quality considerations above. After deciding on the measures, we determined where the appropriate quality standard should be.

F82 In setting the quality standards, we 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.[277]

F83 Table F8 outlines our decision on quality standard levels for each of the revenue-linked grid output measures.

[277] On the question of quality standards, we have sought to engage with customers and interested parties throughout our consultation on setting the price path for RCP3. Transpower also engaged with its customers when preparing its RCP3 proposal. In setting quality standards, unless we received any submissions to the contrary, we have started from a point where customers and consumers are assumed to value at least the quality of service that they have received historically, and therefore our reliability and availability measures have been based initially on historical data. We have also set incentive rates in relation to the VoLL so that the rates generally reflect this estimate of consumer preferences for each POS category.

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

Measure	Quality setting	Quality standard	Pooling of measures?
GP1 measures (for different POS)	Symmetric	Standard = collar	Yes
GP2 measures (for different POS)	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)[278]	Deadband to apply (standard>collar)[279] for selected asset classes	No
GP-M	Reporting only	-	-
AP3	Reporting only	-	-
AP4	Reporting only	-	-
AP5	Reporting only	-	-
CS1	Reporting only	-	-

F84 Our decision is to require reporting if Transpower does not meet any of the quality standards, including reporting details on:

F84.1 the causes of the breach;

F84.2 the impact on Transpower's customers over the period;

F84.3 actions that Transpower took to minimise the effect of loss of supply causes; and

F84.4 lessons learned for the future.

[278] We have decided that asset health will not be 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.

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

Reason for addressing this issue

F85 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.

F86 In setting quality standards, we may consider whether:

F86.1 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

F86.2 we might be more confident that the collar is an appropriate minimum level of the relevant dimension of quality.

F87 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.

F88 The setting of 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

F89 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

F90 Submissions on the Issues paper were generally supportive of reporting requirements for Transpower when quality standards (or performance obligations) were breached.[280, 281]

F91 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:[282]

> 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.

Draft decision and submissions

F92 In our Draft decisions and reasons paper we proposed to set the quality standard for grid performance measures based on a pooling criteria of 2 out of 6 POS categories not met for two out of three years.[283] We also proposed to set a quality standard for non-revenue-linked measure GP-M on momentary interruptions.

F93 For the asset performance measures, we proposed to set quality standards based on a deadband zone between the end of the incentive range (ie, the collar) and the quality standard where no further financial incentive would apply.[284]

F94 For the asset health measures we proposed to set quality standards for each of the asset health classes set at a quarter of the range between the "no investment" strategy percentage of assets with an asset health index greater than 8, and the "RCP3 forecast investment" strategy percentage of assets with an asset health index greater than 8.[285]

F95 In its submission on our draft decision, Transpower proposed that the pooling criteria should be amended to be 3 out of 6 POS categories not met for two out of three years, to reduce the likelihood of quality breaches to an appropriate level. Transpower also proposed to remove the quality standard for measure GP-M.

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

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

[282] Above n 125, at 14.

[283] The pooling approach is explained in Attachment F.1.

[284] The deadband approach is explained in Attachment F.2.

[285] This is discussed further in Attachment F.4.

F96 Transpower submitted that the incentive range settings (and hence the deadband level for setting the quality standard) should be changed for measure AP1 to take into account a higher forced outage allowance.

F97 Transpower proposed that none of the asset health classes should have quality standards so as to not expose Transpower to a risk of non-compliance in circumstances outside of its control and that involve no fault on Transpower's part.

Our decision

F98 For setting quality standards that will apply for RCP3, our decision is to:

F98.1 set quality standards for the revenue-linked grid performance measures (GP1 and GP2) based on a criteria of 3 out of 6 POS categories not met for two out of three years;

F98.2 not set a quality standard for non-revenue-linked measure GP-M;

F98.3 retain quality standards for asset performance measures in line with our draft decision based on a deadband approach; and

F98.4 retain quality standards for two measures of asset health for the power transformer and outdoor circuit breaker asset classes. The standards are set, for each year of RCP3, and in each asset class, 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.

F99 Reasoning for our approaches to setting quality standards are set out in the subsequent sections of this attachment.

Attachment F.1: Revenue-linked measures of grid performance

High-level approach

F100 This attachment discusses the grid performance measures in more detail.

F101 We have retained 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:

F101.1 GP1, measuring the number of unplanned interruptions greater than one minute, across all POS in each sub-category, for every year of RCP3; and

F101.2 GP2, measuring the average duration of unplanned interruptions greater than one minute, across all POS in each sub-category, for every year of RCP3.

F102 Table F9 summarises the measures of grid performance for RCP3.

Table F9 Measures of grid performance

Measure and category	Cap	Target	Collar	Quality standard	Incentive rate	$ at risk[286]
GP1: number of interruptions (per annum)					$ per event	
N-1 security high economic consequence	0	7	14	14	335,714	2,350,000
N-1 security material economic consequence	7	24	41	41	40,294	685,000
N-security high economic consequence	4	6	8	8	250,000	500,000
N-security material economic consequence	9	23	37	37	41,786	585,000
N-1 security generator	5	9	13	13	62,500	250,000
N-security generator	6	12	18	18	41,667	250,000
GP2: average duration of interruption (min)					$ per min	
N-1 security high economic consequence	30	92	154	154	37,903	2,350,000
N-1 security material economic consequence	36	61	86	86	27,400	685,000
N-security high economic consequence	0	103	206	206	4,854	500,000
N-security material economic consequence	0	140	280	280	4,179	585,000
N-1 security generator	50	174	298	298	2,016	250,000
N-security generator	11	93	175	175	3,049	250,000

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

F103 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).[287] 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.

[286] Revenue at risk for the GP measures are explained in Attachment F.6.

[287] Most feedback on Transpower's proposal to not adopt the GP3 measure for RCP3 supported this proposal, but one submitter did not (above n 53, at 93).

F104 For Transpower's proposed RCP3 measures of grid performance (GP1 and GP2), it 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.[288] Following its consultation process on proposed changes to the service performance, stakeholders generally supported Transpower's proposed change in POS categorisation.[289]

F105 We set quality standards for measures GP1 and GP2 with associated targets, caps, collars, incentive rates for each POS category for each measure. We have adopted Transpower's proposed GP1 and GP2 incentive settings (targets, caps and collars) for each of the POS categories. We have cross-checked the measures against Transpower's historical performance, and we consider that the measures are appropriate.[290]

What the Verifier said

F106 The Verifier considered that the 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 Transpower's proposed service performance measures satisfied GEIP because:

F106.1 Transpower's proposed measures address areas of service performance that are likely to be of most concern to consumers, especially those that are directly connected; and

F106.2 the introduction of economic consequence linked to 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".[291, 292]

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[288] 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.

[289] Above n 53, at 93.

[290] 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.

[291] Above n 53, at 106.

[292] 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, available at: https://www.transpower.co.nz/sites/default/files/publications/resources/Value%20of%20Lost%20Load%20%28VoLL%29%20Study%20-%20June%202018.pdf.

F107 Transpower proposed 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.[293]

F108 The Verifier's view was that:[294]

> …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.

F109 The Verifier concluded that Transpower's proposed RCP3 grid output targets were largely consistent with RCP2 although the POS had moved category and as a result some customers will have higher or lower supply reliability and restoration performance.

F110 However, at the time of writing, due to the evolving situation with the grid output measures, the Verifier could not fully satisfy itself that Transpower's proposed targets for the grid output measures satisfied GEIP. The Verifier was also not able to verify Transpower's claim that Transpower's proposed RCP3 service performance measure targets were consistent with historical data. However, based on the Transpower proposal, supporting information and Commission analysis of that material, we were satisfied that the proposed targets for the grid output measures were consistent with historical data and reflected GEIP.

Approach raised in the Issues paper

F111 In our Issues paper, we outlined Transpower's proposed measures of grid performance and how Transpower proposed to link these measures to revenue.[295]

F112 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.[296, 297]

F113 We outlined the Verifier's view of Transpower's proposed RCP3 grid output measures and our view of the measures.

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[293] Above n 288, at 28.

[294] Above n 53, at 107.

[295] Above n 55, at Chapter 5.

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

[297] Above n 264, at 10-13.

F114 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 Transpower's proposed targets, caps, collars or other values were appropriate.

Response in submissions

F115 MEUG submitted that Transpower's proposed measures covered the key areas of grid reliability and carried over the key aspects from RCP2.[298] 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).[299]

F116 Meridian supported quality standards without revenue-linked performance measures as the revenue at risk will not provide a strong enough incentive.[300]

F117 Transpower also noted that with respect to its proposed GP measures:[301]

> 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.

Draft decision and submissions

F118 We reasoned in our Draft decisions and reasons paper that increasing the sample size had the effect of reducing variance in the sample(s). Including intertemporal pooling in the non-compliance criteria (2/3 years) would also filter out single-year performance issues in individual measures while highlighting potential deterioration in performance over multiple years.[302]

F119 In proposing pooling in the GP1 and GP2 measures, we considered there was a need to balance out variations in quality that would lead to an unnecessary need for Commission investigation, with the need to capture events that are worthy of investigation.

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[298] Above n 272, at 1.

[299] Above n 280, at 2.

[300] Above n 111, at 5-6.

[301] Above n 125, at 34.

[302] We have used 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).

F120 In setting the quality standard criteria for the GP measures in RCP3, in our Draft decisions and reasons paper we considered how Transpower would have performed historically (ie, under Transpower's proposed RCP3 measures) and proposed a pooling criteria of 2 out of 6 measures not met for 2 out of 3 years.

F121 In its submission on our Draft decisions and reasons paper, Transpower supported the proposed pooling approach as a welcome evolution of the RCP2 approach.[303]

F122 However, Transpower proposed amending the GP1 and GP2 quality standards pooling criteria to 3 out of 6 measures not met for two out of three years, rather than our proposed of 2 out of 6 measures not met for two out of three years.

F123 Transpower considered that the 2 out of 6 pooling rule:[304]

F123.1 would result in false positives in excess of the Commission's stated expectations; and

F123.2 would likely result in unduly frequent contraventions, leading to costly investigations that are not in the long-term interests of customers and consumers.

F124 In its cross-submission on our draft decision, MEUG stated that it could not replicate Transpower's estimates of the probability of 'false positives' and therefore did not support a change from our draft decision pooling rule.[305]

F125 Transpower has supplied the Commission with further supporting analysis to demonstrate that the proposed 2 out 6 pooling approach (in our draft decision) would mean that it had a 77% chance of breaching the GP1 quality standard at some point over RCP3, and a 52% chance of breaching the GP2 quality standard.

F126 Transpower argued that its alternative 3 out of 6 pooling approach was more realistic, as this reduced the quality breach exposure for the GP1 measure to 13% over RCP3 and 4% for the GP2 measure.

F127 In our Draft decisions and reasons paper we proposed changing the revenue weighting between GP1 and GP2 to 33.3% for GP1, and 66.7% for GP2.

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[303] Above n 71, at 8.

[304] Above n 71, at 8.

[305] MEUG "Transpower IPP 2020 – cross-submission" (11 July 2019), at [4].

Our view

F128 As noted above, we have used Transpower's proposed grid performance target, cap, collar and incentive rate settings for RCP3.[306]

F129 We have set quality standard limits at the collar values for each measure with 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 pooling and rolling time periods do not interact across GP1 and GP2).

F130 This means that to breach either of the GP quality standards, a certain number of POS categories across GP1 and GP2 will need to not be met for two out of a three-year rolling period for each individual pool.

F131 Many of the GP1 and GP2 measures have limited observations (three POS have 20 observations or less), so the rolling period and pooling of measures aimed to effectively increase the sample size and reduce the risk of a quality breach from volatility due to a low number of observations.

F132 For the setting of the GP1 and GP2 quality standards, we tested Transpower's supporting analysis and consider that it is a reasonable analysis for estimating the probability of breaching during RCP3. On the basis that the 2 out 6 pooling approach would result in what could be considered a too high likelihood of quality breach investigations over RCP3, without commensurate customer benefit, we have accepted Transpower's proposed 3 out of 6 pooling submission for GP1 and GP2.

F133 Table F10 demonstrates the revised criteria for a contravention under the measures of grid performance.

Table F10 Criteria for measuring contravention of grid performance standards

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

[306] 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.

F134 We have made Transpower's GP revenue-linked incentive measures symmetric because we consider the GP measures for different POS 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.

F135 The purpose of the quality 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.[307]

F136 In each individual year, if the measure is outside the cap or collar limits we would require an associated report outlining the cause.

F137 In our Draft decisions and reasons paper we proposed changing the revenue weighting between GP1 and GP2 to 33.3% for GP1, and 66.7% for GP2. We have since changed this to an equal weighting of 50% across GP1 and GP2. This is because GP2 is an average-duration measure so will not capture the effect of the number of interruptions (ie, GP1). There could also be a potential risk of imbalanced incentives with our draft decision weightings.[308]

F138 In addition to the incentive measures and quality standards, we have introduced reporting requirements for interruption events based on length of time to restore supply. We have introduced comprehensive reporting requirements for interruptions that last 12 hours or more, and over one system minute.[309]

F139 The comprehensive report is required to be reported on within 42 working days of the event, and is to include details on:

F139.1 the cause(s) of the interruption;

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[307] 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. We have used a target incentive rate based on 50% of VoLL to not over-incentivise investment. This is explained in Attachment F.7.

[308] This could incentivise Transpower to increase the number of short interruptions to reduce the average duration in GP2.

[309] 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 (PMD7, and PMD9) for RCP3.

F139.2 interruption date and time;

F139.3 the impact on Transpower's customers – interruption megawatts (**MW**) and duration including any affected GXP location(s) that includes generation connections to the grid;

F139.4 actions that Transpower has taken to restore supply; and

F139.5 lessons learned for the future.

F140 The comprehensive report would be required at the same time as the IPP annual compliance statement.[310]

F141 In addition to reporting on large interruption events, we have also retained reporting requirements on the reasons why Transpower has failed to meet the collar value for any measures in a given disclosure year.[311]

F142 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.[312] 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

F143 We considered the merits of:

F143.1 having a quality standard with no revenue-linked incentive scheme;

F143.2 setting our own measures rather than using Transpower's proposed measures;

F143.3 setting a deadband zone for quality standards; and

F143.4 options for the pooled measures for setting the quality standards.

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[310] Clause 20 of the Transpower IPP Determination.

[311] Clause 20.1.2(b) of the Transpower IPP Determination.

[312] 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

F144 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).

F145 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.

F146 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).

F147 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.

F148 With the appropriate, or even conservative, revenue-linked incentive settings profit maximising suppliers will be:

F148.1 encouraged to find inexpensive solutions to improve reliability – $MB_T > MC_T$ and $MB_C > MC_C$;

F148.2 neither encouraged or discouraged to find cost-neutral solutions to improve reliability – $MB_T = MC_T$ and $MB_C >= MC_C$; and

F148.3 discouraged to find expensive solutions to improve reliability – $MB_T < MC_T$ and $MB_C < MC_C$.

F149 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 $MB_C < MC_C$.

F150 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.

F151 Transpower 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.

F152 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.

F153 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).

F154 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.

F155 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 Transpower’s proposed measures for RCP3.

Alternatives considered – Setting our own measures

F156 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.

F157 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

F158 For compliance with the quality standard under the Act, we considered varying approaches of pooled compliance across multiple years or for annual compliance.

F159 For example, potential options we have considered include:

F159.1 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.

F159.2 Non-compliance based on multiple year performance – two consecutive years in any measure, or three consecutive years in any measure.

F159.3 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.

F159.4 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.

F160 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 decision

F161 For the measures of grid performance applying to RCP3, our decision is to:

F161.1 use Transpower's proposed targets, caps and collars for GP1 and GP2;

F161.2 for quality standards, set compliance criteria using a pooling approach – a GP1 pool and a GP2 pool. A contravention would require 3/6 measures not being met in a given pool for a period of two out of three years; and

F161.3 set reporting requirements whenever a POS is outside of the collar value (even if there is no contravention in that year).

Attachment F.2: Revenue-linked asset performance measures

High-level approach

F162 We have retained 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:[313]

F162.1 AP1, measuring planned or unplanned availability of the HVDC system; and

F162.2 AP2, measuring planned or unplanned availability of selected HVAC assets.

F163 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.[314]

F164 Following consultation, Transpower proposed the AP2 measure to cover 71 selected assets including 110kV and 220kV circuits, interconnecting transformers, and bus sections that could have most impact on the market when out of service.[315]

F165 We have set quality standards for measures AP1 and AP2 with associated targets, caps, collars, and incentive rates for each measure.

F166 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.

F167 We have adjusted the forced outage allowance from 0.5% to 0.25%. This gives a target of 98.75%.

F168 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%. We have set our incentive settings based on historical data rather than Transpower's proposed values.

F169 Table F11 summarises the asset performance measures for RCP3.

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

[314] 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 53, at 93.

[315] Above n 288, at 14.

Table F11 Asset performance measures

Measure and category	Cap	Target	Collar	Quality standard	Incentive rate	$ at risk[316]
AP1: HVDC availability (%)					$ per 1%	
HVDC availability	99.75%	98.75%	97.75%	96.75%	500,000	500,000
AP2 HVAC availability (%)					$ per 1%	
HVAC availability (71 selected assets)	99.2%	99.0%	98.8%	98.6%	5,000,000	1,000,000

What the Verifier said

F170 The Verifier considered that Transpower's 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 Transpower's proposed service performance measures satisfied GEIP.

F171 Transpower proposed 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.[317]

F172 The Verifier concluded that Transpower's 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 Transpower's proposed targets for the grid output measures satisfied GEIP.

Approach raised in the Issues paper

F173 In our Issues paper, we outlined Transpower's proposed asset performance measures and how Transpower has proposed to link these measures to revenue.[318]

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[316] Revenue at risk for the AP measures are explained in Attachment F.6.

[317] Above n 288, at 28.

[318] Above n 55, at Chapter 5.

F174 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.[319, 320]

F175 We outlined the Verifier's view of Transpower's proposed RCP3 grid output measures and our view of the measures.

F176 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 Transpower's proposed targets, caps, collars or other values were appropriate.

Response in submissions

F177 MEUG submitted that Transpower's proposed measures cover the key areas of grid reliability and carry over the key aspects from RCP2.[321] 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).[322]

F178 Meridian supported quality standards without revenue-linked performance measures, as the revenue at risk would not provide a strong enough incentive.[323]

F179 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:[324]

> 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.

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[319] Above n 296, at 34-36.

[320] Above n 264, at 10-13.

[321] Above n 272, at 1.

[322] Above n 280, at 2.

[323] Above n 111, at 5-6.

[324] Above n 125, at 14.

Draft decision and submissions

F180 For the AP1 measure, in our Draft decisions and reasons paper we proposed consistent incentive rate settings (target, cap, and collar) throughout the period, allowing Transpower to net out the actual impact of the Pole 2 replacement programme. Therefore, the target would apply to all years of RCP3 (with the impacts of Pole 2 replacement in a given year netted out for three years of the period).

F181 Transpower noted in its submission that it will consult its customers in advance of finalising the planned outages over the three years in RCP3.[325]

F182 In our Draft decisions and reasons paper we proposed to reduce Transpower's forced outage allowance for measure AP1 from 0.5% to 0.25% based on analysis of historical data.

F183 In its submission on our Draft decisions and reasons paper, Transpower submitted that the forced outage allowance should not be reduced from 0.5% to 0.25%. Transpower noted that from an international perspective of HVDC links revealed an average forced outage rate much higher than Transpower's proposed 0.5%.[326]

F184 In its cross-submission on our draft decision, MEUG supported our draft decision to set the forced outage allowance to 0.25%.[327]

F185 We received no submissions on our proposed AP2 measure settings.

Our view

AP1

F186 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 (ie, an additional 0.7% of unavailability from scheduled outages).

F187 We have retained our draft decision and have allowed a maximum adjustment in a given year of 0.7% unavailability to allow for the impact of the Pole 2 project.[328] These adjustments can be made in three of the five years, consistent with Transpower's proposal.[329]

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[325] Above n 71, at 27.

[326] Above n 71, at 27.

[327] Above n 305, at [10].

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

[329] Above n 288, at 13-14.

F188 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).

F189 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.

F190 Our 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.

F191 In Transpower's proposal, the target availability provided an allowance of 1% for scheduled outages and 0.5% for forced outages. 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: [330]

> 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.

F192 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.

F193 These reliability benefits can be used to justify either insurance or some form of design mitigation measure. We also note that these types of events will likely be excluded from revenue-linked measures through the normalisation mechanism we have introduced (see Attachment F.5).

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[330] Above n 288, at 35.

F194 In its submission on our Draft decisions and reasons paper, Transpower responded that the forced outage allowance should not be reduced from 0.5% to 0.25%. Transpower noted that from an international perspective of HVDC links revealed an average forced outage rate much higher than Transpower's proposed 0.5%.[331]

F195 We note that Transpower has achieved a much lower forced outage rate compared with international comparators. However, based on historical data, we do not think that the 0.5% is justified as the average forced unavailability for the HVDC system from 2011 to 2018 is 0.19%. This is far lower than Transpower's proposed rate of 0.5%.

F196 In its cross-submission on our draft decision, MEUG supported our draft decision to set the forced outage allowance to 0.25%. MEUG agreed with our argument that the allowance for HILP events should not be included in the setting of forced outages and are better addressed through cable reliability design standards. [332]

F197 Our decision is to set the forced outage allowance to 0.25%.[333] 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%).

F198 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 pooling for the AP measures will not apply for compliance purposes.

F199 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.

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[331] Above n 71, at 27.

[332] Above n 305, at [10].

[333] Transpower supplied us with updated actual HVDC forced outage data for the 2017/2018 financial year on 7 August 2019. This updated information confirmed that the 0.25% forced outage setting is not inappropriate.

F200 Hence, we have set the quality standard for the AP1 measure to be a further 1% below the collar value, ie, at 96.75%.[334]

F201 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).

AP2

F202 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 F3, based on Transpower's proposed measures it would be above the target for most of the historical data and never below the collar value.

Figure F3 AP2 historical performance based on Transpower's 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

F203 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.

F204 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.

F205 We have set 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.[335] This gives a cap of 99.2% and a collar of 98.8%.

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[334] Based on historical data following the Pole 3 commissioning (2014/15 onwards), Transpower would not have contravened the RCP3 quality standard.

[335] 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.

F206 We will use a 'deadband' zone to set the quality standard for the AP2 measure. To estimate this value, we have added a further standard deviation to the collar value to provide additional contingency. This results in a quality standard of 98.6%.

F207 Figure F4 demonstrates Transpower's HVAC availability performance based on the values for RCP3. Historically, Transpower would not have breached the quality standard but would have been in the deadband zone between the collar and standard.

Figure F4 AP2 historical performance based on Commission proposed measures

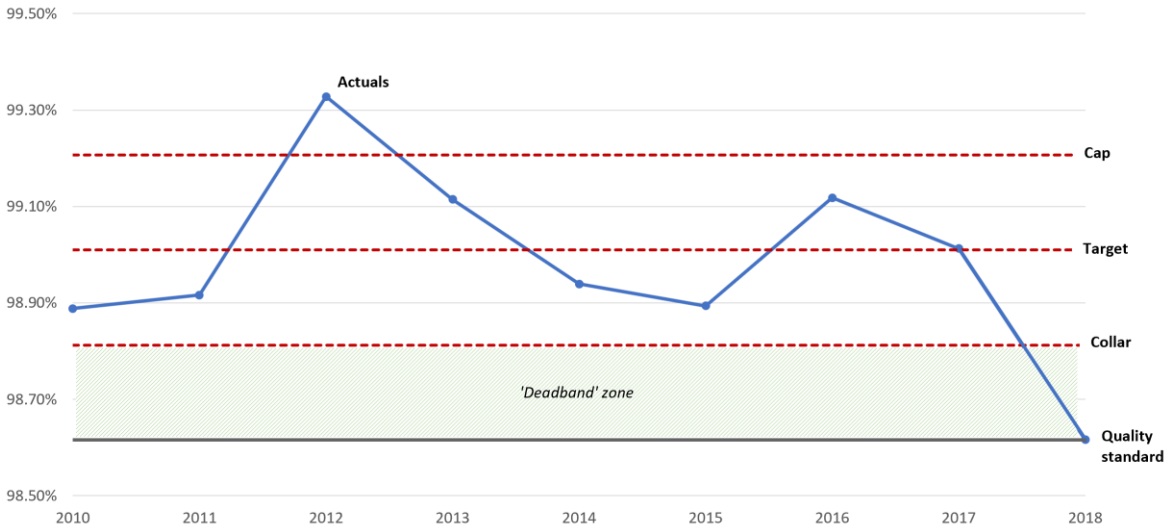
AP2	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Commission proposed	99.1%	99.0%	99.2%	99.3%	98.9%	98.9%	99.3%	99.1%	98.9%	98.9%	99.1%	99.0%	98.6%

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

F208 We have applied 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.

F209 Figure F5 illustrates how the AP2 incentive measures (cap, collar and target) and quality standard compare against Transpower's historical performance.

Figure F5 AP2 – % Availability of HVAC



F210 For both measures AP1 and AP2, we will retain annual compliance reporting requirements, which means that Transpower will have to report on why it has failed to meet the collar value for any measures in a given disclosure year (ie, annual availability is in the deadband zone).

Alternatives considered

F211 We considered the merits of:

F211.1 having a quality standard with no revenue-linked incentive scheme;

F211.2 setting asymmetric incentive rates; and

F211.3 pooling the AP measures for compliance purposes.

Alternatives considered - Quality standard with no incentive scheme

F212 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).

F213 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.

F214 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).

F215 With the appropriate, or even conservative, revenue-linked incentive settings profit maximising suppliers will be:

F215.1 encouraged to find inexpensive solutions to improve reliability – $MB_T > MC_T$ and $MB_C > MC_C$;

F215.2 neither encouraged or discouraged to find cost-neutral solutions to improve reliability – $MB_T = MC_T$ and $MB_C >= MC_C$; and

F215.3 discouraged to find expensive solutions to improve reliability – $MB_T < MC_T$ and $MB_C < MC_C$.

F216 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 $MB_C < MC_C$.

F217 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.

F218 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.

F219 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

F220 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.[336]

F221 Asymmetric incentives result in a higher downside revenue at risk and lower upside revenue at risk.

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

F222 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 the they are willing to pay (**WTP**) for higher reliability. For example, London Economics, in advising Ofgem, considered that:[337]

> … 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.

F223 The two main reasons put forward for by London Economics are loss aversion and the endowment effect.[338] Also, consumers will have made lifestyle and business decisions consistent with the status quo of service quality they receive.

F224 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).[339]

F225 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.

F226 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 negative revenue adjustment to Transpower on average.

Alternatives considered – Pooling for compliance purposes

F227 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.

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

[338] 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.

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

Our decision

F228 For the asset performance measures applying to RCP3, our decision is to:

F228.1 adjust Transpower's proposed target, cap and collar for the AP1 measure;

F228.2 set the AP2 measure based on historical data rather than Transpower's proposed values;

F228.3 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

F228.4 set reporting requirements whenever an availability measure is outside the collar value (even if there is no contravention in that year).

Attachment F.3: Non-revenue-linked measures

High-level approach

F229 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. We have also decided to retain two PMD measures from RCP2 that were not proposed to be retained by Transpower for RCP3.

F230 The measures aim to:

F230.1 improve certainty around the return of assets back into service after a planned daily outage;

F230.2 provide timely communication to the market of delays to outage return times for a planned outage;

F230.3 provide information to interested parties about the quantity and cause of momentary interruptions; and

F230.4 provide timely communication following an event.

F231 The performance measures not linked to revenue for RCP3 are:[340]

F231.1 measure of grid performance GP-M, which measures reliability through the number of momentary interruptions (interruptions under one minute);[341]

[340] Above n 288, at 15.

F231.2 asset performance measure 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;[342]

F231.3 asset performance measure 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);

F231.4 asset performance measure AP5, which measures the extent that Transpower has placed customers on N-security of supply;[343] and

F231.5 customer service measure CS1, which relates to the timeliness of post-interruption event communication and information provided to affected customers through a survey process.[344]

What the Verifier said

F232 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 shortened this to two hours in its proposal.

F233 The Verifier did not state an opinion on the other non-revenue-linked measures as these had not yet been developed for the Verifier to assess.

Approach raised in the Issues paper

F234 In our Issues paper, we asked for stakeholders' views on whether Transpower's 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.

F235 We sought stakeholders' views on whether measure CS1 should have an associated quality standard, as it appears to be sufficiently mature.

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[341] This was RCP2 performance measure development initiative PMD6 and was not proposed to be included in Transpower's RCP3 proposal.

[342] 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.

[343] This was RCP2 performance measure development initiative PMD5 and was not proposed to be included in Transpower's RCP3 proposal.

[344] This measure incorporates RCP2 PMD initiatives 1, 2 and 3.

Response in submissions

F236 NZIER (for MEUG) and Mercury agreed that the AP3 and AP4 measures should not be linked to revenue.[345]

F237 NZIER (for MEUG) supported measure CS1 having an associated quality standard.[346]

F238 Transpower submitted that it is open to discussing trial quality targets for measure CS1, stating:[347]

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

Draft decision and submissions

F239 In our Draft decisions and reasons paper, we proposed to introduce measure GP-M to report on momentary interruptions. We proposed to set a quality standard for the measure as a 'safety net' standard to capture extreme outcomes from momentary interruptions.[348]

F240 In its submission on our draft decision, Transpower disagreed with our proposal to set a quality standard for momentary interruptions. Transpower stated:[349]

> Increased momentary interruptions do not necessarily indicate a poor or deteriorating level of service. Increased momentary interruptions can in fact be a sign of improving performance. As we replace our existing protection assets at 20 to 25 years, the replacements inevitably provide greater functionality (often now including auto-reclose) than the old assets. When our customers are on N- security (by design or outage) an auto-reclose momentarily interrupts supply to clear a fault. Auto- recloses help to prevent longer interruptions.

F241 In its cross-submission on our draft decision, MEUG did not support Transpower's proposal to report only on trends as interested parties should have access to the granular raw data to make their own assessment of trends.[350]

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[345] Above n 272, at 7, and above n 280, at 4.

[346] Above n 272, at 7.

[347] Above n 125, at 14.

[348] Above n 57, at [F220]-[F222].

[349] Above n 71, at 9.

[350] Above n 305, at [10].

F242 In our Draft decisions and reasons paper we proposed retaining RCP2 availability measure PMD5, which measures the extent to which Transpower places customers on N-security, as a reporting requirement for RCP3 (named AP5 for RCP3). We considered that time on reduced levels of security can have a significant impact on customers if they are not given adequate warning to prepare for this.

F243 In its submission on our draft decision, Transpower stated that in most instances it places assets on N-security to undertake work to maintain or upgrade grid assets and that this is not a leading indicator of network deterioration.[351]

F244 Transpower also noted that unplanned interruptions coinciding with customers being on N-security is already reported on through the GP1 and GP2 measures.[352] We agree that interruptions of N-security POS will be picked up in the aggregate GP measures. But this will not include information on when customers have been placed on a reduced level of security.

F245 In its cross-submission on our draft decision, MEUG stated:[353]

> MEUG is surprised this statistic is not reported to the Transpower Board. Having customers that have contracted for N-1 or higher security being provided service at N security would worry a business in a workably competitive market environment. The long-term solution for Transpower may be to revise the Transmission Benchmark Agreement to accommodate lower charges when service is less than N-1. We think there is merit in gathering this information and perhaps Transpower could consider automating collection of actual N security events to lower collection and reporting costs?

F246 We did not receive submissions on the other non-revenue-linked measures that were part of Transpower's original RCP3 proposal (AP3, AP4 and CS1).

Our view

F247 We consider that, based on submissions and Transpower's engagement process, customers and stakeholders would value having these measures and we have retained them as non-revenue-linked measures for RCP3.

F248 We have not set quality standards for the GP-M, AP3, AP4, AP5 and CS1 measures. We consider that the measures are not mature enough, and in some cases not appropriate, to have an associated quality standard. We will consider potential links to revenue in subsequent periods with data from RCP3.

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[351] Above n 71, at 27.

[352] Above n 71, at 27.

[353] Above n 305, at [12].

GP-M

F249 RCP2 measure PMD6 will remain as a non-revenue-linked reporting requirement for RCP3, named GP-M (grid performance – momentary interruptions). Transpower will already be collecting this data and stakeholders (for example, Contact Energy and MEUG) have suggested that reporting the information would be beneficial to customers and consumers.

F250 We agree with Transpower's submission that the number of momentary interruptions does not necessarily indicate deteriorating quality and can help prevent longer duration interruptions. Therefore, our decision is to remove the quality standard for the GP-M measure.

F251 However, we still consider that transparency over the number and cause of momentary interruptions should be available for interested parties to evaluate. In its submission on our draft decision, Transpower considered that reporting should be on trends, insights and notable events which will be more useful than granular reporting.[354]

F252 We agree with MEUG's cross-submission that interested parties should have access to granular data to assess trends in momentary interruptions themselves. Our decision is to maintain our proposal to report on momentary interruptions, at the same time as the annual compliance statement, specifically on:

F252.1 the cause of each momentary interruption;

F252.2 the date and time of each momentary interruption;

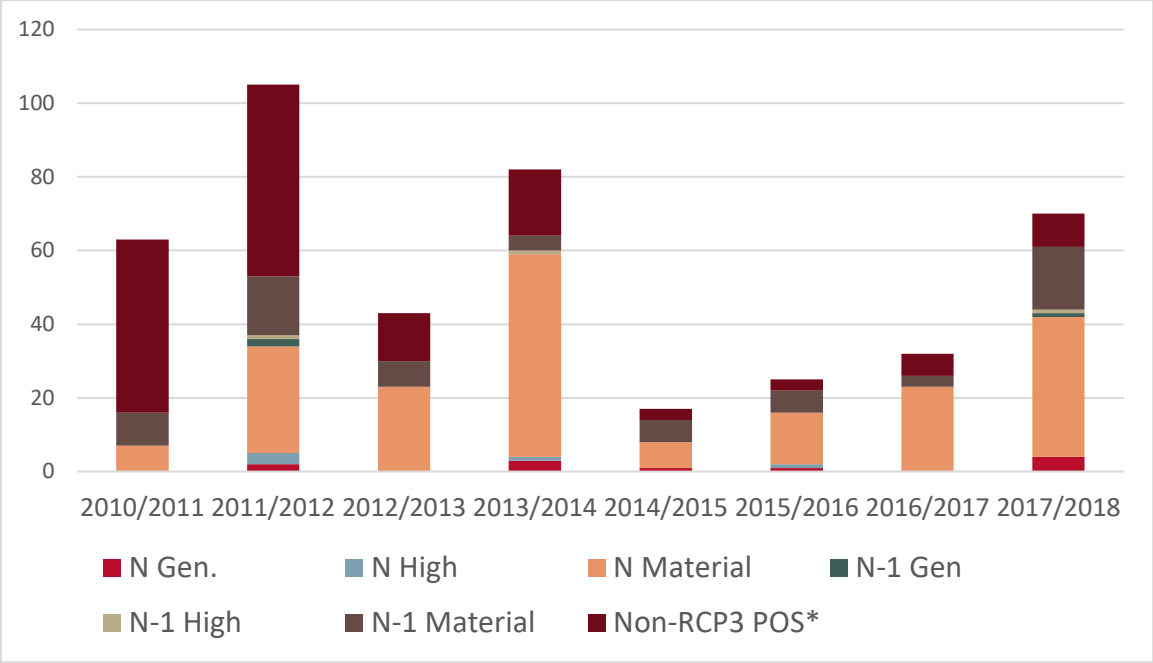
F252.3 GXPs and grid injection points (**GIPs**) affected by each momentary interruption; and

F252.4 an explanation of any general trends in momentary interruptions.

F253 Figure F6 displays the number of momentary interruptions by POS from 2010/11 to 2017/18.

[354] Above n 71, at 9.

Figure F6 Momentary interruption count by POS



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

AP3

F254 Asset performance measure AP3 was proposed by Transpower as a new a new non-revenue-linked measure for RCP3. AP3 measures the extent to which Transpower meets estimated return to service times for planned outages of the HVAC assets set out in Schedule G of the determination.[355]

F255 AP3 requires disclosure of HVAC assets that are returned to service two or more hours after Transpower's estimated return to service time, including:

F255.1 when this has occurred;

F255.2 the impact on affected parties, including the market, if applicable; and

F255.3 the steps Transpower took to inform affected parties and the market.

[355] Schedule G of the revised draft IPP determination.

AP4

F256 Asset performance measure AP4 was proposed by Transpower as a new a new non-revenue-linked measure for RCP3. AP4 measures the extent to which Transpower communicates delays to affected parties of planned outage return to service times of the HVAC circuits assets set out in Schedule G.[356]

F257 AP4 measures the percentage of time that Transpower gives 1.5 hours or more notice to the market in the event assets are going to be returned to service later than the original planned return to service time.

AP5

F258 We have retained 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 reduced levels of security can have a significant impact on customers if they are not given adequate warning to prepare for this.

F259 We note that from Transpower's RCP3 engagement process there was mixed feedback calling to continue measure PMD5 for RCP3.[357] Transpower noted 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.[358] We consider reporting on this measure will provide customers, consumers and us with meaningful information.

F260 Transpower also noted in its RCP3 engagement process:[359]

> 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.

F261 We note Transpower's submission on our draft decision but agree with MEUG's cross-submission that automating this process could reduce processing time, and that the key information we have specified in the determination could be published on Transpower's website. Interested customers could then undertake analysis themselves and reduce the resource burden on Transpower.

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[356] Schedule G of the revised draft IPP determination.

[357] 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 271, at 7.

[358] Above n 270, at 8-9.

[359] Above n 268, at 25.

F262 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.

F263 We have introduced reporting measure AP5 which requires disclosure on the extent that Transpower has placed customers on N-security, including:

F263.1 when it has occurred;

F263.2 how much notice Transpower provided customers; and

F263.3 the POS affected by the reduction to N-security.

F264 We are also interested in what processes Transpower follows to give notice to affected customers about reduced levels of supply security. Based on the information we gather about AP5 during RCP3 we will consider whether we need to introduce a further measure regarding adequate notice given to customers placed on N-security.

CS1

F265 For the CS1 measure, 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 will adopt 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.

F266 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.

F267 In its submission on our draft decision, Transpower proposed that CS1 reporting should be annual and anonymised noting that public disclosure could limit the extent to which customers are willing to offer full transparency in responses.[360] We agree that anonymised reporting could lead to more useful responses.

Our decision

F268 For the non-revenue-linked measures, our decision is to: keep measures CS1, AP3, AP4, AP5 and GP-M as reporting only for RCP3 (and have no quality standard for these measures).

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[360] Above n 71, at 24.

Attachment F.4: Asset health measures

High-level approach

F269 Transpower 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.

F270 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	• Transmission towers (painting) • Tower foundations (grillages) • Outdoor circuit breakers • Power transformers • Outdoor-to-indoor substation conversions	• 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).

F271 Transpower argued that asset class selection in Transpower's proposed asset health scheme was influenced by a number of factors, including:

F271.1 they covered a wide range of asset types;

F271.2 included asset types with volumetric and non-volumetric replacement strategies; and

F271.3 contained asset types not subject to large variations due to project changes (like overhead conductors).[361]

[361] Above n 288, at 20.

F272 Transpower 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.[362]

F273 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.[363]

Table F13 Transpower proposed asset health measures summary[364]

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

F274 The Verifier carried out a review of the Transpower proposed grid output measures and targets but noted that:[365]

> 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.

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[362] "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 288, at 19).

[363] Above n 288, at 29.

[364] Above n 288, at Table 11.

[365] Above n 53, at 94.

F275 Our analysis has confirmed that Transpower's proposed AH measures changed after 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.[366]

F276 As general observations of the asset health measure framework proposed by Transpower, the Verifier noted that:

F276.1 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;

F276.2 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

F276.3 Transpower indicated in the Asset Health Pilot Report that changes in its work programme that provide benefits to customers should not result in a negative revenue adjustment.

F277 However, the Verifier concluded that:

F277.1 if the AHI modelling was a perfect representation of actual asset deterioration, the index would be equivalent to the old volume-based measures;

F277.2 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;

[366] 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 288).

F277.3 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; and

F277.4 the use of a 'deadband' is supported for each measure to allow for small variations between targets and actual outcomes.

Verifier view of asset health modelling and condition data of asset classes in Transpower's proposed asset health measures

F278 In its report the Verifier made observations about the asset health modelling and condition data processes for:[367]

F278.1 transmission line structures;

F278.2 transmission line insulators;

F278.3 power transformers; and

F278.4 outdoor circuit breakers.

F279 For the transmission line structures asset class, the Verifier observed that:

F279.1 transmission line structure asset health models are good but field condition data is continually being used to tune the models;[368]

F279.2 the asset health models have the capability to predict future health with or without intervention;[369]

F279.3 field observations are used to modify the asset health models and intervention periods may be extended based on these observations;[370] and

F279.4 Transpower seems to have met its RCP2 volumetric targets for transmission structure refurbishment/replacement over RCP2 in this asset class.[371]

F280 For the transmission line insulators asset class, the Verifier observed that:

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[367] Grillage foundations were not reviewed by the Verifier.

[368] Above n 53, at 162.

[369] Above n 53, at 163.

[370] Above n 53, at 163.

[371] Above n 53, at Table 18.

F280.1 asset health models for insulators are well developed and degradation is based on corrosion zones;[372]

F280.2 Transpower is continually learning about degradation of different insulator types through field observation which will modify replacement estimates;[373]

F280.3 the asset health models presently provide a reasonable prediction of degradation and asset condition;[374] and

F280.4 at the time of verification, over RCP2 Transpower had replaced 850 insulators compared with its forecast number of 1,420 due to insulators being in better condition than expected after field condition assessment. This prompted a revision of the insulator asset health models and a reduction in predicted replacement volumes.[375, 376]

F281 For the power transformers asset classes, the Verifier observed that:

F281.1 Transpower's power transformer asset health models are based on the Condition Based Risk Management (**CBRM**) approach;[377] and

F281.2 the asset health modelling maturity and data confidence is high in this asset class.[378]

F282 For the outdoor circuit breakers asset classes, the Verifier observed that:

F282.1 Transpower's outdoor circuit breaker asset health models are based on the CBRM approach;[379] and

F282.2 there are defined asset health models with mature model functionality.[380]

F283 The Verifier did not review the grillage foundations asset class although a Deloitte 2018 analysis of asset health modelling maturity, reproduced by the Verifier, suggested that asset health models for tower foundations and foundation interfaces (of which grillages are a part) fell short of target maturity.

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[372] Above n 53, at 163.

[373] Above n 53, at 164.

[374] Above n 53, at 163.

[375] Above n 53, at 163.

[376] Above n 53, at Table 18.

[377] Above n 53, at 214-215.

[378] Above n 53, at Table 29.

[379] Above n 53, at 225.

[380] Above n 53, at 225.

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

F284 We consider that having a good understanding of asset health is a cornerstone of effective asset management because:

F284.1 it informs asset replacement or refurbishment expenditure decisions; and

F284.2 asset expenditure forecasts can be made with more certainty, particularly within the context of the regulatory approvals process.

F285 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.

F286 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.

F287 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:

F287.1 to customers that Transpower is over-forecasting expenditure; and

F287.2 to Transpower that it is under-forecasting expenditure.

F288 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:

F288.1 Transpower's proposed asset health measures cover the main dimensions that would be expected from Transpower in measuring its performance and if anything is missing;

F288.2 Transpower's proposed asset health measures add value for customers;

F288.3 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;

F288.4 asset health measures should be revenue-linked and whether the applicable quality standard should be the collar value or something else;

F288.5 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;

F288.6 they had comments in general about the targets, caps and collars for the asset health measures proposed by Transpower; and

F288.7 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

F289 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.

F290 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:[381, 382]

> 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.

F291 There was not much submitter support for revenue linking the asset health measures, except 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.[383]

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[381] Above n 300, at 6.

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

[383] Above n 281, at 4.

F292 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.[384]

F293 On the same question, Transpower advocated for revenue linking the asset health measures, mainly because it considered an incentive regime:[385]

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

F294 Transpower considered that its proposed asset health measures will assist it to:[386]

F294.1 understand the condition of assets and the probability of failure;

F294.2 address potential problems caused by assets near end-of-life;

F294.3 provide stakeholders and the regulator with a view of the state of assets; and

F294.4 highlight potential work required to improve the condition of the grid.

F295 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.[387, 388]

Supporting information from Transpower – Request for Information #019 (asset field data)

F296 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 Transpower's proposed asset health measures. Transpower responded in its Issues paper submission that:[389]

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[384] Above n 272, at 6.

[385] Above n 125, at 15.

[386] Above n 125, at 16.

[387] Above n 125, at 16.

[388] Above n 280, at 5.

[389] Above n 125, at Appendix B.

F296.1 it still has some way to go to get the right data at the right time, right first time, into its systems easily;

F296.2 the challenge is significant, but necessary, to bring its data, standards and processes to an internationally leading level;

F296.3 of the 32 asset classes, it has addressed 20, with the balance to be completed before the end of RCP2;

F296.4 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";

F296.5 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

F296.6 there are various assurance levels and steps by the various parties throughout the process to ensure CA data quality.

F297 We consider Transpower has identified shortcomings in its asset condition data assessment processes and appears to be actively seeking improvements to these.

F298 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.

F299 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 – Request for Information #038 (future asset health classes)

F300 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:

F300.1 maturity of asset information and data management;

F300.2 maturity of condition assessment techniques;

F300.3 level of sophistication of analysis required for the decision-making process; and

F300.4 materiality of the investment programme when compared to the cost of establishing and maintaining a model.

F301 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".[390]

F302 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.

F303 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

F304 As part of our review of Transpower's 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 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.

F305 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's reasons for this include:[391]

F305.1 it has moved to a more risk-based approach, with the consequences of failure having an impact on mitigation decisions;

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[390] Transpower response to RFI038: Asset health model – development of further asset classes.

[391] Transpower's response to RFI039: Asset health measures.

F305.2 system change and unconfirmed customer commitments may delay investment;

F305.3 data errors can misrepresent asset health, and asset health models are data-driven;

F305.4 alternative mitigation measures to replacement may be employed, such as more monitoring to enable contingency planning; and

F305.5 project bundling and integration of works may result in some asset work being done earlier or later.

F306 These are reasonable explanations given we have been influencing Transpower to implement risk-based investment decision making since the RCP1 decision.

Our draft decision of Transpower's proposed asset health measures

F307 We decided not to link the proposed asset health measures to revenue for a variety of reasons:

F307.1 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 such an 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.

F307.2 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.

F308 We therefore proposed to implement a range of measures that will incentivise Transpower to continue to improve data quality and maintain asset health, namely:

F308.1 a requirement under s 53ZD(1)(d) of the Act for Transpower to develop a roadmap for developing its asset health, asset life-extension and asset/network risk modelling for RCP3;

F308.2 a requirement under s 53ZD(1)(e) of the Act that Transpower provide information annually on its progress towards implementing the roadmap;

F308.3 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;

F308.4 an annual reporting requirement for each asset class in the proposed asset health measures, if the percentage of assets at an asset health index score greater than 8 is outside the collar value of the trial non-revenue-linked incentive scheme; and

F308.5 a requirement under s 53ZD(1)(f) of the Act for a mid-RCP3 independent expert opinion on Transpower's progress, with details of the review process to be specified in a s 53ZD notice.

F309 In our Draft decisions and reasons paper, we proposed setting asset health quality standards for each asset class in the proposed asset health measures because:

F309.1 these will act as a safety net in order that asset health will not degrade significantly over RCP3 for the asset classes in the asset health measures; and

F309.2 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.

F310 We proposed those quality standard set at a quarter of the range between the "no investment" strategy percentage of assets with an asset health index greater than 8, and the "RCP3 forecast investment" strategy percentage of assets with an asset health index greater than 8.[392]

Draft decision submissions on proposed asset health measure quality standards

F311 Transpower responded to our draft decision by disagreeing that these should be asset health quality standards and proposed these should be reporting only because:[393]

F311.1 the proposed asset health quality standards "would not be for the long-term benefit of consumers"; and

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[392] An asset health index of 1 denotes best condition and an asset health index of 10 denotes worst condition.

[393] Above n 71, at 5-6.

F311.2 would "expose Transpower to a risk of non-compliance in circumstances outside of our control and that involve no fault on Transpower's part (false positives)".

F312 Transpower qualified its reasoning by stating that:[394]

F312.1 there is a risk Transpower will fail to comply with the asset health quality standards because of improved data or asset management strategies;

F312.2 Transpower's asset management practices are still maturing and it should be incentivised to innovate strategies that might reduce costs without changing asset risk profiles;

F312.3 there are innovation projects underway that could result in changes to some asset class strategies during RCP3; and

F312.4 there is a risk of enforcement action where non-compliance does not necessarily reflect increased risk to service reliability.

F313 Transpower provided additional explanation of its reasoning by discussing the tower painting program (which is one of the asset classes from its proposed asset health measures) stating:

> However, if it became apparent that undertaking periodic refurbishment or replacement of towers was more economic than tower painting then we should have the flexibility to change our approach.

F314 Transpower also stated that it is implementing an innovation project that will provide automatic recommendations for the most economic options to manage tower member corrosion based on the specific corrosion, environmental, and economic profile for each individual tower. Transpower stated that this will also have a material impact on its forecast AHI scores in this asset class.

F315 Transpower did not discuss the other asset classes where asset health quality standards were proposed.

Our decision

F316 Based on the further information submitted by Transpower and considering the views of the Verifier, we have amended our draft decision that set quality standards for all Transpower's proposed grid output measures.

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[394] Above n 71, at 6-8.

F317 Instead we have decided to remove the transmission line tower painting, grillage foundation and insulator asset classes from Transpower's proposed asset health quality standards and set these as reporting only because:

F317.1 while the transmission line tower structure and insulator asset class asset health models seem well developed, field condition data has the potential to significantly affect asset health model condition estimates. The result is that actual interventions may differ from forecast interventions which may result in quality standard breaches for no discernible increase in asset outage risk; and

F317.2 grillage foundation asset condition after field observations may also significantly affect asset health model estimates. While this aspect of the transmission line structure asset class was not reviewed by the Verifier, the Deloitte assessment suggests that current asset health model maturity for tower foundations and foundation interfaces (of which grillages are a part) fell short of target maturity. Basing a quality standard on asset health models that are not sufficiently mature may result in quality standard breaches for no discernible increase in asset outage risk.

F318 We have decided to retain asset health quality standards for the power transformer and outdoor circuit breaker asset classes because:

F318.1 the power transformer asset health models are based on the CBRM approach and that the asset health model maturity and data confidence is high in this asset class; and

F318.2 the outdoor circuit asset health models are based on the CBRM approach with defined asset health models and mature model functionality.

F319 The asset health quality standards are set out in set out in Table F14. The standards are set, for each year of RCP3, and in each asset class, 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.

Table F14 Asset health quality standards summary

Asset class	AHI	2020/2021 (%)	2021/2022 (%)	2022/2023 (%)	2023/2024 (%)	2024/2025 (%)
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

F320 While we have decided to not link Transpower's proposed asset health measures to revenue, and have set two asset health quality standards instead, we will require Transpower, at the same time as the annual IPP reporting process, to report on its proposed asset health measures as if these were revenue-linked.

F321 We would like to see the expansion of asset health measures in future to include more asset classes. However, while the asset classes in Transpower's proposed asset health measures covered 38% of total assets and included a range of asset types, asset health model accuracy in many asset classes is affected by field condition data.

F322 Proposing asset health measures for asset classes that can be affected in this way seems problematic particularly for transmission structure and foundation assets that seem to be significantly affected by different corrosion zones making predictions difficult.

F323 Finally, the Verifier in its review identified a number of asset classes where asset health modelling could be improved. For some of those asset classes there is a predicted expenditure uplift in RCP4 that appears to be sustained into RCP5. We would like Transpower to focus on these asset classes so that we can be more confident of RCP4 expenditure forecasting.

F324 Over RCP3 we will be focussing on these asset classes by setting s 53ZD information provision requirements and a mid-period expert opinion on Transpower's progress in this and other areas.

F325 Aspects of the reports may be confidential for commercial reasons and not be published. However, we will work with Transpower to ensure that relevant parts of the reports can be disclosed to interested parties. Our objective will be to ensure that sufficient information is readily available to interested persons to assess whether the Part 4 purpose is being met.

F326 We intend to seek this information under s 53ZD instead of s 53N or s 53C because this information is not strictly for monitoring compliance with the RCP3 price-quality path and may not meet the purpose of information disclosure. Rather, it is intended to assist us in our evaluation for RCP4.

F327 The asset classes we want Transpower to focus are:

F327.1 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);

F327.2 HVDC and Reactive Assets – Reactive Assets – we will be expecting Transpower to develop suitable asset health models for these assets (refer Attachment G.5);

F327.3 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

F327.4 Secondary Assets – SA Substation Management Systems - we expect Transpower to implement asset life-extension modelling by developing asset-centric health and criticality models.

Attachment F.5: Normalisation of service performance measures

High-level approach

F328 In our Draft decisions and reasons paper we proposed a normalisation approach for the measures of grid performance (GP1 and GP2) and asset performance measures (AP1 and AP2) for events that are beyond the reasonable control of Transpower.[395, 396]

F329 Where the Commission is satisfied the event meets certain criteria, the outage impact of this event will be excluded from the quality measures we set.

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[395] An example of an event qualifying for normalisation would be the Christchurch earthquake.

[396] In our Draft decisions and reasons paper we proposed a threshold where events were "wholly" beyond the reasonable control of Transpower. We have since concluded that the "wholly" test is not workable, as it does not take into account other non-material causal factors or Transpower's ability to rule out those non-material causal factors.

What the Verifier said

F330 Transpower did not propose a normalisation methodology in its proposal so the Verifier did not have a view.

Approach raised in the Issues Paper

F331 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.

F332 In our Draft decisions and reasons paper we proposed to extend normalisation to include the asset performance measures (AP1 and AP2).

Response in submissions

F333 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.[397] Transpower also supported a normalisation mechanism to apply to GP1 and GP2.[398]

F334 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:[399]

> 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.

Transpower's response to our questions about normalisation – RFI032

F335 Prior to our draft decision, 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.

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[397] Above n 280, at 5.

[398] Above n 125, at 15.

[399] Above n 272, at 7.

F336 Transpower also proposed a list of events that might qualify as normalisation events and we largely agree with this list. That list is similar to the definition used by the Australian Energy Regulator (AER), with the addition of events that are applicable to New Zealand conditions, such as tsunami, landslide and volcanic activity.[400]

F337 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.

Draft decision and submissions

F338 In our Draft decisions and reasons paper we proposed a normalisation mechanism to apply to measures of grid performance (GP1 and GP2) and measures of asset performance (AP1 and AP2). We agreed with Transpower's preliminary view regarding normalisation event severity and proposed a minimum 24-hour interruption duration as a normalisation event criterion.[401]

F339 We outlined the type of normalisation events that could qualify for normalisation, and that the Commission must be satisfied that the cause of the event is, despite the exercise of GEIP, beyond the reasonable control of Transpower.[402]

F340 In its submission on our draft decision, Transpower supported our proposed normalisation but suggested that the normalisation needed to accommodate exclusions for POS where transmission alternatives may operate in the future.[403] This view was supported by MEUG in its cross-submission.[404]

Our view

F341 We have considered submitter views and the additional information from Transpower. We consider that it is reasonable to normalise out the effect of certain events.

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[400] 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.

[401] Transpower's response to RFI032 – Interruption normalisation.

[402] Above n 57, at [283].

[403] Above n 71, at 26.

[404] Above n 305, at [9].

F342 The normalisation will apply to measures of grid performance (GP1 and GP2) and measures of asset performance (AP1 and AP2).

F343 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 revised draft determination.

F344 Where the Commission is satisfied the event meets certain criteria, the outage impact of this event will be excluded from the quality measures we set.

F345 We retain our draft decision regarding normalisation event severity, and have set a minimum 24-hour interruption duration as a normalisation event criterion.

F346 While we do not expect that Transpower will use normalisation to exclude reliability events that occur in the ordinary course of business, we largely agreed with Transpower's list of events that meet the criteria.

F347 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, beyond the reasonable control of Transpower, and is due to one or more of the following events:

F347.1 natural disaster, fire or explosion not caused by Transpower equipment failure, civil commotion, malicious damage, terrorism, war (declared or undeclared), revolution, or contamination;

F347.2 action or inaction by a court, government agency (including denial, refusal or failure to grant any authorisation, despite timely best endeavour to obtain an authorisation);

F347.3 a work stoppage, dispute between an employer and employees or work bans;

F347.4 acts or omissions (other than failure to pay money) of a third party that affect the ability of Transpower to prevent or minimise the interruption or outage.[405]

[405] 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**).

F348 In determining whether to approve a normalisation event being excluded, Transpower must make a written application to the Commission informing that a normalisation event has occurred, the reasons why and evidence to support those reasons.

F349 We have retained the right to decline the exclusion of a normalisation event, for example, where we consider that Transpower has provided insufficient evidence to demonstrate the event cause; or that the effect is reasonably within Transpower's control.

F350 We note submissions on our draft decision suggesting that transmission alternatives should be included in the normalisation mechanism. We understand that transmission alternatives may have different reliability characteristics to transmission network assets, but consider significant events related to connected and/or third parties will already be covered in the normalisation mechanism. We also note that we will take any relevant facts into account, such as transmission alternative risk/cost trade-offs, when investigating any quality standard breaches.

F351 We will consider whether a specific transmission alternative normalisation mechanism is needed for RCP4 based on how normalisation performs during RCP3.

Our decision

F352 For the introduction of normalisation our decision is to:

F352.1 set a normalisation mechanism for the measures of grid performance (GP1 and GP2) and asset performance measures (AP1 and AP2) for events that are beyond the reasonable control of Transpower and meet the normalisation event criteria set out in the determination; and

F352.2 set a minimum 24-hour outage duration as a normalisation event criterion.

Attachment F.6: Revenue at risk

High-level approach

F353 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.

F354 Transpower 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.[406]

F355 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%

F356 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 consumers will pay more).

F357 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 have capped total annual revenue at risk for service performance measures at the same level as RCP2 (ie, 1.40%).

[406] Above n 288, at 23.

Reasons for addressing this issue

F358 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 customers may not necessarily be willing to pay for.

F359 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).[407]

What the Verifier said

F360 The Verifier did not comment on Transpower's proposed revenue at risk.

Approach raised in the Issues paper

F361 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

F362 NZIER (for MEUG) disagreed that revenue at risk should be increased, stating that:[408]

> 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.

F363 Mercury noted that the potential increase in revenue at risk highlights the need to link performance incentives to consumer benefits as directly as possible.[409]

F364 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.[410]

Draft decision and submissions

F365 In our Draft decisions and reasons paper we proposed retaining revenue at risk at the same level as RCP2 for the service performance measures (ie, 1.40%).

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

[408] Above n 272, at 2.

[409] Above n 280, at 3.

[410] Above n 111, at 5-6.

F366 In its submission on our draft decision, MEUG welcomed further explanation on how the revenue at risk for unplanned interruptions (GP1 and GP2) is expected to:[411]

F366.1 alter Transpower's expenditure or asset management decisions at the margin; and

F366.2 how these decisions are expected to change the frequency of duration of unplanned interruptions.

Our view

F367 For our GP measures, the economic value at risk has been set based on a target VoLL of 50% (after adjusting for IRIS),[412] and using Transpower's proposed economic value at risk for the AP measures. This gives a revenue at risk of 1.75%.[413]

F368 However, we consider that the total annual revenue at risk should be capped at the same level as RCP2 (ie, 1.40%). We continue to consider this level of revenue at risk is appropriate taking into account the pooling approach. It represents approximately 1% of the after-tax revenue for RCP3. There does not appear good justification for increasing this incentive amount.[414]

F369 As discussed above, we have not linked the asset health measures to revenue. We have set the cap on total revenue at risk over the regulatory period at 1.40% (before adjustments for time value of money and tax). This a reduction from Transpower's proposed 2.8% total revenue at risk (before adjustments).

F370 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.[415]

F371 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). This is further discussed in Attachment F.7.

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[411] MEUG "Transpower IPP 2020 – Draft decisions" (27 June 2019), at [15].

[412] Transpower proposed the target ratio of 50 percent to set the incentive strength for reliability measures to avoid over-incentivising reliability investment.

[413] Based on the forecast SMAR based from our draft decision.

[414] We also note that it is unlikely that Transpower will reach the total annual revenue at risk. This would require Transpower to meet the cap (or collar) on all service performance measures in a given year.

[415] Above n 254, at [4.17].

F372 In its submission on our draft decision, MEUG welcomed further explanation on how the revenue at risk for unplanned interruptions (GP1 and GP2) is expected to:[416]

F372.1 alter Transpower's expenditure or asset management decisions at the margin; and

F372.2 how these decisions are expected to change the frequency of duration of unplanned interruptions.

F373 The grid output incentives are intended to incentivise Transpower to provide services at a quality that better reflects consumer demand through balancing the cost-quality trade-offs provided by the quality incentive mechanism.[417]

F374 As previously stated in paragraphs F145 to F152, we consider that revenue-linked measures incentivise Transpower to find solutions to improve reliability where the benefit to consumers outweighs the marginal cost of the solution. The benefit to consumers is approximated through the VoLL and feeds into the calculation of the incentive rate.[418]

F375 If the incentive rate settings and revenue at risk are set at appropriate levels, Transpower would be faced with incentives to provide a quality of service that reflect consumer demands. We would expect Transpower to respond to these incentives when making expenditure and asset management decisions at the margin in providing the service.

Alternatives considered

F376 We 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 F357, if revenue at risk is 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 decision

F377 Our decision is to set an annual total revenue at risk cap of 1.40% (before adjustments for time value of money and tax).

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[416] Above n 411, at [15].

[417] Above n 254, at [4.48].

[418] An example of how we have calculated the grid performance incentive rates based on VoLL is provided in Attachment F.7.

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

High-level approach

F378 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).

F379 We have applied Transpower's approach for setting incentive rates for the revenue-linked service performance measures, but have applied adjustments for an updated expenditure incentive rate and target VoLL.

Transpower's proposed approach for setting incentive rates

F380 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. [419] We consider that this is appropriate and in the interests of consumers.

F381 For the reliability measures (GP1 and GP2), Transpower proposed incentive rates (and hence revenue at risk) proportionate to the economic cost of interruptions (ie, the VoLL).[420] 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.[421]

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[419] To understand the approach used in Transpower's proposal (published on its website), see: https://www.transpower.co.nz/sites/default/files/uncontrolled_docs/RT02%20Output%20Incentives%20Model_.xlsx.

[420] 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.

[421] 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.

F382 For the GP Generator POS categories (N-1 and N-Security), the incentive rate is not explicitly linked to VoLL and we have used Transpower's proposed economic value at risk.[422] Generator POS categories typically inject electricity into the grid, so VoLL is not an appropriate measure to compare with.[423]

F383 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.[424]

F384 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.[425] 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.

F385 Transpower also applied a scaling factor to the measures of grid performance to set its proposed targets, caps and collars which gave a total revenue at risk for the revenue-linked service performance measures (GP1, GP2, AP1, and AP2) of 2%.

F386 Transpower proposed that we 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.

F387 In setting the GP2 measures for the two N-security POS, the cap-collar range would be set such that the cap was zero (and the collar would be symmetric around the target).[426] We consider that the cap-collar ranges are appropriate to provide greater incentives to maintain quality on POS with greater economic consequence.

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[422] Transpower's economic value at risk is then discounted along with the rest of the GP1 and GP2 measures to get the 1.40% revenue at risk.

[423] This is because the wholesale electricity price is generally not comparable with VoLL.

[424] Above n 288, at 26.

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

[426] Above n 288, at 26.

F388 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.[427] For AP2, Transpower's proposed economic value has remained at $1,000,000.

Draft decision and submissions

F389 In our Draft decisions and reasons paper we proposed incentive rates for the revenue-linked service performance measures using Transpower's approach and adjusting to keep consistent with revenue at risk of 1.40%.

F390 In its submission on our draft decision, MEUG stated:[428]

> Worked examples of the linkage between the value of lost load (VoLL) for the different types of points of service (POS) and the mix of number and duration of outages would be helpful in advancing the discussion of whether the allocation of revenue at risk between the number and duration of unplanned outages for different POS reflects consumer views of the cost of the outage.

Setting of incentive rates

F391 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 50% VoLL for the measures of grid performance.[429] This approach aims to set the incentive rates with regard to the impact of interruptions on customers at each POS. For the GP measures we have accepted the targets, caps and collars incentive rates from Transpower's proposal.

F392 We have adjusted Transpower's GP incentive rate calculations by:

F392.1 Changing the incentive rate that Transpower bears under the incentive scheme from 33% to 25%. This is the incentive rate for the base capex expenditure adjustment as specified in the Capex IM based on the most recent WACC determination. We have equalised the base capex incentive rate to be consistent with the opex rate;[430] and

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[427] Above n 288, at 27.

[428] Above n 411, at [12].

[429] Transpower used a target VoLL ratio of 50 percent to set the strength for reliability measures to avoid over-incentivising reliability investment not demanded by consumers (above n 288, at 26).

[430] The opex incentive rate is based on the value of the WACC to account for the time value of money. Therefore, the 25% incentive rate is consistent with the opex incentive rate based on our most recent Transpower ID WACC estimate (as at 31 July 2019).

F392.2 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 (see Table F16 below).

F393 In response to MEUG's submission our draft decision, Table F16 demonstrates how we have calculated economic value at risk given the targets, caps and collars with a target of 50% VoLL.[431] We have determined the economic value at risk for each POS given the MWh (based on average load and difference in target and collar), and compared this to VoLL with a target ratio of 50%. The economic value at risk is then allocated between GP1 and GP2.

Table F16 Overview of economic value at risk for calculating incentive rates

VoLL	$25,000
VoLL*incentive rate (25%)	$6,250

	Hours (collar vs target)	Average load (MW)	MWh	Economic value at risk ($)	$/MWh	$/MWh as % of VoLL
N-1 Security High Economic Consequence	25.2	57.0	1,436.4	4,700,000	3,272	52.4%
N-1 Security Material Economic Consequence	34.4	12.1	415.8	1,370,000	3,295	52.7%
N-Security High Economic Consequence	17.2	17.8	305.6	1,000,000	3,273	52.4%
N-Security Material Economic Consequence	119.0	3.0	357.0	1,170,000	3,277	52.4%
N-1 Security Generator	38.5	92.0	3,538.9	500,000	141	-
N-Security Generator	33.9	28.6	969.5	500,000	516	-

[431] As previously discussed in paragraph F382, for the Generator POS the economic value at risk is not linked to VoLL.

F394 This results in a total revenue at risk across revenue-linked service performance measures of 1.75%. This is a reduction from Transpower's proposal of 2.0% for service performance measures. We have also applied an annual cap on revenue at risk of 1.4%, as previously discussed.

F395 Table F17 summarises the service performance measures proposed by Transpower in its proposal. Table F18 summarises our proposed service performance measures and the associated incentive rates and revenues at risk.

Table F17 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 F18 Our 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	335,714	2,350,000
N-1 security material economic consequence	7	24	41	40,294	685,000
N-security high economic consequence	4	6	8	250,000	500,000
N-security material economic consequence	9	23	37	41,786	585,000
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	37,903	2,350,000
N-1 security material economic consequence	36	61	86	27,400	685,000
N-security high economic consequence	0	103	206	4,854	500,000
N-security material economic consequence	0	140	280	4,179	585,000
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	99.75%	98.75%	97.75%	500,000	500,000
AP2 HVAC availability (%)				$ per 1%	
HVAC availability (71 selected assets)	99.2%	99.0%	98.8%	5,000,000	1,000,000
Total revenue at risk					
Revenue at risk (%)					1.75%
Revenue at risk cap (%)					1.40%

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 decisions relating to base capex for the IPP reset, and to explain our reasons for those 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.[432]

G3 We consider this concept to be consistent with the purpose of Part 4, which is a required consideration under the capex evaluation criteria.[433]

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

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[432] Above n 116, at [A15].

[433] 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.

Transpower's proposal was reviewed by an independent verifier

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 Transpower 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.[434]

G13 Selection of the identified programmes was guided by criteria, in line with the Capex IM, and agreed by Transpower and us, as:[435]

I. The top two portfolios by expenditure for the following asset categories across capex[436]
   - 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.[437]

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.

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[434] 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.

[435] The identified programmes and their selection are discussed in the Verifier report (at 157-282).

[436] Note that the Buildings and Grounds asset category has not been included. This is the only exception.

[437] 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 ($m)	Approved RCP3 expenditure ($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	$59.0	-39%
ICT programme[438]	$169.0	$127.5	-23%
ICT - IT Telecoms, Network and Security Services	$64.7	-	-
ICT - Transmission Systems	$31.8	-	-
Non-identified programmes			
ICT - Asset Management Systems	$23.3	-	-
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	-	-
ICT – Shared Services	$30.7	-	-

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;

[438] The ICT base capex was reviewed and a decision made at a programme level.

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 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 attention on. We explored 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:

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;

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 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	• 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	• 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 –expenditure for RCP3 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	• 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 –expenditure for RCP3 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.5 - HVDC and Reactive Assets - Reactive assets	Yes	No	Yes	• 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 – RCP3 expenditure not unreasonable and is consistent with GEIP.
Attachment G.6 - AC Substations - Power Transformers	No	No	No	• 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 – expenditure for RCP3 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.7 - AC Substations - 33kV Outdoor Indoor (ODID) conversions	No	No	Yes	• 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 – expenditure for RCP3 is consistent with GEIP.
Attachment G.8 - Secondary Assets - SA Protection, Battery Systems and Revenue Meters	Yes	No	Yes	• 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 to 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 – expenditure for RCP3 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.9 - Secondary Assets - SA Substation Management Systems	Yes	No	No	• 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 – expenditure for RCP3 is consistent with GEIP.
Attachment G.10 - E&D	Yes	Yes	Yes	• 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 have decided to approve Transpower's low-expenditure scenario envelope amount of $59m (compared with proposal amount of $76.4m). • We recognise the original intention to reduce uncertainty was that the base capex allowance adjustment mechanism (**BCAM**) would be used. • After further consideration we have introduced an IM amendment which gives Transpower the opportunity to seek additional funding for uncertain E&D projects during the regulatory period.

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.12 - ICT - IT Telecoms, Network and Security Services	Yes	No	Yes	• Verifier identified that forecasting based on lifecycle management and benefits-driven investment was a sound approach for IT Telecoms related projects. • Proactive 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, we decided to approve $127.5m ($18.7m lower than Transpower's proposal amount). EMCa identified issues with economic justifications of benefits-driven projects and maturity of business cases of lifecycle projects.
Attachment G.11 - ICT Total programme and Attachment G.13 - ICT - Transmission Systems	Yes	No	Yes	• 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, we decided to approve $127.5m ($18.7m lower than Transpower's proposal amount). 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
Verifier reviewed - Non-identified programmes				
Attachment G.11 - ICT Total programme and Attachment G.14 - ICT - Asset Management Systems	Yes	No	Yes	• 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, we decided to approve $127.5m ($18.7m lower than Transpower's proposal amount). EMCa identified issues with economic justifications of benefits-driven projects and maturity of business cases of lifecycle projects.
Attachment G.15 - AC Substations - Buildings and Grounds	No	No	No	• 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 – expenditure for RCP3 is consistent with GEIP.

Programme and attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Projects and programmes not reviewed				
Attachment G.16 - other projects and programmes not reviewed	N/A	N/A	N/A	• 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."[439]

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 Transpower's proposed expenditure for this category is consistent with GEIP.[440]

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[439] Transpower "Transmission Line Towers and Poles Asset Class Strategy document" (April 2018), at 1.

[440] Above n 53, 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 paint 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 consider that following the Verifier report, and our review of the Verifier report and Transpower supporting information, 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 decision is to approve Transpower's 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:[441]

> 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 Transpower's proposed expenditure for RCP3 is consistent with GEIP.[442]

G36 Some other key Verifier observations included that:[443]

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;

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[441] Transpower "Transmission Line Conductors and Hardware Asset Class Strategy document" (April 2018), at 1.

[442] Above n 53, at 174-189.

[443] Above n 53, 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 ±30%, most of the cost estimates have an accuracy of ±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 proactive 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 decision is to approve Transpower's 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:[444]

> 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.
>
> 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 Transpower's proposed expenditure is consistent with GEIP.[445]

G44 Some other key Verifier observations included that:[446]

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. 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

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[444] Transpower "Portfolio Management Plan – HVDC Assets" (October 2018), at 4.

[445] Above n 53, at 189-200.

[446] Above n 53, at 186-187.

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;

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:[447]

> 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 whether the expert condition assessments Transpower stated are usually carried out to define project need had been carried out.

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[447] Transpower "Asset Management Plan" (October 2018), at 371.

G47 Transpower's proposal material was unclear on this issue and its Portfolio Management Plan – HVDC assets Transpower stated that:[448]

> 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.
>
> 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-extension- 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 with 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.

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[448] Above n 444, at 23-24.

G52 Meridian was supportive of using the Listed Project mechanism stating that:[449]

> …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.

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:[450]

> 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.[451]

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.[452]

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[449] Above n 111, at 6.

[450] Above n 125, at 20-21.

[451] These submitters included Contact, Genesis, Mercury and Fonterra. See the Verifier report (above n 53, at 387).

[452] Transpower "HVDC Assets Pole 2 Plan Reference Document – Asset Status 2018" (March 2018).

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;

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, based on the Verifier report, our review of the Verifier report, the Issues paper submissions and Transpower RCP3 supporting material, our draft decision was to approve Transpower's proposed HVDC and Reactive Assets - HVDC programme expenditure of $64.6m. We received no submissions on our draft decision.

Our decision

G65 In summary, our final decision is:

G65.1 to approve Transpower's proposed HVDC and Reactive Assets - HVDC programme expenditure of $64.6m in RCP3;

G65.2 to 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;

G65.3 to implement requirements to test progress on the Verifier's recommendations by:[453]

G65.3.1 setting requirements for Transpower to provide information under s 53ZD(1) of the Act to provide transparency on progress for interested persons; and

G65.3.2 under s 53ZD(1)(f) of the Act, obtaining a mid-RCP3 expert opinion on Transpower's progress, with details of the review process to be specified in a s 53ZD notice.

[453] Above n 67.

Attachment G.5: HVDC and Reactive Assets - Reactive assets

G66 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.

G67 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.

G68 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.[454]

G69 Some other key Verifier observations included that:[455]

G69.1 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;

G69.2 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;

G69.3 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;

G69.4 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

G69.5 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.

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[454] Above n 53, at 200-211.

[455] Above n 53, at 186-187.

G70 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G70.1 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;

G70.2 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;

G70.3 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

G70.4 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.

G71 Prior to our draft decision, 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.

G72 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

G73 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.

G74 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:

G74.1 **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.

G74.2 **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.

G74.3 **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 to 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

G75 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.

G76 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 Transpower's proposed expenditure is dependent on future asset condition assessments. However, for the Strategy 3 asset type this rises to 32%.

G77 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.

G78 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.

G79 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 our questions in its proposal and RFI supporting information.

G80 In conclusion, and based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our decision is to approve Transpower's proposed HVDC and Reactive Assets – Reactive Assets programme expenditure of $39.5m in RCP3.

G81 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:[456]

G81.1 setting requirements to provide information under s 53ZD(1) to provide transparency on progress for interested persons; and

G81.2 under s 53ZD(1)(f) of the Act, obtaining a limited scope, mid-RCP3, expert opinion on Transpower's progress, with details of the review process to be specified in the s 53ZD notice.

Attachment G.6: AC Substations - Power transformers

G82 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.

G83 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.

G84 The Verifier concluded that based on the modelling maturity and the monetised risk-based options analysis tool that this expenditure is consistent with GEIP.[457]

G85 Some other key Verifier observations included that:[458]

G85.1 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;

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[456] Above n 67.

[457] Above n 53, at 212-223.

[458] Above n 53, at 186-187.

G85.2 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;

G85.3 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;

G85.4 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

G85.5 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.

G86 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G86.1 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;

G86.2 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

G86.3 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 it TEES cost-estimation model.

G87 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.

G88 Based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our decision is to approve Transpower's proposed AC Substations – Power transformers programme expenditure of $60.1m in RCP3.

Attachment G.7: AC Substations - Outdoor Indoor (ODID) conversions

G89 Transpower stated that "Outdoor 33kV switchyards provide an interface point between our high-voltage transmission network and medium voltage distribution customers. Outdoor 33kV switchyards consist of multiple asset types such as structures, buswork, disconnectors, circuit breakers, and instrument transformers".

G90 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.

G91 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.

G92 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.[459]

G93 Some other key Verifier observations included that:[460]

G93.1 there are no specific strategies (or asset health modelling) defined for the outdoor 33kV switchyards asset class;

G93.2 asset investments decisions relate to the prioritisation of the ODID conversions; and

G93.3 most of the remaining outdoor switchgear will be replaced in RCP3, hence no improvement to asset health modelling is required or planned in RCP3.

[459] Above n 53, at 222-229.

[460] Above n 53, at 222-229.

G94 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G94.1 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;

G94.2 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;

G94.3 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;

G94.4 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;

G94.5 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;

G94.6 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

G94.7 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.

G95 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.

G96 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.

G97 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.

G98 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 it is reasonably practicable and economic to do so.

G99 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.

G100 In summary and based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our decision is to approve Transpower's 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

G101 This asset class includes network and asset protection schemes, station DC systems and revenue metering. Transpower described these assets and their function as:[461]

> 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.

G102 There is considerable expenditure uplift in this asset category, $141.6m in RCP3, when compared with RCP2 ($63.2m).

G103 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.

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[461] Transpower "Portfolio Management Plan – Protection , Station DC Systems & Revenue Metering" (October 2018).

G104 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.[462]

G105 Some other key Verifier observations included that:[463]

G105.1 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;

G105.2 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;

G105.3 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 Transpower's proposed $141.6m RCP3 expenditure, this would equate to a reduction of $35.4m; and

G105.4 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.

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[462] Above n 53, at 229-237.

[463] Above n 53, at 228-238.

G106 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G106.1 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;

G106.2 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;

G106.3 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 the existing relay fleet; and

G106.4 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.[464]

Our analysis

G107 In our Issues paper we signalled to submitters that we intended to examine the expenditure in this asset category stating that:

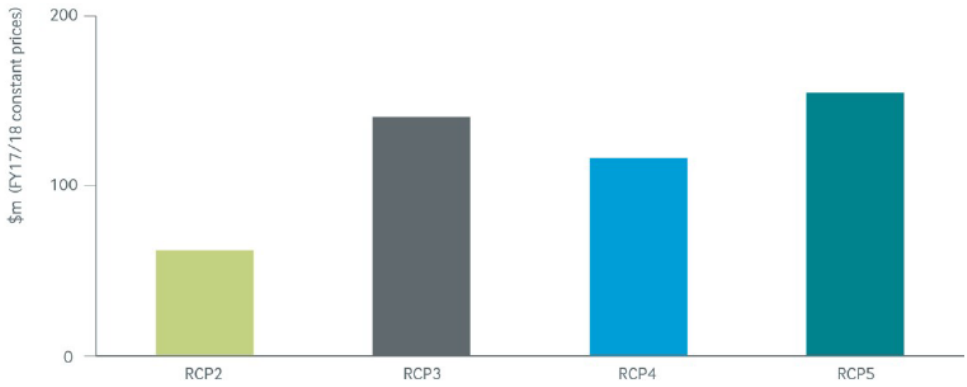
> (We are) specifically seeking evidence of business cases and justifications to support expenditure programs such as duplicate bus zone protection. While the Verifier identified that in many cases replacement was necessary due to obsolescence and spares unavailability, there was likely to be value in 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.

[464] OEM – Original Equipment Manufacturer.

G108 Prior to our draft decision, 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.

G109 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".[465]

Figure G1 Transpower estimate of SA Protection, Station DC systems and Revenue Metering capex for RCP2 to RCP5[466]



G110 Transpower responded to our RFI questions on 8 March 2019 stating that:

G110.1 duplicate protection schemes for assets at 220kV and above are a requirement of the Electricity Industry Participation Code 2010;[467]

G110.2 duplicate protection schemes at the 110kV and 66kV sites are tested economically when the existing protection schemes are investigated for renewals;

G110.3 Transpower has also approved extending the life of all duplicated protection schemes for lines (110kV and 66kV), transformers and the majority of feeders;

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[465] Above n 447, at 394.

[466] Above n 447, at 394.

[467] Clause 4(4)(b) of Technical Code A – Assets of Schedule 8.3 of the Code.

G110.4 there are no plans to extend the life of non-duplicated protection schemes at this stage; and

G110.5 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.

G111 We considered that Transpower hadn't adequately answered our 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.

G112 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.

G113 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.

G114 There is no reason given by Transpower about why non-duplicated protection schemes do not qualify for asset health modelling.

G115 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.

G116 Transpower provided information in two separate RFI's on 12 April 2019 (RFI0043) and 29 April 2019 (RFI059). RFI043 and RFI059 provide 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.

G117 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.

G118 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.

G119 In conclusion, and based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material and RFI responses, our decision is to approve Transpower's proposed Secondary Assets – SA Substation Management Systems programme expenditure of $58.6m in RCP3.

G120 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:[468]

G120.1 setting requirements to provide information under s 53ZD(1) to provide transparency on progress for interested persons; and

G120.2 under s 53ZD(1)(f) of the Act, obtaining a limited scope, mid-RCP3, expert opinion on Transpower's progress, with details of the review process to be specified in a s 53ZD notice.

[468] Above n 67.

Attachment G.9: AC Substations - Secondary assets - SA Substation Management Systems (SMS)

G121 This asset class includes assets that facilitate the remote control and monitoring of substation primary assets. Transpower described these assets and their function as:[469]

> 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.

G122 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.

G123 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.[470]

G124 Some other key Verifier observations included that:[471]

G124.1 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;

G124.2 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 and measured Mean Time Between Failures (**MTBF**) statistics;

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[469] Transpower "Substation Management Systems – Asset Class Strategy" (November 2017).

[470] Above n 53, at 238-247.

[471] Above n 53, at 238-247.

G124.3 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. It should be a priority in RCP3 to consider developing further the asset health and criticality models for SMS assets; and

G124.4 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, and network performance, which should lead to further optimisation of capex and opex expenditure of substation assets into the future.

G125 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G125.1 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;

G125.2 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;

G125.3 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;

G125.4 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

G125.5 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.[472]

[472] Transpower "Portfolio Management Plan – Secondary Assets Substation Management Systems" (October 2018), at 35.

G126 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.

G127 We will be seeking Transpower to report on its progress as part of a package of reporting requirements over RCP3, that encourage Transpower to continue with its asset health and criticality modelling beyond just doing so for primary assets.

G128 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.

G129 In conclusion, and based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our decision is to approve Transpower's proposed Secondary Assets – SA Substation Management Systems programme expenditure of $58.6m in RCP3.

G130 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 Transpower's progress in addressing the Verifier's recommendations by:[473]

G130.1 setting requirements to provide information under s 53ZD(1) to provide transparency on progress for interested persons; and

G130.2 under s 53ZD(1)(f) of the Act, obtaining a limited scope, mid-RCP3, expert opinion on Transpower's progress, with details of the review process to be specified in a s 53ZD notice.

Attachment G.10: Enhancement and Development

G131 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.

G132 The Verifier described E&D capex projects as investments that:[474]

G132.1 increase or decrease the capability of the grid;

[473] Above n 67.

[474] Above n 53, at 248-259.

G132.2 ensure grid capability matches generation, demand, security, reliability and market requirements;

G132.3 meet system need by providing system capacity, reliability and security required to meet future customer and grid requirements; and

G132.4 are externally driven, such as customer developments and new connections, and any changing economic conditions and statutory requirements.

G133 Transpower sought $76.4m of base capex in the E&D portfolio after identifying a range of possible E&D projects in its ongoing transmission planning work. It took a scenario approach, assigning likelihood estimates and high-level costs for each of the projects.

G134 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.

G135 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.

G136 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).

G137 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 was to reduce the risk of overestimating uncertain E&D base capex.[475]

Analysis

The Capex IM base capex allowance adjustment mechanism

G138 In the 2017/18 Capex IM Review we introduced an "option for an expenditure adjustment mechanism for base capex E&D projects".[476]

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[475] Above n 116, at [68.4].

[476] Above n 116, at [X23.1].

G139 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.

G140 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".[477]

G141 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.[478]

G142 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

G143 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.

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[477] Above n 116, at [179].

[478] In our Capex IM review decisions and reasons paper, we 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 116, at [182]).

G144 Some other key Verifier observations included that the Verifier:[479]

G144.1 was satisfied that the list of projects used in developing the high and low scenarios are reasonable and relevant for the RCP3 forecast;

G144.2 accepted as reasonable a nominal 10% adjustment for potential savings through emerging technologies and deferred investment;

G144.3 noted the base capex allowance adjustment mechanism proposed by the Commerce Commission in the amended Capex IM of 25 May 2018; and

G144.4 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.

Our initial view of Transpower's RCP3 E&D expenditure analysis

G145 Transpower decided to carry out project likelihood scenario modelling for this portfolio and sought an expenditure envelope, rather than 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.

G146 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:

G146.1 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

G146.2 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.

G147 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 by Transpower), this may not be the case for future proposals.

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[479] Above n 53, at 248-259.

G148 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:[480]

> 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.

G149 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:[481]

> …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

G150 We tested this idea in the Issues paper consultation. Transpower was the only party which submitted on this issue, stating that:

G150.1 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;

G150.2 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

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[480] Transpower "Transmission Planning Report" (October 2018), at 24-25.

[481] Above n 480, at 24-25.

G150.3 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.

Draft decision

G151 Our draft decision was to approve Transpower's "low scenario" envelope expenditure amount in the base capex allowance at $59m, compared with Transpower's proposal amount of $76.4m. We noted that we would explore improving the workability of the BCAM through an amendment to the Capex IM.

G152 In response to our draft decision Transpower submitted that it agreed that the BCAM "should be amended so it is a workable mechanism" and stated that it intended to submit as part of the separate consultation process on this.[482]

G153 While Transpower supported the principle of a mechanism that can deal with the inherent uncertainty in the E&D base capex programme, it suggested that this be "amended in a way that is simple to implement without undue administrative burden". Transpower concluded that if the amendment is not simple to implement then this will require it to either delay some E&D projects into RCP4 or utilise approved expenditure from other base capex programmes.

Our view of Transpower's RCP3 E&D expenditure analysis

G154 Our decision is to confirm our draft decision to approve Transpower's "low scenario" envelope expenditure amount in the base capex allowance at $59m, compared with Transpower's proposal amount of $76.4m.

G155 We also recognise 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.

G156 The decision to progress these potential projects will in many cases be 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.

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[482] Above n 71, at 21.

G157 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.[483]

G158 When the BCAM was introduced as part of the 2017/18 Capex IM review, it was envisaged that:[484]

> …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.

Transpower IM determination amendment

G159 In our Draft decisions and reasons paper we noted that we would explore improving the workability of the BCAM through an amendment to the Capex IM. After further consideration, rather than modifying the BCAM as a means to address uncertainty in the E&D base capex portfolio, we have addressed this in a similar way to other events that are outside of Transpower's reasonable control – by way of a new price path reconsideration provision.

G160 The inclusion of additional reopeners for this purpose has been included in the Transpower IM amendment determination. This change will allow Transpower a single opportunity to seek additional funding for E&D projects during the regulatory period.[485]

G161 Through the Transpower IM amendment determination we have addressed the inherent uncertainty of projects in the E&D base capex portfolio to allow additional funding during the RCP for those E&D projects:

G161.1 that had not been approved at the time the IPP was reset; and

G161.2 that were unforeseeable when the IPP was reset, or that were foreseeable but were unknown in their cost and/or timing.

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[483] Above n 125, at section 8.1.1.

[484] Commerce Commission "Transpower capex input methodology review: Companion paper to final amendment determination" (25 May 2018), at 11.

[485] Above n 63.

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.

The nature of ICT capex

G162 ICT capex is not like other grid asset capex because many of the assets involved depreciate at much faster rates and their expected asset lives are generally less than 10 years. This means ICT capex investments are necessary more often when compared with grid asset capex.

G163 If we consider the proposed ICT expenditure as a pool of total expenditure or 'totex' (ICT capex and ICT opex combined), it would total $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 proposed expenditure in RCP3.

Verifier assessment of ICT programme capex

G164 Transpower has categorised the ICT programme expenditure into four broad project types:

G164.1 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).

G164.2 Risk mitigation projects – to reduce threat or minimise the impact of a risk (9% of ICT capex programme).

G164.3 Compliance projects – considered to be 'must-do' to meet regulatory obligations either adopted by Transpower or prescribed (1% of ICT capex programme).

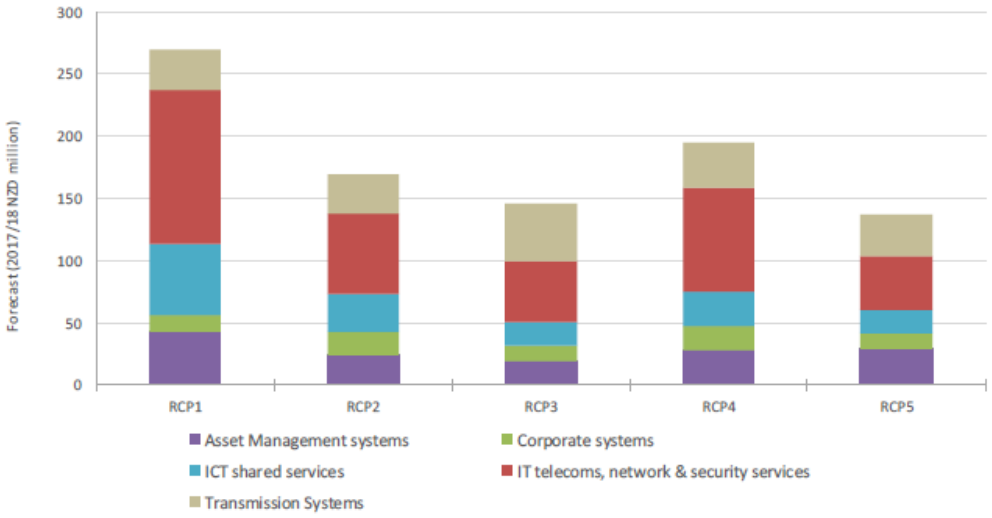
G164.4 Benefits-driven projects – that provide operational savings and capex deferral (25% of ICT capex programme).

G165 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).[486]

[486] Above n 53, at Table 73.

G166 The total proposed programme is $146.1m in RCP3 compared with $169.5m in RCP2. Figure G2 illustrates Transpower's proposed RCP3 ICT capex when compared with previous periods and Transpower's prediction for RCP4 and RCP5.

Figure G2 Total ICT capex from RCP1 to RCP5[487]



G167 The Verifier reviewed three 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.[488]

G168 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.

G169 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:[489]

> 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.

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[487] Above n 53, at 261.

[488] Above n 51, at 120.

[489] Above n 53, at 269.

G170 The Verifier further concluded that:[490]

> 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.

G171 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G171.1 the Verifier had limited ICT capex expertise;

G171.2 the bulk of the ICT program is lifecycle expenditure (about two thirds). 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 do not appear to exceed the costs; and

G171.3 there are two potential issues with the Verifier report in relation to ICT capex. The first is that the Verifier did not verify the lifecycle projects, which is about two thirds of the ICT capex program (about $100m). The second 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.

G172 We therefore engaged an expert in this area to review Transpower's proposed ICT capex.

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[490] Above n 53, at 269.

Our initial analysis and RFI request

G173 The Verifier did 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 a workshop, and were not convinced that Transpower had sufficiently justified how it arrived at the identified benefits.[491]

G174 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:

G174.1 provide more detailed description and justification for the capex and opex benefits, and cost deferral amounts stated in its supporting information provided to date;

G174.2 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

G174.3 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

G175 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.[492]

G176 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:[493]

> ….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.

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[491] Verifier workshop with Commission staff (1-2 November 2018).

[492] Transpower's response to RFI034 – ICT benefits driven projects.

[493] Above n 492, at 2.

G177 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.

G178 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.

G179 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.

G180 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.[494] This seems to be an economic investment if the benefits do transpire.

G181 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:[495]

> 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.

[494] Assuming the project started in year 3 of the regulatory period with costs were spread evenly over the last 3 years of the period.

[495] Above n 492, at 7.

G182 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:[496]

> 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.

G183 However, Transpower provided no more detail about which asset upgrade or asset replacement projects would be deferred, only to summarise that:

G183.1 cancellation of the ICT capex deferral amount of $7.8m will mean the RCP3 capex amount will increase by $60m; and

G183.2 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

G184 Following our assessment of the Verifier's report on Transpower's proposed ICT expenditure and our assessment of the ICT information we requested from Transpower, we were unable to conclude that Transpower's proposed ICT expenditure met the expenditure outcome. As such, we decided to engage specialist ICT consultants, EMCa, to undertake a review of the ICT programme (both opex and capex) and propose any areas where a detailed analysis may be necessary.[497] In particular, we wanted EMCa to test whether:

G184.1 Transpower's proposed ICT expenditure is comparable to Australian transmission providers (TNSPs), both at an aggregate level and at a functional disaggregated level;

G184.2 Transpower's business cases for lifecycle and benefits-driven ICT expenditure, in particular, are sufficiently robust;

G184.3 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

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[496] Transpower's response to RFI028 - ICT Capex Forecast and Benefits.

[497] 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.

G184.4 the expenditure proposed by Transpower adequately provides for the cybersecurity activities or assets in RCP3 that EMCa considers would meet GEIP.

G185 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.

G186 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.

G187 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 could not be satisfied that Transpower's proposed ICT capex amount of $146.1m was fully prudent and efficient, and recommended that the Commission adjust its approval amount by $32.6m.

G188 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:[498, 499]

G188.1 there is limited evidence of risk-based investment development and management in this portfolio;

G188.2 further work is needed to develop internal challenge processes for the benefits-driven projects;

G188.3 there appear to be limited links to historical investment plans, actual expenditure (including expenditure variances), and performance outcomes in key documents in this expenditure programme;

G188.4 documentation that demonstrate expenditure justifications appear preliminary and are generally insufficient to meet the prudent and efficient test;

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[498] EMCa "Transpower Regulatory Control Period 3 Proposal – Review of aspects of the Proposed ICT Expenditure" (May 2019).

[499] Above n 70

G188.5 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

G188.6 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 considered 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.

G189 EMCa also reviewed the lifecycle, benefits-driven and cybersecurity capex programmes, making further observations and recommendations, namely that:

G189.1 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 2020/21). in conjunction with concept stage cost estimates, EMCa concluded that only 85% of Transpower's proposed expenditure was likely to be prudent and efficient;

G189.2 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:

G189.2.1 Transpower's own information demonstrates that the certainty rating for the benefits-driven projects is generally low; and

G189.2.2 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;

G189.3 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.

Draft decision submissions and further external advice from EMCa

G190 Having considered the Verifier's report, questioned the Verifier further in a workshop, considered Transpower's proposal and further information it provided, and EMCa's expert opinion, we reached our draft decision on ICT capex expenditure.

G191 We proposed to:

G191.1 approve 85% of Transpower's 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; and

G191.2 approve 50% of Transpower's 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.

G192 This resulted in our adjusting down Transpower's proposed ICT programme capex of $146.1m by $32.6m and approving $113.6m, which was in line with EMCa's expert opinion.

G193 Vector in its submission on our draft decision supported the use of external experts to inform Commission decisions, but considered Transpower had limited opportunity to review and respond to the expert report. Vector further noted that ICT is now a critical part of electricity networks.[500]

[500] Above n 92, at [3]-[5].

G194 MEUG in its submission on our draft decision expressed concern about EMCa's findings and stated that ICT assets are critical to the management of modern power systems. MEUG also made more general comments about overall New Zealand industry ICT capability in the management of data and whether there are sufficiently skilled staff for this purpose.[501]

G195 Transpower submitted further information on the ICT base capex programme and indicated that additional documentation regarding proposed ICT projects was available on request. Transpower disagreed with the reduced approval amount in our draft decision because:[502]

G195.1 the draft decision was "informed by a report by EMCa that contains material inaccuracies and incorrect assumptions";

G195.2 it disagreed with the "level of detail needed to substantiate a capex proposal";

G195.3 the RCP3 proposal had already incorporated a 14% reduction after an internal challenge process, which was in line with the EMCa report expectation that this challenge would typically amend ICT proposals by between 10% and 20%;

G195.4 ICT project costs were based on costs for similar recent projects; and

G195.5 if the proposed reduction is adopted then this will result in expected benefits in other programmes being reversed and will increase opex requirements as legacy systems are maintained for longer.

G196 We asked EMCa to review the further information from Transpower in its submission and asked EMCa to prepare a supplementary report.

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[501] Above n 411, at [19]-[22].

[502] Above n 71, at 10-20.

G197 EMCa's supplementary report, which is published alongside this paper:[503]

G197.1 corrected minor errors and used an updated Transpower spreadsheet that Transpower had corrected for errors. EMCa concluded that amending these errors did not materially affect its conclusions, that Transpower has not fully explained what errors have occurred in the EMCa report that supported the draft decision but that clarifying information has been considered in its final report.[504]

G197.2 concluded that, in terms of Transpower's ICT governance framework, while Transpower provided additional clarifying information it "had not provided the necessary justification to reasonably support a finding that its RCP3 expenditure is likely to be prudent and efficient";[505]

G197.3 concluded that, for the lifecycle-driven capex projects Transpower's "new and clarifying information has mitigated but not eliminated our concerns regarding the likely prudency and efficiency of its proposed lifecycle-driven work" and that there are likely to be opportunities to defer work, seek cheaper options and reduce costs. However, on the basis of the additional information provided to EMCa it recommended a $9.5m reduction in the approval amount for Transpower's proposed lifecycle ICT projects;[506] and

G197.4 concluded that, for the benefits-driven capex projects Transpower's "new and clarifying information has mitigated but not eliminated our concerns regarding the likely prudency and efficiency of its proposed benefits-driven ICT work" and that there are likely to be more economic options, and a more prudent prioritisation of these projects. However, on the basis of the additional information provided to EMCa it recommended a $9.2m reduction in the approval amount for the proposed benefits-driven ICT capex projects.[507]

G198 We have reviewed the revised EMCa report, its review of Transpower's response to its report in support of our draft decision, and Transpower's additional clarifying information.

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[503] Above n 70.

[504] Above n 70, at 5-6.

[505] Above n 70, at 7-11.

[506] Above n 70, at 12-15.

[507] Above n 70, at 16-19.

G199 We engaged EMCa because of its particular expertise in the area of ICT expenditure, and expenditure reviews at large utilities.[508] We consider EMCa has carried out a thorough examination of Transpower's ICT programme based on the information provided to it in the proposal and from the additional RFI and draft decision submission material. EMCa has made some key observations about the governance framework Transpower uses to justify ICT projects. We encourage Transpower to consider these observations ahead of the next reset.[509]

Decision

G200 Exercising our judgement in light of all of the evidence described above, our decision is to:

G200.1 approve 90% of Transpower's proposed ICT capex programme lifecycle projects on the basis that some work could be deferred, more economic options may exist and that assumed cost estimates may be reduced; and

G200.2 approve 75% of Transpower's proposed ICT capex programme benefits-driven projects. While the updated financial information and benefits-driven project documentation provided more confidence of the link between expenditure and the benefits, for many projects the need and certainty were unclear, and there was little evidence of risk analysis.

G201 This results in us adjusting down Transpower's proposed ICT programme capex of $146.1m by $18.7m and approving $127.5m.

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.

G202 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.

G203 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.

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[508] EMCa also noted in its final report that it had "recently reviewed ICT expenditure for three Australian DNSPs on behalf of the Australian Energy Regulator for which the businesses provided detailed (preliminary) business cases and supporting evidence of assumptions (including benefits) for every project for their respective 2020-25 RCPs." Above n 70, at [55].

[509] Above n 70, at [56].

G204 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.[510]

G205 The Verifier also observed that:

G205.1 Transpower will focus on delivering new fibre solutions, provided a benefit can be identified within 8 to 10 years;

G205.2 further drivers for RCP3 are delivering cybersecurity solutions to manage the evolving threat landscape; and

G205.3 the small investment in reconfiguring the TransGO network is considered prudent and efficient in deferring more expensive upgrade work to RCP4.[511]

G206 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G206.1 ICT programs are now necessary for ongoing transmission business operation so taking a proactive 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;

G206.2 it is probably very difficult to calculate the impact of lost functionality in this expenditure programme. The functions that these investments perform are now considered to be so essential that justifying their existence 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

G206.3 in general, it is difficult to ascertain whether a proactive 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.

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[510] Above n 53, at 269-274.

[511] 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 51, at 121.

G207 Prior to our draft decisions, 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.

G208 Based on the Verifier report, our review of the Verifier report, Transpower's supporting material and the EMCa review:

G208.1 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

G208.2 following the EMCa review of the ICT program expenditure in total, particularly the benefits-driven ICT base capex projects, our decision is to adjust the ICT programme expenditure approval amount to $127.5m.

Attachment G.13: ICT capex - Transmission Systems

NB: this section links to Attachment G.11 for an ICT base capex total programme view

G209 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.

G210 The Verifier identified that much of this programme is to fund continuation of upgrades and enhancements that were part of RCP2. The largest activity is the replacement of the SCADA/EMS assets.[512] Asset replacement due to technical obsolescence and lack of vendor support was identified a key driver in this expenditure category.

G211 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.[513]

G212 The Verifier also observed that:

G212.1 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;

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[512] SCADA – Supervisory Control and Data Acquisition. EMS – Energy Management System.

[513] Above n 53, at 274-282.

G212.2 there is a drive to improve SCADA/EMS capability to include spatial, weather and lightning information for better market and system operation;

G212.3 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;

G212.4 much of the capex programme in RCP3 is a continuation of upgrades and enhancements started in RCP2;

G212.5 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);

G212.6 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;

G212.7 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;

G212.8 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

G212.9 it is satisfied that Transpower's proposed staged programme of software and process updates for outage management, field communications and power system modelling is appropriate and prudent.

G213 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G213.1 these assets are essential to the reliable operation of the modern network which uses a lot of remote automatic monitoring and control;

G213.2 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

G213.3 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.

G214 Prior to our draft decision, 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.

G215 Based on the Verifier report, our review of the Verifier report, Transpower's supporting material and the EMCa review:

G215.1 we agree that that the ICT capex – Transmission Systems proposed expenditure of $47m appears to be prudent and consistent with GEIP; however

G215.2 following the EMCa review of the ICT program expenditure in total, particularly the benefits-driven ICT base capex projects, our decision is to adjust the ICT programme expenditure approval amount to $127.5m.

Attachment G.14: ICT capex - Asset Management Systems

NB: this section links to Attachment G.11 for an ICT base capex total programme view

G216 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.

G217 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.

G218 While about 65% of the programme expenditure was identified as being benefits driven, the Verifier was satisfied these were sufficiently demonstrable such as:

G218.1 saving in annual maintenance expenditure;

G218.2 improved operational decision making; and

G218.3 a potential to reduce response times to outages.

G219 The Verifier concluded that:[514]

> 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.

G220 On these bases, the Verifier concluded that this expenditure programme was prudent and consistent with GEIP.

G221 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G221.1 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;

G221.2 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;

G221.3 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;

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[514] Above n 53, at 296.

G221.4 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

G221.5 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.

G222 Prior to our draft decision, 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.

G223 Based on the Verifier report, our review of the Verifier report, Transpower's supporting material and the EMCa review:

G223.1 we agree that that the ICT capex – Asset Management Systems proposed expenditure of $18.6m appears to be prudent and consistent with GEIP; however

G223.2 following the EMCa review of the ICT program expenditure in total, particularly the benefits-driven ICT base capex projects, our decision is to adjust the ICT programme expenditure approval amount to $127.5m.

Attachment G.15: ACS Buildings and Grounds

G224 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 building sites, Transpower described these assets further as:[515]

> 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.

G225 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.

G226 The Verifier was satisfied that the expenditure in this category was 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.[516]

G227 The Verifier also observed that:

G227.1 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**);

G227.2 Transpower has forecast that by the end of RCP3, all projects deferred from RCP2 will be completed; and

G227.3 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.

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[515] Above n 447, at section 4.4.

[516] Above n 53, at 283-290.

G228 We tested the verification against the Terms of Reference and the requirements of the Capex IM and carried out our own review concluding that:

G228.1 this base capex programme was fully verified by the Verifier despite being a non-identified programme;

G228.2 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;

G228.3 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;

G228.4 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;

G228.5 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

G228.6 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.

G229 Based on the Verifier report, our review of the Verifier report and Transpower RCP3 supporting material, our decision is to approve Transpower's proposed ACS Buildings and Grounds programme expenditure of $39.5m in RCP3.

Attachment G.16: Other projects and programmes

G230 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.[517]

G231 The non-reviewed projects were in the Transmission Lines, AC Substations and business support capex categories.

G232 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.

G233 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.[518]

G234 Our decision is to approve these small projects and programmes for RCP3 only.

[517] The Verifier also added two non-identified programmes to its review, namely the ACS Buildings and Grounds and the ICT Asset Management Systems programmes.

[518] 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 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.[519]

H3 We consider this concept to be consistent with the Part 4 purpose, which is a required consideration under the capex evaluation criteria.[520]

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) our focus is on expenditure prudency.

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.[521]

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.

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[519] Above n 116, at [A15].

[520] Clause 6.1.1(2)(b) of the Capex IM.

[521] Above n 55, 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;[522]

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 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

[522] 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:[523]

> 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.[524]

H13 Our view is that Transpower's processes and tools are capable of providing reasonable cost estimates following these improvements.

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[523] Above n 53, at 139-140.

[524] Above n 53, 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.[525]

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.[526] 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 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.

[525] Enterprise systems are large-scale computer application software packages that support business processes, information flow and data analytics.

[526] 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 requires more focussed investigations and site visits to quantify costs.[527]

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.[528] 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;[529] 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.

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

[528] 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.

[529] 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: [530]

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 have introduced an RCP3 initiative to help us understand the evolution of the scope of projects through their development phases and for us to 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 eventually the RCP4 base capex proposal.

Decision on cost estimation information reporting for RCP3

H28 We are introducing for RCP3 a 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 and programmes.

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.[531] The new information reporting requirement extends this comparison to include the cost estimates in the proposals sent to the Commission for approval.

H30 The information should 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

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[530] The FECs are from Transpower's RCP3 Regulatory Template (RT01) (above n 518). 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.

[531] 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.

H30.3 how the efficiencies of scope are captured in the base capex forecasts.

H31 Specifically, we are introducing a new obligation under a notice that we will provide to Transpower under s 53ZD(1) of the Act to provide the Commission with:

H31.1 Information 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 Information 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, an explanation of reasons for variances greater than +/- 30% between the high-level building block estimates or the total estimates.[532]

H32 Transpower will be required to provide these reports:

H32.1 annually, within 105 working days after the end of each disclosure year, for:[533]

H32.1.1 all completed base capex projects greater than $5 million, including listed projects approved in RCP2; and

H32.1.2 all completed major capex projects regardless of when they were approved; and

H32.2 for RCP3, within 105 working days after the end of the last disclosure year of RCP3, for all base capex programmes valued at more than $20 million.[534]

H33 Aspects of the reports may be confidential for commercial reasons and not be published. However, we will work with Transpower to ensure that relevant parts of the reports can be disclosed to interested parties. Our objective will be to ensure that sufficient information is readily available to interested persons to assess whether the Part 4 purpose is being met.

H34 Since the report will be an output from Transpower's cost estimating tool 'TEES', we do not consider the report will need to be audited.

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[532] 30% reflects the upper bound of the accuracy of cost estimates in the proposal.

[533] The reporting period of 105 working days will end in mid-November each year.

[534] We selected $20 million as the size limit, because this is the usual threshold between major capex and base capex.

H35 We intend to seek this information under s 53ZD instead of s 53N or s 53C because this information is not strictly for monitoring of compliance with the RCP3 price-quality path and may not meet the purpose of information disclosure. Rather, it is intended to assist us in our cost-estimation considerations for RCP4.

H36 The s 53ZD notice will 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.

Attachment I Opex

Purpose of this attachment

I1 The purpose of this attachment is to set out our decisions relating to opex for the IPP reset, and to explain our reasons for those decisions.

Operating expenditure overview

RCP3 proposed opex versus approved opex for RCP2

I2 Transpower proposed total opex for RCP3 of $1,342.9m in 2017/18 dollars. This is shown in Table I1 below, alongside the RCP2 opex.[535]

I3 Key contributors to Transpower's proposed opex increase in RCP3 are increases of $55.0m in predictive maintenance, $15.9m in insurance costs, and $6.9m in Asset Management & Operations (**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.[536]

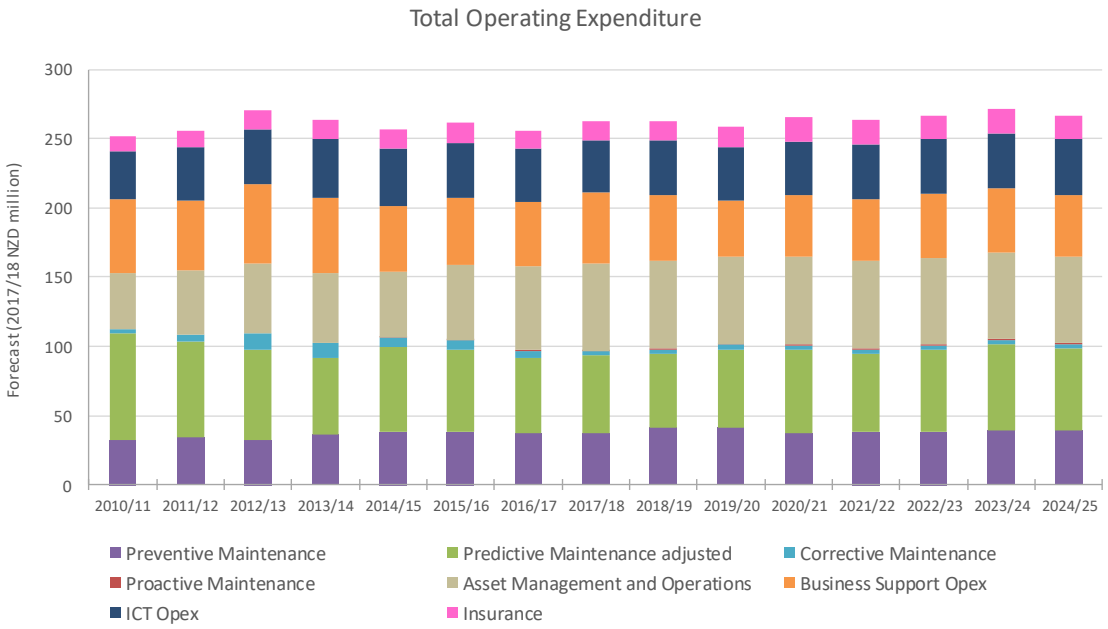
Opex trends since RCP1

I4 Figure I1 shows annual opex for periods RCP1 to RCP3 (reflecting reported and forecast data) broken down by major expenditure category.

[535] Above n 51, at 98.

[536] 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 51, at 98).

Figure I1 Annual opex for RCP1 to RCP3[537]



[537] Includes the deliverability adjustment offset against the predictive maintenance opex.

Table I1 Summary of operating expenditure

	RCP2 expenditure ($m)	RCP3 proposal expenditure ($m)	Draft decision ($m)	Final decision ($m)	Variance (RCP2 to proposal)	Variance RCP2 to decision)	% approved	Identified programme?
Network opex								
Preventive maintenance	$194.0	$198.8	$198.8	$198.8	2.5%	2.5%	100.0%	Yes
Predictive maintenance	$280.9	$335.9	$322.7	$322.7	19.6%	14.9%	96.1%	Yes
Corrective maintenance	$24.4	$15.0	$15.0	$15.0	-38.6%	-38.6%	100.0%	No
Proactive maintenance	$2.7	$2.5	$2.5	$2.5	-8.1%	-8.1%	100.0%	No
Maintenance deliverability adjustment	$0.0	-$29.1	-$29.1	-$29.1	N/A	N/A	100.0%	No
Total network opex	**$502.0**	**$523.0**	**$509.8**	**$509.8**	**4.2%**	**1.6%**	**97.5%**	
Non-network opex								
Asset management and operations[538]	$302.6	$309.5	$309.2	$309.2	2.3%	2.2%	99.9%	Yes
Business support[539]	$237.3	$226.5	$220.6	$209.1	-4.6%	-11.9%	92.3%	Yes
ICT opex[540]	$191.6	$195.9	$195.9	$168.3	2.3%	-12.2%	85.9%	No
Insurance[541]	$72.1	$88.0	$68.1	$82.0	22.0%	13.7%	93.2%	No
Total non-network opex	**$803.6**	**$819.8**	**$793.8**	**$768.5**	**2.0%**	**-4.4%**	**93.7%**	
Total RCP3 Opex	**$1,305.6**	**$1,342.9**	**$1,303.6**	**$1,278.4**	**2.9%**	**-2.1%**	**95.2%**	

[538] The reduction (compared to the RCP3 proposal) in the draft decision and final decision is due to the classification of a levy as a pass-through cost and its removal from opex.

[539] The RCP3 final decision reduction relates to the reclassification (capitalisation) of payments relating to operating leases under GAAP.

[540] The RCP3 final decision reduction relates to the reclassification (capitalisation) of payments relating to operating leases under GAAP.

[541] The reduction (compared to the RCP3 proposal) in the draft decision and final decision is due to the classification of a levy as a pass-through cost and its removal from opex.

I5 The key features of the annual expenditure profile since 2010/11 are:

I5.1 Reasonably consistent contributions to total annual opex from maintenance (around 40%) and AM&O (since start of RCP2) (around 23%); and

I5.2 Variable costs for insurance over time, reflecting external insurance market conditions.

Transpower's RCP3 opex forecasting methodologies

I6 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:[542]

> 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.

I7 Base-step-trend forecasting is discussed in more detail in Attachment I.1.

I8 Transpower has taken the following approach to forecasting the base amount:[543]

I8.1 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;

I8.2 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

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[542] Above n 51, at 59.

[543] Above n 53, 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.[544]

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 Maximo[545] 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.

[544] Transpower has set out steps it has taken in order to innovate and drive efficiency gains, in support of its view that the base year is efficient.

[545] Maximo is Transpower's operational asset register and maintenance management tool.

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.

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 opex Incremental Rolling Incentive Scheme

I18 In analysing the results of the base-step-trend approach, we also consider the interaction between opex and the opex IRIS.

I19 The opex IRIS provides a constant strength incentive for Transpower to realise efficiency gains on its opex. The IRIS mechanism results in Transpower retaining approximately 25% of the benefit of any underspend of its opex allowance, or bearing approximately 25% of any overspend (based on the most recent WACC determination).[546] The IRIS mechanism returns (or passes on) the remaining proportion 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 approximately 25% 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).

[546] The percentage of benefit or additional cost that is shared with Transpower's customers is not a set percentage, but depends on a formula in the Transpower IM Determination which takes the WACC rate as one of the inputs. We expect the retention factor will change slightly based on the final WACC applying to the IPP (we intend to publish this in October 2019). Clauses 3.6.2 and 3.6.4 of the Transpower IM Determination.

I21 For temporary gains (eg, an amount of expenditure that can be deferred until later years) the net benefit is the timing advantage (ie, the NPV of the amount of expenditure deferred, less the NPV of the later spend) and Transpower will retain approximately 25% 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 would be too high).

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.

I22.3 Step changes for additional work requirements ensure that these additional expenses are correctly treated.

I23 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. We are currently consulting separately with interested persons on our proposed approach for calculating the "differences in penultimate year", an input to calculating the baseline adjustment term, as required by the Transpower IMs.[547]

I24 We note that the estimated annual revenues shown in this paper include Transpower's estimate of this recoverable cost in its $103 million of forecast IRIS recoverable costs. This figure includes the effect of Transpower's forecast value for the baseline adjustment term (this estimate was $79.3m[548]) as well as other amounts accrued. Our draft decision on setting the baseline adjustment term results in a materially lower figure than Transpower's $79.3m estimate.[549]

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[547] Above n 76.

[548] Above n 76, at [X19]. This number reflects Transpower's estimate, with a minor adjustment to reflect the more recent WACC estimate of 5.13% (rather than the 5.50% used at the time of Transpower's RCP3 proposal).

[549] Above n 76.

Opex review of Transpower's proposal

Opex review and the Capex Input Methodologies

I25 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.

I26 Therefore, consistent with our approach to assessing base capex, in assessing opex we have been guided by:

I26.1 the extent to which the opex that Transpower proposes will promote the purpose of Part 4 of the Act; and

I26.2 where they can be usefully applied to opex, the base capex evaluation criteria.[550]

I27 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).[551]

Transpower's proposal was reviewed by an independent verifier

I28 In our Process paper, we considered it would be beneficial to use an independent verifier to verify Transpower's proposal in advance of Transpower submitting it to us. We considered that an independent verification process would:

I28.1 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;

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[550] Schedule A of the Capex IM.

[551] '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].

I28.2 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;

I28.3 provide useful insights to Transpower in terms of potential operational improvements it could make;

I28.4 help to mitigate the risk of any potential incentives on Transpower to provide overly generous estimates of forecast expenditure; and

I28.5 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.

I29 We consider that the independent verification process has been useful and effective for us, for Transpower, and for consumers. Verification has:

I29.1 provided many of the benefits we identified in our Process paper;

I29.2 identified key areas for us to focus on in our review of Transpower's opex proposal; and

I29.3 identified issues we may want Transpower to focus on as it continues to improve its asset management and planning processes.

I30 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.[552]

Limitations in Verifier expertise

I31 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.

I32 The exception related to the step change in insurance costs. Although the Verifier commented on the prudency of the insurance costs, it considered that expert actuarial advice was necessary to assess the efficiency of the opex.

[552] As signalled in our Process paper.

I33 Also, as discussed in Chapter 2, we engaged EMCa to test the ICT capex and opex programmes as a whole. In its report, EMCa has provided its assessment of Information Services and Technology (**IST**) staffing costs within business support and a high-level overview of ICT expenditure trends in Australia as a comparison with Transpower in New Zealand, which is discussed in the relevant sections.

Sub-attachments

I34 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:

I34.1 a short summary of Verifier conclusions and key points;

I34.2 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;

I34.3 issues raised after the verification and our analysis and how these were reflected in the Issues paper and Draft decisions and reasons paper;

I34.4 a summary of submissions relevant to the opex identified and non-identified programmes;

I34.5 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

I34.6 our conclusions about whether to approve Transpower's proposed expenditure for our decision, and if not, how much to approve.

I35 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:

I35.1 asked questions in the Issues paper seeking submitter views on aspects of Transpower's proposal;

I35.2 sought further supporting information from Transpower; and

I35.3 carried out analysis of this information to decide next steps.

I36 We have provided a guide in Table I2 that points to the part of this attachment linked to each identified and non-identified programme, to highlight:

I36.1 where issues have been identified;

I36.2 what has been submitted on by interested persons on our Issues paper and our Draft decisions and reasons paper; and

I36.3 where supporting information has been sought from Transpower and further analysis has been 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?	Decision reasoning
Verifier reviewed – Identified programmes				
Preventive maintenance (Attachment I.2)	Yes	No	Yes	• 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. 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	Yes	Yes	• 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 decision, compared to Transpower's proposal.

Programme and Attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Asset Management and Operations (Attachment I.3)	Yes	Yes	Yes	• Maintaining same level of activity as RCP2 is consistent with the underlying drivers including capex planning and investigations. • However, we had reservations around the efficiency of the base year. • Downward trend factor includes productivity gains. • We accept the proposed expenditure (with the exception of $0.4m for levies paid to Utilities Disputes Limited, which now are a pass-through cost).
Business Support (Attachment I.5)	Yes	Yes	Yes	• 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. • Consideration of additional review and analysis performed by EMCa. • We accept the proposed expenditure, with the exception of $17.4m of payments related to operating leases which are now capitalised under GAAP.

Programme and Attachment reference	Issues identified after Verifier and our analysis?	Submission on expenditure?	RFI and further analysis?	Decision reasoning
Verifier reviewed – Non-identified programmes				
ICT opex (Attachment I.4)	Yes	No	Yes	• 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, with the exception of $27.6m of payments related to operating leases which are now capitalised under GAAP.
Insurance (Attachment I.6)	Yes	Yes	Yes	• 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, with the exception of: - $4.1m in FENZ levies (now a new recoverable cost) - $1.9m due to concerns relating to overprovision of self-insurance (see comments in Attachment I.6).
Corrective maintenance (Attachment I.2)	No	No	No	• Relatively low materiality of the portfolios. • Difficulties in predicting expenditure within these portfolios precisely. • Proportionate scrutiny applied. • We accept the proposed expenditure.
Proactive maintenance (Attachment I.2)	No	No	No	

Top-down challenge

I37 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).

I38 To address this concern, we have looked at, or sought additional information about, expenditure at a wider level, where appropriate. Specifically, we have:

I38.1 requested additional information regarding total expenditure within AM&O (ie, AM&O totex) in order to better understand the drivers and patterns of expenditure;

I38.2 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

I38.3 considered the possibility that maintenance opex includes work that may not be needed.

I39 Due to the substitutability of opex amongst its sub-categories,[553] Transpower may reallocate opex to attempt to achieve efficiencies. As discussed at paragraphs I18 to I22, underspent and overspent opex will produce incentive amounts.

I40 The 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).

I41 The ability of interested persons to access information and form a view on Transpower's efficiency was a topic raised by Meridian in its submissions. It considered 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.[554]

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[553] Transpower's opex is fungible across the opex categories and is effectively a single pool of expenditure.

[554] Above n 111, at 2-5, and above n 112, at 1-2.

I42 We agree that this would be useful information for interested persons and that requiring this information to be provided will help promote these goals over time. We have therefore incorporated an annual reporting requirement into the revised draft IPP determination that requires Transpower to publish and explain the opex IRIS incentive adjustments it receives (or incurs) for RCP3, which would be an indicator of Transpower's direction of travel on opex efficiency.

I43 Meridian has indicated its support for this reporting requirement.[555]

I44 We also note that the effectiveness of the opex IRIS as an incentive mechanism is dependent on preserving the linkage between regulatory periods. The calculation of the baseline adjustment term (through our determination of the 'differences in penultimate year' term) is key to preserving this linkage and ensuring the correct incentive outcomes, in particular, the correct treatment of permanent and temporary efficiency savings (or overspends).

I45 Our analysis and draft decision on the baseline adjustment term is available for comment by interested persons.[556]

I46 Transpower has set out steps it has taken in order to innovate and find efficiencies in its submission on our Issues paper:[557]

> 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.

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[555] Above n 112, at 1.

[556] Submissions have closed, but cross-submissions may be made until 5pm, Thursday 5 September 2019 (above n 76).

[557] Above n 125, at 4.

Exclusion of costs of moving to a new Transmission Pricing Model

I47 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.

I48 Due to the uncertainty in timing and quantum there are difficulties with including this as part of our RCP3 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.[558]

I49 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 opex IRIS mechanism, or the base capex incentive (depending on whether costs are opex, capex, or both).

Fines and other pecuniary penalties

I50 We have amended the definition of 'operating cost' in the Transpower IM Determination to make it clear that Court-imposed fines or penalties are excluded from opex. This will also apply to any other body with a statutory power to impose such fines or penalties.[559] The amendment and our responses to the points raised in submissions to our draft decision are discussed in the reasons paper on Transpower IM amendments published yesterday.[560]

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[558] In its submission on our proposed changes to the Transpower Input Methodologies, Transpower proposed an IM amendment, to provide greater certainty, that would enable the Commission to allow additional base capex and recoverable costs relating to responding to the change (Transpower "Proposed amendments to input methodologies" (5 July 2019), at 4). We note that under s 54V(3) of the Act, the Electricity Authority must advise us as soon as practicable, following any change in the Code that results in increased costs to Transpower, and that s 54V(5) of the Act provides a requirement for us to reconsider the IPP determination if the Electricity Authority asks us to do so. The Electricity Authority identified a number of potential Code amendments that it considered would be necessary to accompany its proposed changes to the TPM (above n 157, at Appendix F).

[559] Above n 63. We are still to finalise our decision on the treatment of pecuniary penalties in respect of EDBs and we will address their submissions in our final EDB IM amendments decision which we will publish in November 2019.

[560] Above n 64.

I51 If penalty costs were able to be included in Transpower's forecast opex allowance, approximately 75% of the cost would be passed through to consumers via the opex 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.

I52 The IM amendment will also apply to all opex IRIS incentive amounts that will be calculated with respect to 'forecast opex' for RCP3 onwards. We are currently consulting on the new financial reporting standard NZ IFRS 16, and its effects on IRIS.[561] We expect to reach a final decision on IM amendments resulting from this change in November 2019. To the extent any additional changes to IRIS are required to give effect to the change to the treatment of pecuniary penalties in the definition of operating costs, we will also finalise these amendments in November.

I53 Transpower has confirmed that there are no such fines or pecuniary penalties in its base-year opex used to forecast its RCP3 opex, which will ensure that we get our best estimate of the forecast opex for RCP3 on a pecuniary penalty-exclusive basis, as well as helping provide confidence that the expenditure allowance does not include an amount relating to fines or pecuniary penalties.[562] The amendment to the Transpower IM Determination will apply to Transpower in the event that such fines or penalties are imposed at any future time.

Productivity

I54 A consideration raised in submissions related to productivity within the Electricity, Gas, Water and Waste Services (**EGWW**) sectors. MEUG identified recent work by the Productivity Commission showing that the EGWW sector has had both a decline in labour productivity and a declining share of gross domestic product (**GDP**) over the 13-year period ending in 2016. It suggested that we seek to obtain the underlying analysis to better understand historic productivity trends for both Transpower and EDBs.[563]

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[561] Above n 64.

[562] Transpower's response to RFI067 – Pecuniary penalties.

[563] Above n 411, at [23].

I55 We consider that Transpower is addressing the issue of productivity in its business. For example, with regard to Transpower's external maintenance contracts, which are provided through a number of service providers, the Verifier concluded:[564]

> We are satisfied that Transpower has a sound approach in negotiating and managing the standard job costs as part of external service provider contracts, and that the performance management framework in place should continue to put pressure on the service providers to find efficiencies in their costs.

I56 MEUG's suggested analysis is outside of the scope of our work for the RCP3 reset. However, this work may be helpful to do over time and could be considered as part of our future 'summary and analysis' work.

Attachment I.1: Further detail on base-step-trend forecasting methodology

Verifier's description of base-step-trend

I57 The Verifier described base-step-trend forecasting, and made the following comments, which we consider helpful to reproduce:[565]

> 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.

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[564] Above n 53, at 146.

[565] Above n 53, 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 prudency 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

I58 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 and any inefficiencies within the base year will also be built into the forecast for RCP3 (subject to these being removed by a trend factor).

I59 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.

I60 However, we note the following:

- I60.1 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;
- I60.2 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;
- I60.3 Transpower's maintenance opex is outsourced to service providers, which adds a further potential level of variability, due to contractor capacity; and

I60.4 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.

I61 In the context of the entire RCP, and without adjusting for any expected step changes or one-off irregularities in expenditure, 2017/18 is:

I61.1 0.6% ($0.6m) lower maintenance opex than the RCP average; and

I61.2 0.7% ($2m) higher total opex than the RCP average.

I62 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

I63 Maintenance opex maintains the grid assets to meet safety, asset reliability and operational requirements. Maintenance opex comprises 39% of Transpower's proposed opex.

I64 Since RCP1, Transpower has been evolving its maintenance asset practice and it described this evolution as follows:[566]

I64.1 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;

I64.2 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

I64.3 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.

[566] Above n 51, at 97.

I65 For RCP3, Transpower has classified maintenance opex into four portfolios. Table I3 shows Transpower's RCP3 forecasts for these portfolios.

Table I3 Summary of Maintenance expenditure in Transpower's RCP3 proposal ($m)

	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	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

I66 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 decision rather than as input into detailed analysis.

Reasons for addressing this issue

I67 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 opex[567]

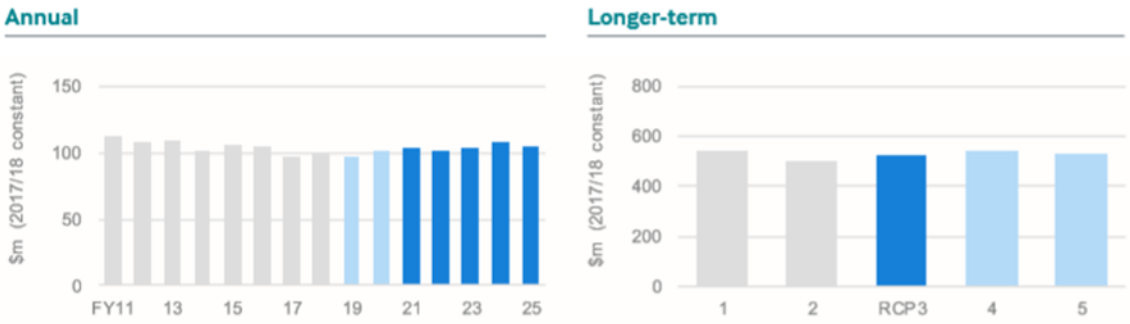
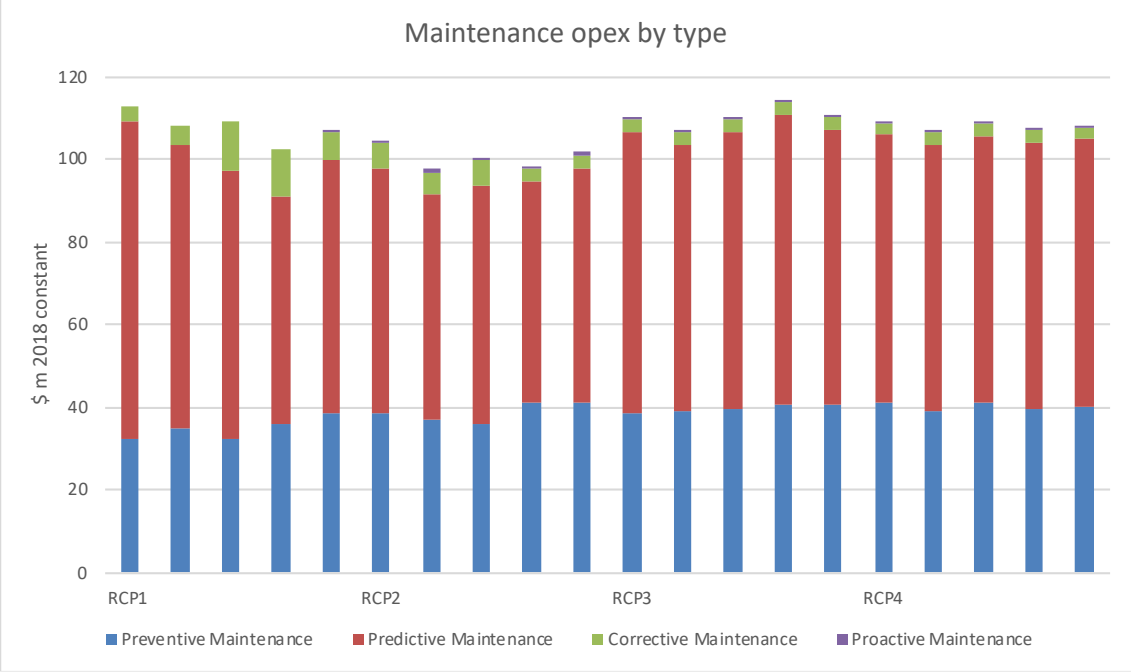


Figure 53: Historical and forecast maintenance opex

[567] Above n 51, at 107.

I68 The increase in the unadjusted maintenance expenditure in RCP3 was 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.[568]

Figure I3 Historical and forecast maintenance opex



Deliverability adjustment

I69 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."[569] 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.[570]

[568] Above n 53, at 371.

[569] Above n 53, at 307.

[570] Above n 125, at 27.

I70 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:[571]

> 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.

I71 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.[572] It said:[573]

> 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.

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[571] Above n 125, at 44-45.

[572] Above n 125, at 27. Transpower also provided examples of how it considers it may continue to unlock these efficiencies (above n 125, at 28 and Attachment D).

[573] Above n 125, at 42.

I72 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

I73 Predictive maintenance is performed to address defects identified during preventive maintenance or by the monitoring systems. Transpower stated that:

I73.1 it rectifies approximately 15,000 defects per year under Predictive maintenance; and

I73.2 there is some low impact outstanding additional work that may require intervention in a later period.[574]

I74 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.

I75 Transpower uses the spend ratio between the predictive portfolio spend and total maintenance spend 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%).[575]

Relevant considerations

I76 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).[576]

I77 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.

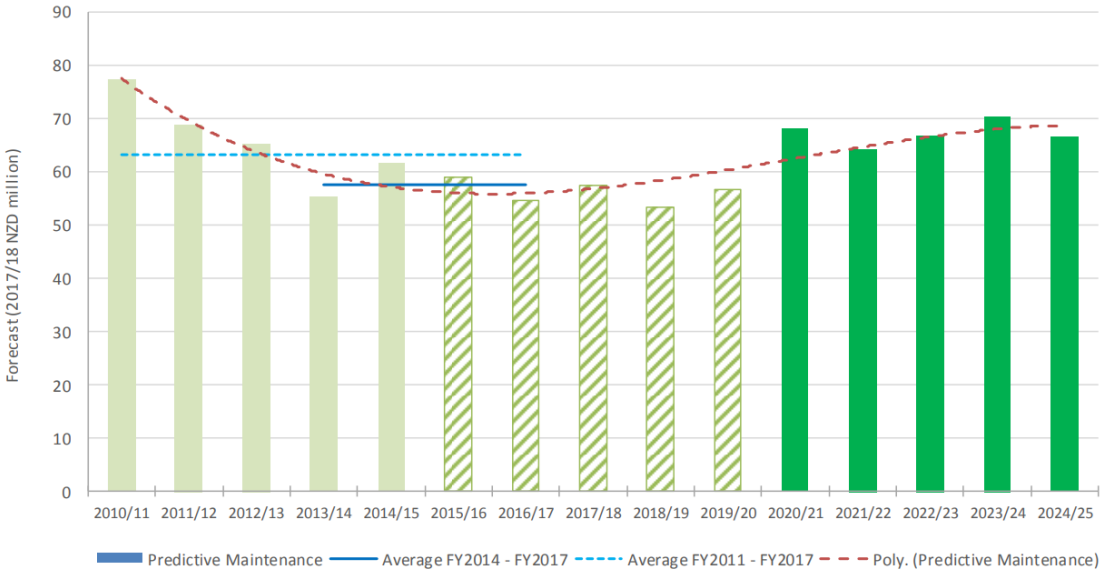
---

[574] Transpower "Maintenance Opex Overview" (September 2018), at 10.

[575] Transpower "Maintenance Planning Framework" (September 2018), at 10.

[576] Above n 51, at 102.

Figure I4 Historical and forecast predictive maintenance[577]



I78 The Verifier:

I78.1 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;[578]

I78.2 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;[579]

I78.3 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;[580]

I78.4 was not able to verify that $26m of the step increase is consistent with GEIP but concluded that it was prudent; [581, 582] and

[577] Above n 53, at 318.

[578] Above n 53, at 321.

[579] Above n 53, at 320.

[580] Above n 53, at 322.

I78.5 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.[583]

I79 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.

I80 We agree with the Verifier's reasoning that 2017/18 is an appropriate base year because it represents the latest audited maintenance costs, and it should include any efficiency improvements realised so far in RCP2.[584]

I81 We have re-assessed the step component of the predictive maintenance forecast. Our assessment is summarised in Table I4 below.[585]

Table I4 Summary of the step components of predictive maintenance

Drivers	Transpower Forecast ($m)	Commission accepts for decision ($m)	Comments
Asset health – additional opex to manage older assets[586]	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.
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 decision is based on verification assessment that this expenditure forecast meets GEIP.

[581] 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.

[582] Above n 53, at 325.

[583] Above n 53, at 322.

[584] Above n 53, at 322.

[585] Above n 51, at 102.

[586] In Transpower's proposal this amount was $10.4m and in response to our RFI, Transpower modified this to $5.2m (same as in the Verifier report).

Drivers	Transpower Forecast ($m)	Commission accepts for decision ($m)	Comments
RCP4 and RCP5 programme support	18.5	18.5	This expenditure is for additional testing and data collection. The Verifier was unable to assess this as consistent with GEIP but considered it as prudent. 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.
Deferred maintenance	14.3	14.3	This includes the following components in Transpower's proposal - Attachment points ($8.9m), steel and bolt ($2.9m), deferred maintenance ($2.5m). The Verifier assessed this as consistent with GEIP. We agree with the Verifier and we accept Transpower's proposed expenditure.
General maintenance of switchyard facilities	2.6	2.6	This includes maintenance of switchyard gravel and fencing, and appears to be due to deferred maintenance. The Verifier assessed this as consistent with GEIP. We accept Transpower's proposed expenditure.[587]
Health and safety	4.8	4.8	Additional cost for managing earth potential rise[588] seems to be accelerating the works. Transpower advised that the additional cost is due to temporary mitigation of asbestos such as protection equipment, temporary barriers and tunnels. Verifier assessed this as consistent with GEIP. We accept Transpower's proposed expenditure.
Earth switch	3.0	3.0	Maintain rather than replace. The Verifier assessed this as consistent with GEIP. We accept Transpower's proposed expenditure.
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.)

[587] 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.

[588] 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 ($m)	Commission accepts for decision ($m)	Comments
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 Transpower's proposed expenditure.
Forecasting adjustment		-6	Refer to the section on forecasting adjustment below.
Total	67.4	54.2	

I82 Our assessment of the 'step' components is to:

I82.1 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:

I82.1.1 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;[589] and

I82.1.2 gas insulated switchgear (GIS) testing and repairs: the additional work includes expert review of GIS and gas and partial discharge testing;[590]

I82.2 accept the component "RCP4 and RCP5 programme support" since this has the potential to provide a more informed forecast of upcoming transmission line work;[591]

I82.3 accept all "deferred maintenance components". Refer to our discussion at paragraphs I18 to I22 above of how IRIS treats deferred expenditure;

I82.4 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

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589 Transpower's response to RFI042 - Risk informed maintenance and predictive maintenance step change.

590 Above n 447, at 107.

591 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.

I82.5 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

I83 We have made a forecasting adjustment to the step forecast because:

I83.1 Transpower has applied for $26.4m of predictive maintenance to address deferred maintenance;[592]

I83.2 We note that in the first three years of RCP2, Transpower has under-delivered its maintenance opex by $21.4m;

I83.3 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;

I83.4 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;

I83.5 Given that the base component of the RCP3 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;

I84 In its submission, Transpower commented that the adjustment should not be applied stating that:[593]

> our view is a further $6 million adjustment would compound the level of cost/risk trade-off we will be required to make.

I85 Transpower also mentioned that its $29.1 million deliverability adjustment included for over-forecasting. Transpower stated that one such adjustment was for the lower than anticipated delivery of dampers and spacers.[594]

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[592] Further details are in Table I4 above.

[593] Above n 71, at 22.

[594] Above n 71, at 22.

I86 We are not convinced that Transpower has made a strong case for the additional allowance:

I86.1 In our view, Transpower has not provided sufficient reasons to justify the re-instatement of the over-forecasting adjustment. The adjustment for delivery of dampers and spacers mentioned by Transpower is not due to over-forecasting but deferring of work that it could not deliver as highlighted in Table I4 above where Transpower stated that "*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*".

I86.2 Similarly, the argument on cost/risk trade-off is not well justified. For example, in our decision for RCP2, we reduced corporate opex and Transpower put forward similar arguments to justify an increase. Transpower commented that a reduction would lead to unacceptable risk to safety, reliability and the deliverability of its Capex programme. The actual and Transpower's forecast opex for RCP2 show there was over-forecasting and Transpower forecasts to underspend the Corporate asset portfolio compared to the allowance.[595]

I87 We therefore have adjusted the predictive opex allowance ("forecasting adjustment") by $6m to address this concern.

I88 We are satisfied that the forecasting adjustment will not compound the level of cost/risk trade-off.

High-level overview of our decision on maintenance opex

I89 Table I5 and Table I6 outline the amounts of maintenance opex we have approved, and how they compare to Transpower's proposal.

[595] Transpower, "Response to IPP Draft Decision" (27 June 2014), at 28.

Table I5 Summary of predictive maintenance forecast by components

Components	Description	Transpower's proposal ($m)[596]	Decision ($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 I4.	67.4	54.2
Trends	There is no trend.	0	0
Total		335.9	322.7

Table I6 Summary of decision for Predictive maintenance ($m)

	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	RCP3 total
Transpower proposal	68.1	64.2	66.8	70.3	66.5	335.9
Approved for decision	65.4	61.6	64.2	67.6	63.9	322.7

Preventive maintenance

I90 Preventive maintenance is delivering time-based maintenance activities, such as routine checks, to assess condition and carry out routine services.

I91 The main preventive maintenance activities are:

I91.1 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;

I91.2 Condition assessments and condition monitoring – periodic measurement activities performed to monitor asset condition and to provide systematic data for analysis; and

I91.3 Servicing – routine tasks performed on the asset to ensure that its condition remains at an acceptable level.

[596] Above n 51, at 102.

I92 Defects found during preventive maintenance are addressed under predictive maintenance.

Relevant considerations

I93 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.

I94 The Verifier recommended that we accept Transpower's forecast. The Verifier:

I94.1 assessed that Transpower's approach of forecasting using standard jobs and costs allows for a direct link between maintenance work planning and risk assessment of maintenance programmes to support works prioritisation;

I94.2 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; and

I94.3 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.[597]

I95 We have some concerns with preventive maintenance:

I95.1 We expect preventive maintenance to reduce over time as Transpower implements reliability-based maintenance practice; and

I95.2 We see that the preventive maintenance forecast for RCP3 is greater than that for RCP2.

[597] Above n 53, at 315-317.

Figure I5 Preventive maintenance work volumes[598]

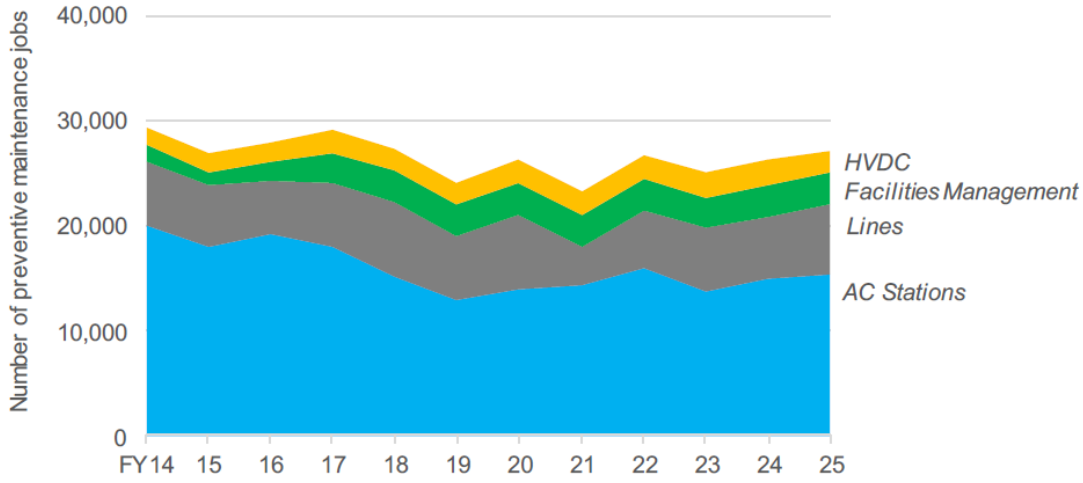

Figure 51: Preventive maintenance work volumes

I96 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.

I97 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.

I98 Transpower has also signalled:[599]

> 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.

I99 Transpower forecasts an increase in preventive maintenance in RCP3 and later, as shown in Figure I6.

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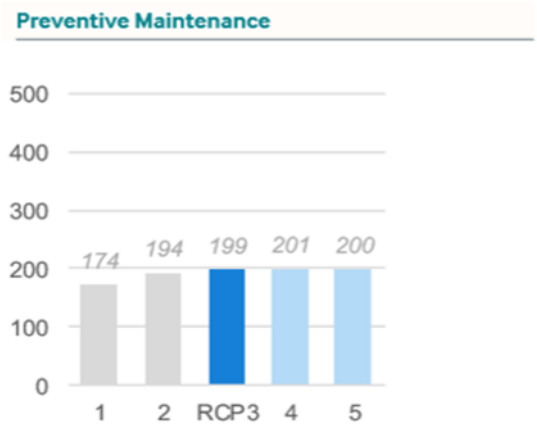
[598] Above n 51, at 104.

[599] Above n 125, at 44.

Figure I6 Historical and forecast preventive maintenance ($m 2018/18 constant)[600]



I100 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)[601]

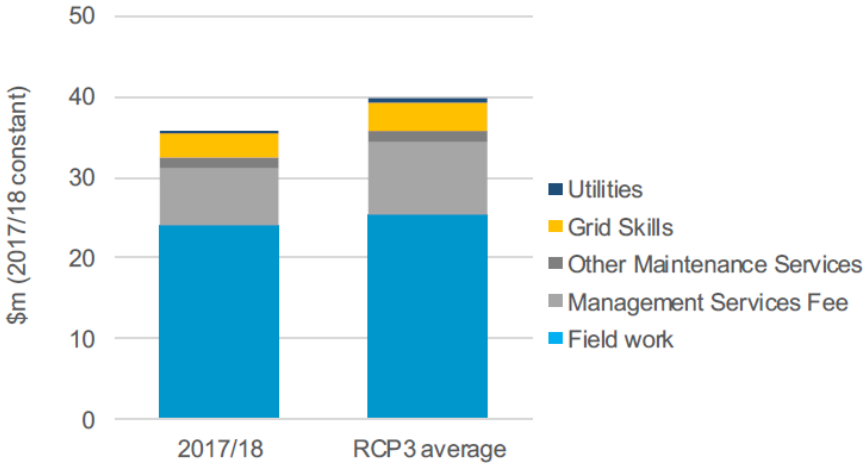


Figure 52: Composition of predictive maintenance forecast

[600] Above n 51, at 108.

[601] Above n 51, at 105.

I101 Transpower explained the additional maintenance service fees as follows:[602]

> 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.
>
> 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.

I102 Our decision is to accept Transpower's proposed forecast. We accept Transpower's argument that some of the jobs have become more complex for valid 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.

Decision

I103 Our 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 ($m)

	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	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

I104 Corrective maintenance is responding to faults or performing maintenance work on failed equipment.

I105 Proactive maintenance is improvement work driven by reliability analysis of either assets or design.

I106 These maintenance activities are difficult to predict and Transpower has used a base-step-trend approach for forecasting these portfolios.

[602] Above n 589.

Decision

I107 Our decision is to accept Transpower's proposed corrective and proactive maintenance, shown in Table I8.

Table I8 Summary of approval of Corrective and Proactive maintenance ($m)

	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	RCP3 total
Corrective maintenance						
- Proposed by Transpower	3.0	3.0	3.0	3.0	3.0	15.0
- Our decision	3.0	3.0	3.0	3.0	3.0	15.0
Proactive maintenance						
- Proposed by Transpower	0.5	0.5	0.5	0.5	0.5	2.5
- Our 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

I108 AM&O contains the staffing costs for planning and management of grid work. Transpower described the key activities that AM&O carries out as:[603]

- 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.

I109 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.

[603] Above n 51, at 109.

I110 Transpower proposed $309.5m in opex within AM&O over RCP3. This comprises:[604]

I110.1 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);

I110.2 Three steps that net off as zero:

I110.2.1 decrease in expenditure due to RCP2 initiatives;

I110.2.2 increases in pre-capex investigations; and

I110.2.3 increases in strategic investigations;

I110.3 Four trend factors that total a $4.8m decrease in expenditure over RCP3:

I110.3.1 $2.7m growth in black start[605] and over-frequency event[606] costs;

I110.3.2 $0.6m increase for event charges;

I110.3.3 $3.1m decrease due to an expected 0.2% productivity gain; and

I110.3.4 $5m decrease, attributable to efficiency gains from ICT capex.

I111 AM&O expenditure has increased since RCP1, but is forecast to stabilise from the base year onwards (see Figure I8). The Verifier explained the increasing trend in expenditure since RCP1 as follows:[607]

> 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.

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[604] Above n 51, at 112.

[605] "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. See: https://www.transpower.co.nz/system-operator/electricity-market/black-start for further information.

[606] 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.

[607] Above n 53, at 328-330.

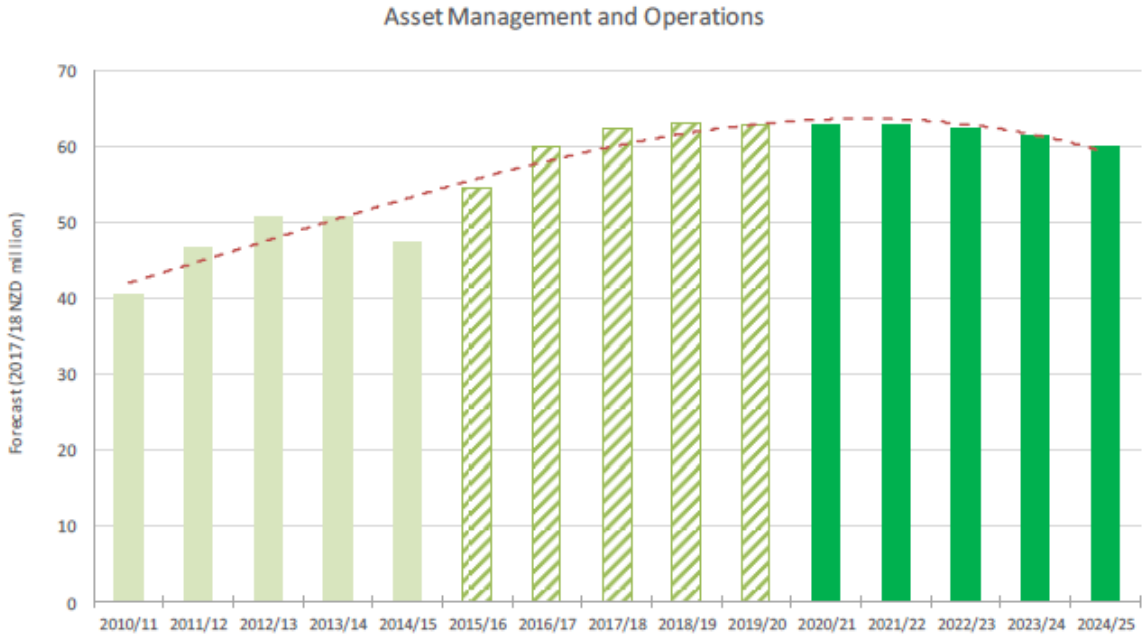
For RCP2, the maintenance planning changed to optimised, risk-based maintenance strategies using failure modes for many of the assets and continued time-based maintenance where it was more appropriate for other assets (such as power transformers and circuit breakers). This was supported by a review of 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.

I112 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).[608]

Figure I8 Annual AM&O Opex (RCP1-RCP3)[609]



I113 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.

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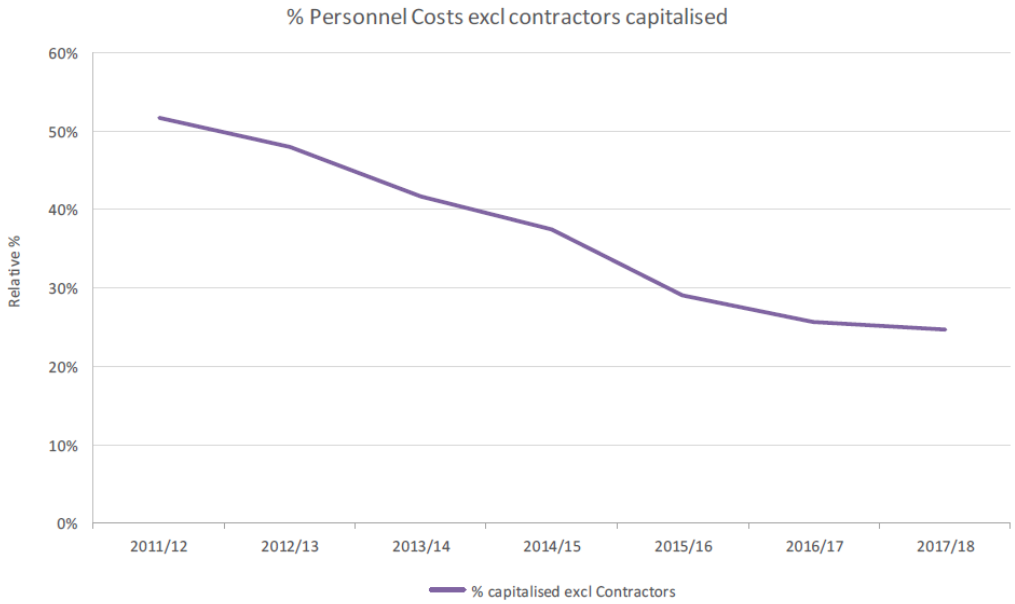
[608] Above n 51, at 109.

[609] Above n 53, at 327.

Figure I9 Capitalisation of FTEs within AM&O[610]



The Verifier considered Transpower's proposed AM&O expenditure

I114 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.

I115 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 were not expected to increase beyond RCP3.

I116 The Verifier also considered the transition from capex delivery to maintenance planning and the associated change in capitalisation rate.

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[610] Above n 53, at 332.

I117 In concluding, the Verifier said: [611]

> 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.
>
> 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.

I118 The Verifier reviewed the forecast trend in black start costs and identified the benefits in productivity included from the ICT capex forecast, and concluded:[612]

> 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.

I119 The Verifier also considered the drivers of the steps and the expected trend, concluding:[613]

> 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

I120 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 its proposed expenditure fits into its preparation for future challenges.

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[611] Above n 53, at 335.

[612] Above n 53, at 335.

[613] Above n 53, at 334.

I121 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.[614]

I122 Our draft decision, which took into account our additional review described below, provided an opportunity for interested persons to comment on our conclusions on AM&O opex.[615]

Additional review

I123 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.

I124 We also requested additional information from Transpower, to supplement the supporting information already provided to us.

I125 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.

I126 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 ODID conversions, to increased work on substations).

I127 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.

I128 Our draft decision was to allow the full amount of proposed opex (aside from the recategorization of a relatively small amount of proposed expenditure as a pass-through cost).[616] We did not receive further submissions on this aspect of our draft decision.

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[614] Above n 125, at 38-40.

[615] Above n 57, at [I93]-[I118].

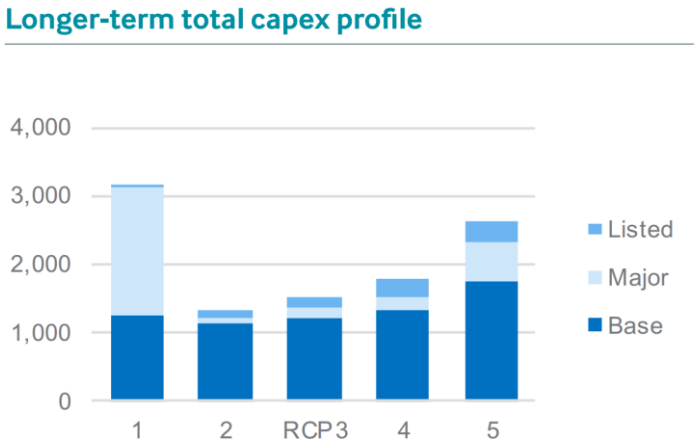
[616] Above n 57, at [I118].

I129 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.

I130 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.

I131 The increasing trend in major capex and listed projects is shown in Figure I10.

Figure I10 Total capex profile ($m 2017/18)[617]



I132 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.

[617] Above n 51, at 39.

Energy Complaints Scheme

I133 The Energy Complaints Scheme, established under the Electricity Industry Act 2010 and the Gas Act 1992, operated by Utilities Disputes Limited, provides a service to resolve complaints about distributors and retailers of electricity and gas. Transpower is required to be a member of this scheme.

I134 As a member, Transpower pays levies to fund the operation of the scheme. These levies form part of its forecast AM&O expenditure.

I135 Under the recent amendment to the Transpower IM Determination, these amounts will be pass-through costs during RCP3, 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.

Decision

I136 Our decision is to accept $309.2m of AM&O opex. This is a reduction of $0.4m from Transpower's proposal. This is on the basis that:

I136.1 We are comfortable that the level of AM&O opex is consistent with the RCP2 expenditure;

I136.2 The Verifier found Transpower's personnel/expenditure ratio benchmarks comparable to Australian transmission networks;

I136.3 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

I136.4 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

I137 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:[618]

I137.1 **Leases:** the costs of leases for ICT components, such as fibre circuits, used to support core business functions;

I137.2 **Third-party support and maintenance:** third-party costs to deliver specialist outcomes, such as offsite backups;

I137.3 **Outsourced services:** where it is more practical and cost-efficient to use specialist providers;

I137.4 **Licenses:** software and hardware licenses;

I137.5 **Communications and Control:** third-party costs to maintain TransGO; and

I137.6 **Investigations:** pre-capex project activities exploring options to deliver business outcomes.

I138 Transpower proposed $195.9m in ICT opex over RCP3.[619] This is a 2.3%, or $4.3m increase over RCP2 expenditure. Transpower's RCP3 proposed expenditure comprises:[620]

I138.1 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);

I138.2 A number of steps that total $9.9m. These are identified below, with regard to the individual categories that they relate to; and

I138.3 No trend factors.

I139 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.

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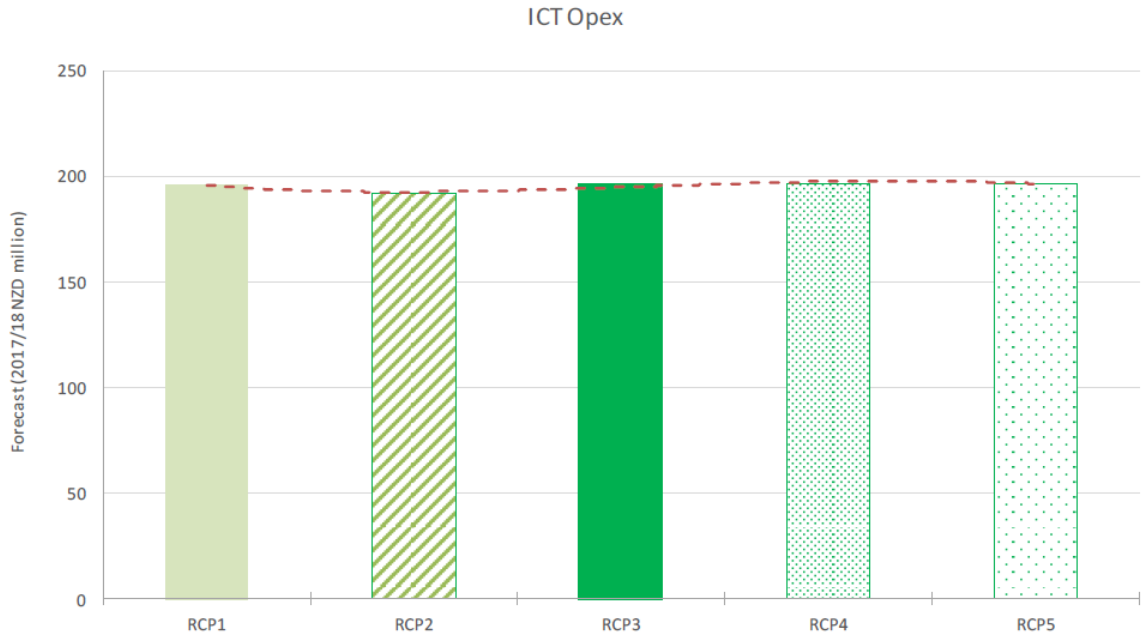
[618] Above n 447, at 474-475.

[619] This included $27.6m of operating leases that are capitalised under NZ IFRS 16. Our approach to these leases is discussed at paragraphs I160 to I162.

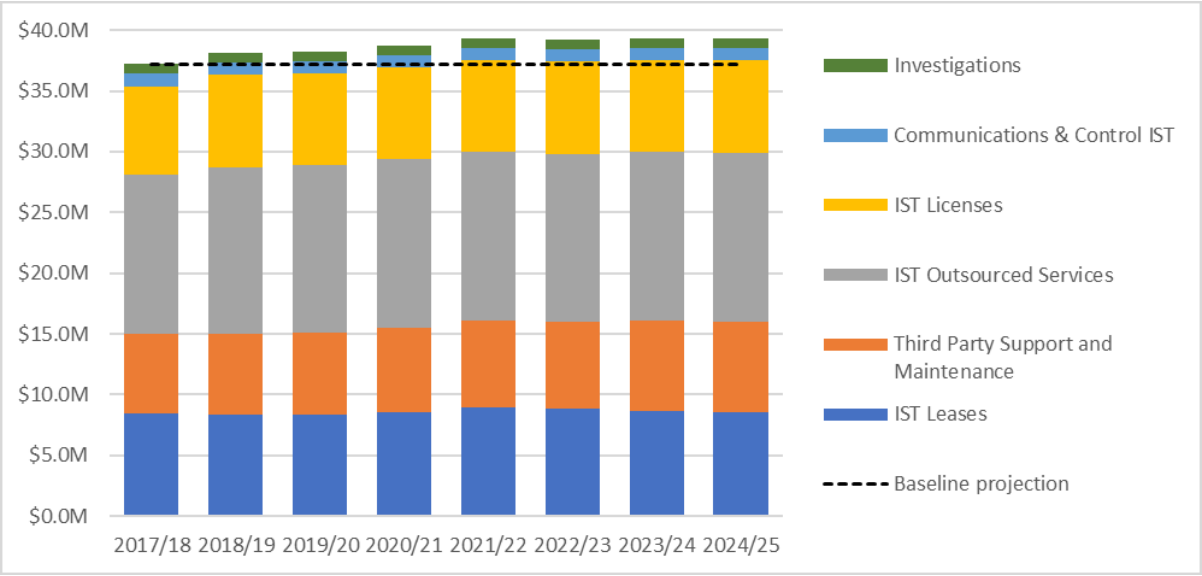
[620] Above n 51, at 122.

Figure I11 ICT Opex by RCP[621]



I140 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 IST Leases and Third Party Support and Maintenance, with the other categories remaining relatively consistent.

Figure I12 ICT Opex by category[622]



[621] Above n 53, at 348.

[622] Above n 53, at 351.

I141 Although it was not an identified programme, the Verifier considered ICT opex.

I142 The Verifier noted that:[623]

> 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.

I143 The main factors influencing the RCP3 forecast were identified by the Verifier as:[624]

- 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
- deferring the TransGO upgrade to RCP4 requiring leasing of additional network capacity for substation data.

I144 The Verifier concluded:[625]

> 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.

I145 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 on our Issues paper in relation to ICT opex.

I146 Our draft decision was to approve the amount of opex Transpower proposed under ICT opex.[626] We did not receive submissions on our draft decision in relation to this opex.

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[623] Above n 53, at 349.

[624] Above n 53, at 349.

[625] Above n 53, at 353.

Our view

I147 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.

I148 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.

I149 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.

IST Leases

I150 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.[627]

I151 IST 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.[628]

Third Party Support and Maintenance

I152 Approximately half of the $6.5m expenditure within this category relates to four items,[629] with the remainder said to be from a variety of third-party service providers with relatively low (less than $0.1m) individual costs.[630]

I153 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).[631]

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[626] Above n 57, at [I145].

[627] Above n 447, at 476.

[628] Above n 53, at 352.

[629] 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).

[630] Above n 447, at 476.

[631] Above n 53, at 352.

Outsourced services

I154 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:[632]

I154.1 $4.5m – infrastructure support (servers and desktops);

I154.2 $4m – operations management of the TransGO network by specialist providers supporting the Transpower Network Operations Centre;

I154.3 $2m – data centre facilities management;

I154.4 $1.8m – amortisations of telecommunications service fees; and

I154.5 $1.1m – service desk costs.

I155 Three step changes totalling $3.6m were identified:[633]

I155.1 $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;

I155.2 $1.0m for connection fees (to third-party core data traffic service) increase; and

I155.3 $0.7m for electricity costs for Data Centres (contracted rise).

Licenses

I156 The base amount of $7.3m is largely attributable to licenses from four main vendors:[634]

I156.1 $1.5m Oracle database licences;

I156.2 $1.1m IBM licences;

I156.3 $900,00 Microsoft select licences;

I156.4 $650,000 Checkpoint licences (software security); and

I156.5 the remainder (approximately $3.15m) comprises the remaining software packages used across Transpower.

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[632] Above n 447, at 477.

[633] Above n 51, at 123.

[634] Above n 447, at 477.

I157 Transpower also forecasted a $1.5m step due to increases in Microsoft licenses.

Communications and control

I158 Transpower considered the current level of $1.0m annual expenditure to be long-term sustainable, based on current operational needs, without step changes.[635]

Investigations

I159 Transpower proposed maintaining the $0.8m annual expenditure at its current level.[636]

Capitalisation of operating leases

I160 Transpower's proposed business support opex included amounts in respect of operating leases, which are affected by the change in accounting treatment under New Zealand Equivalent to International Financial Reporting Standard 16 Leases (NZ IFRS 16).[637] NZ IFRS 16 changes the accounting treatment of operating leases for lessees, by requiring operating lease payments to be capitalised and be reported as capital expenditure.

I161 We have separately released a draft decision setting out how we consider operating lease payments should be treated under our regulatory regime.[638] Our current view expressed in that draft decision is to accept alignment with NZ IFRS 16 for price quality and ID regulation purposes. Consistent with that approach, our draft decision is to make an adjustment to remove operating lease payments from the opex allowance.[639]

I162 At the time of its proposal, Transpower estimated that $39.5m of operating lease payments were included within its proposed ICT opex. Transpower has provided an updated estimate, and confirmed total operating lease costs within ICT as $27.6m.[640]

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[635] Above n 447, at 478.

[636] Above n 447, at 478.

[637] New Zealand Equivalent to International Financial Reporting Standard 16 Leases (NZ IFRS 16), available at: https://www.xrb.govt.nz/accounting-standards/for-profit-entities/.

[638] Above n 64.

[639] However, for the purposes of the IRIS calculation, our draft decision expressed in that paper is to amend the IMs so that operating leases continue to be treated as opex for IRIS purposes.

[640] Transpower's response to RFI065 – Request for nominal numbers.

EMCa review

I163 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 decisions on these expenditure areas.[641] We engaged EMCa to test the ICT capex and opex programmes as a whole. As noted at G199, we engaged EMCa due to its particular expertise in the area of ICT expenditure, and expenditure reviews at large utilities.

I164 In its report, EMCa provided a high-level overview of ICT expenditure trends in Australia. While it identified difficulties in forming reliable views on ICT trends due to inconsistencies relating to data and categorising expenditure,[642] it noted that Transpower's trend in increasing opex was consistent with the outlook for Australian distribution network service providers.[643]

I165 Although the EMCa report recommended a reduction in business support costs associated with ICT opex,[644] 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:[645]

I165.1 providing a more explicit link between historical RCP3 expenditure and proposed RCP4 expenditure in its planning documents;

I165.2 providing more compelling needs analysis (including risk assessment), options analysis, and cost estimates in business cases (even preliminary versions); and

I165.3 adopting NPV analyses, with a well-defined counterfactual as the basis for project and programme options comparison and selection.

I166 To progress these recommendations, we intend to issue an information request during RCP3 to obtain 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.

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[641] We lacked specialist knowledge in this area and, as noted at paragraph 2.91.3, the Verifier also lacked experience in ICT.

[642] Above n 498, at 224.

[643] Above n 498, at 227.

[644] Above n 498, at 222.

[645] Above n 498, at 24.

I167 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.

Decision

I168 Our decision is to approve $168.3m of Transpower's proposed $195.9m of opex within this portfolio.

I169 Our decision is on the basis that:

I169.1 Transpower's proposed RCP3 ICT opex is only a small increase over the RCP2 expenditure;

I169.2 We agree with the Verifier's finding that the step changes are clearly defined, and linked to the overall corporate direction;

I169.3 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

I169.4 The $27.6m reduction reflects the exclusion of payments relating to operating leases which are now capitalised under Generally Accepted Accounting Principles (**GAAP**).

Attachment I.5: Further detail on Business Support opex

Business support

I170 The Business Support category covers personnel and service-related costs for four operating divisions:[646]

I170.1 IST: responsible for developing and maintaining ICT systems for grid and non-network functions, enterprise information management and ICT strategy and architecture.

I170.2 The Chief Executive Office: responsible for governance and key advisory functions across the business, including corporate legal counsel, corporate communications.

[646] Above n 53, at 336-337.

I170.3 Corporate Services: responsible for providing financial support, treasury services, strategic planning, regulatory relationship management and corporate governance to Transpower.

I170.4 People: responsible for Transpower's human resources function, Health & Safety advisory services, management of technical training programmes and facilities management.

I171 Transpower's 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.

I172 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:

I172.1 Transformation programme costs: -$5.2m;

I172.2 RCP3 project costs: -$1.3m;

I172.3 Atypical vacancies: $1.4m; and

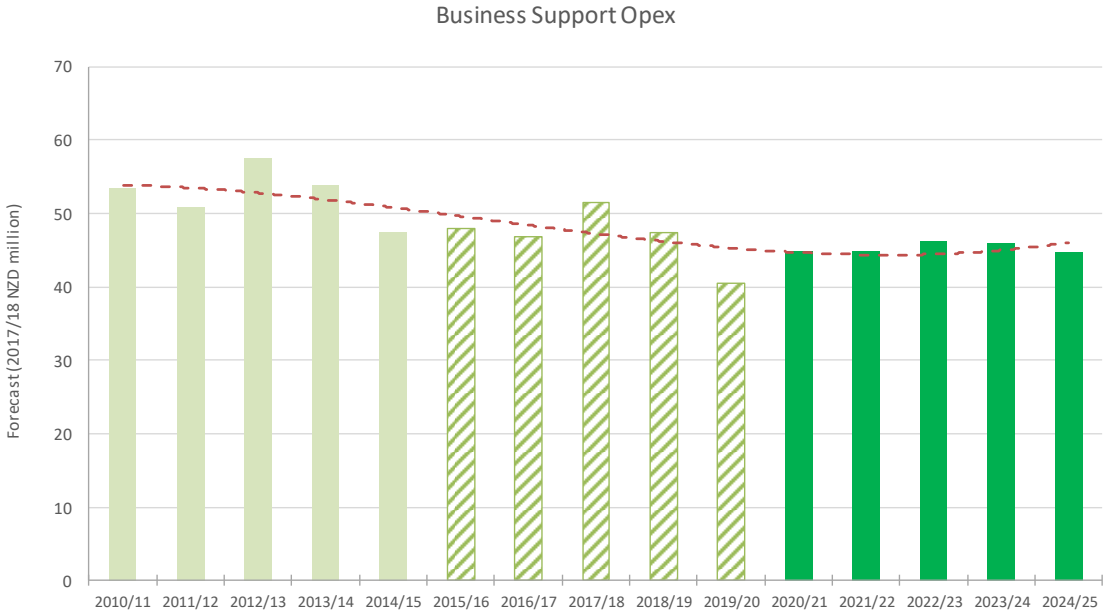
I172.4 Building lease cost increase: $0.3m.

I173 One step change was identified, totalling $2.6m for preparation costs of the RCP4 proposal.

I174 A trend factor of 0.2% increasing productivity was applied, which is equivalent to $2.3m in savings over RCP3.

I175 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)[647]



I176 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.

I177 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. Subsequent to this we engaged an external expert consultant to provide us with their view on aspects of Business Support opex relating to ICT, as part of a wider review of ICT expenditure. This, and Transpower's submissions in response, are discussed below at I183-I192.

I178 While the Verifier considered that the trend reflects continuing cost efficiencies, we considered it prudent for us to scrutinise from a bottom-up approach.

I179 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.

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[647] Above n 53, at 337.

Capitalisation of operating leases

I180 Transpower's proposed business support opex included amounts in respect of a number of operating leases, affected by the change in accounting treatment under NZ IFRS 16. Under GAAP, these leases will be capitalised. (Our recently released draft decision on the treatment of these leases is to follow GAAP, with the exception of incentive mechanisms).[648]

I181 Consistent with that approach, we have made an adjustment to remove operating leases from the opex allowance.

I182 At the time of its proposal, Transpower estimated that $19.1m of operating leases were included within its proposed business support opex. More recently we issued an information request to Transpower to confirm this estimate. It has now confirmed that the total amount was $17.4m.

Draft decision submissions and EMCa review

I183 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,[649] and Transpower's responses to specific requests for additional information.

I184 We discuss our engagement of EMCa and other aspects of their review of ICT expenditure in detail at G184-G199, and I163-I167 above.

I185 EMCa considered the size of the six service groups within the division:

I185.1 GM IST;

I185.2 Digital technology services;

I185.3 Network and security services;

I185.4 Enterprise services;

I185.5 Critical services; and

I185.6 Strategy and architecture.

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[648] Above n 64.

[649] As noted at paragraph G199 we engaged EMCa because of its particular expertise in the area of ICT expenditure, and expenditure reviews at large utilities.

I186 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 a Platform as a Service. It assessed opex attributable to this service group as being high, and recommended we reduce business support opex, based on its recommendation for a reasonable size for the unit, and suggested costs (staff and overhead). [650]

I187 We considered this advice and adjusted Transpower's proposed opex by$5.9m in our draft decision.

I188 Transpower provided responses to this aspect of EMCa's report through interim feedback (including a review by PwC),[651] and in its submission on the Draft decisions and reasons paper. This included the following arguments:[652]

I188.1 That the staffing numbers were lower, due to the size of critical services being smaller than EMCa stated (due to the need to exclude 16 FTE relating to Transpower's System Operator role), and that 43% of staff time and overhead is capitalised.

I188.2 Taking these reduced numbers into account results in a lower effective size of IST, that does not exceed the size that EMCa regarded as reasonable; and

I188.3 That roles and functions of the business units had been misattributed, including attribution of functions carried out by one unit to a different unit, and the functions carried out within Transpower.

I189 The PwC review was limited to EMCa's review approach, rather than the factual accuracy of EMCa's report.[653] PwC concluded: [654]

> We have considered the methodology and approach adopted by EMCa in undertaking its review of the ICT expenditure proposal for RCP3, as documented in their report.

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[650] Above n 498, at 20.

[651] Transpower "Interim Feedback on EMCa Review of Transpower's Proposed ICT Expenditure" (10 June 2019), available at: https://comcom.govt.nz/__data/assets/pdf_file/0032/153869/Transpowers-feedback-on-EMCa-report-10-June-2019.PDF.

[652] Above n 651, at 13-14, and above n 71, at 17.

[653] PwC "EMCa's approach to the review of aspects of Transpower's proposed ICT expenditure" (7 June 2019), at 2.

[654] Above n 653, at 4.

The report reflects review steps which are typically undertaken by independent verifiers during similar regulatory processes. These incorporate consideration of a regulated entity's planning processes and supporting evidence, supplemented with expert analysis.

There is one key area where we consider that EMCa's report does not demonstrate a review approach which is consistent with our expectations. The report does not document the substantive evidence relied on when determining the quantum of the ICT capex and the IST staff costs which EMCa recommends are not approved.

I190 We considered these submissions, and asked EMCa to review whether they affected its recommendations. EMCa's supplementary report noted:[655]

In its Interim Feedback document, Transpower provided revised information concerning:

- its cost allocation methodology (capitalising opex) results in 43% of employee time is invested in defining and delivering projects and not charged to opex;
- the roles and functions of its various groups; and
- an updated table to the one it provided in response to Information Request RFI040 and presented in our report at table 10.

I191 EMCa then concluded:[656]

Based on the information provided, a total of 77.2 IST staff are notionally full-time supporting IT systems on an operational basis (i.e. not booking any of their time to capex). On this basis the IST staff levels do not appear to be excessive.

We noted in the section 3.4 of this report that each CSCI document records a 'Invex. Cost' that appears to be the cost for Business Case preparation. We assume that this cost includes capitalised IST staff costs, and that based on extrapolation of information in the sample of 20 CSCI documents we received, the aggregate costs would be many millions of dollars. However, we have not assessed whether these costs are reasonable.

I192 We have reviewed these submissions, and EMCa's further advice. After considering the additional information provided by Transpower, and our review of EMCa's further advice, our concern that Transpower's expenditure in this area may have been high has been resolved.

Decision

I193 Our decision is to approve $209.1m of opex within this portfolio. This is the amount proposed by Transpower, with the exception of amounts relating to operating leases that are now capitalised under GAAP.

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[655] Above n 70, at [105].

[656] Above n 70, at [110]-[111].

I194 Our decision is made on the basis that:

I194.1 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);

I194.2 The RCP3 forecast represents a decrease compared to RCP2, suggesting Transpower is finding efficiencies in this area;

I194.3 The Verifier's top-down review concluded that the decreasing trend reflects an organisation that continues to deliver cost efficiencies;

I194.4 EMCa's consideration of the size of the IST unit;

I194.5 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.6: Further detail on insurance opex

Insurance overview

I195 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.[657]

I196 Transpower described its approach to insurance as follows:[658]

I196.1 purchasing insurance cover from external insurers for key risks, to a prudent level and where insurance cover is available at reasonable cost; and

I196.2 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.

I197 Figure I14 shows the yearly trend of Transpower's insurance opex. Transpower forecasts higher RCP3 insurance opex than in previous RCPs.

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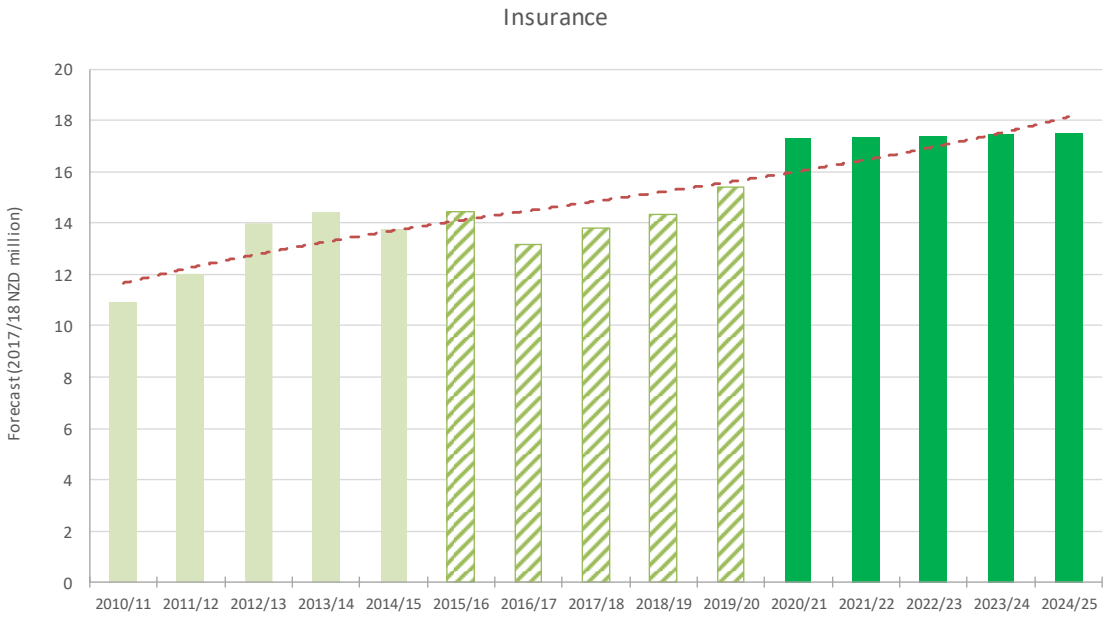
[657] Above n 53, at 354.

[658] Above n 51, at 130.

I198 The increase in expenditure is attributed to global insurance prices increasing from historically low levels back to historical averages, amongst other factors.[659] 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 FENZ levies following the reorganisation of FENZ.

Figure I14 Annual Insurance Opex (RCP1-RCP3)[660]



I199 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.

I200 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.[661] Transpower was seen as acting prudently in managing network risk exposures through its insurance programme.[662]

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[659] Above n 51, at 134.

[660] Above n 53, at 355.

[661] Above n 53, at 356.

[662] Above n 53, at 358.

I201 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.

I202 Transpower provided additional supporting documentation, including reports from its insurance broker and an actuary, to support of its premium forecasts.[663] 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.

I203 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:[664]

I203.1 identifying only those risks that are appropriate to insure;

I203.2 ensuring appropriate coverage (in terms of limits, deductibles, coverage terms and insurer security and diversity) is in place;

I203.3 engaging with the insurance market annually and undertaking a competitive tender process; and

I203.4 annually reviewing its insurance arrangements to ensure it remains comfortable with cost and risk.

Our view

I204 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 identified two areas of concern that we considered further, which we discuss below:

I204.1 Insurance opex related to an expected increase in the levy paid to FENZ; and

I204.2 Premiums of policies paid to its captive insurer.

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[663] Transpower "Insurance Opex Overview" (October 2018).

[664] Above n 51, at 130.

FENZ levy

I205 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.

I206 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.

I207 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.[665]

I208 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. This has been implemented through amendments to the Transpower IM.[666]

[665] 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.

[666] Clause 3.1.3(1)(f) of the Capex IM.

I209 Our decision is therefore to not include an amount of opex relating to FENZ levy that Transpower forecasts it will incur, as this is no longer necessary since FENZ levies are a recoverable cost. This treatment is consistent with the approach we have taken under the DPP that applies to EDBs.[667] Refer to our discussion in Attachment J regarding treatment of FENZ levies as recoverable costs.[668]

Premiums paid to captive insurer for self-insurance

I210 We indicated in our Issues paper, we considered 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).

I211 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.

I212 In practice, Transpower has effectively done this through its captive insurer. From a shareholder perspective, premiums and risk are not shifted outside the group. The perspective under the regulatory framework is somewhat different.

I213 Under this framework we set the maximum revenue that Transpower can earn from its customers – and indirectly, consumers – in respect of its regulated electricity lines services (which does not include the activities of its captive insurance subsidiary, RRL, in providing insurance to Transpower). Opex directly increases the revenue Transpower may earn, meaning that where risk is shifted to RRL, customers pay the total cost of the premium. Any dividends are not considered under our regulatory framework.

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[667] In response to our draft decision and reasons paper, the ENA submitted in support of this treatment, consistent with that proposed for electricity distribution businesses under the DPP. ENA "Transpower's individual price-quality path from April 2020: Submission to the Commerce Commission" (27 June 2019), at 6.

[668] As noted in our IM amendments reasons paper (above n 63), Transpower submitted that this should be a pass-through cost rather than a recoverable cost, to align the treatment with other levies, and that this would not result in a different outcome for its customers. We note that levies that are pass-through costs are generally totally outside the control of Transpower, whereas the FENZ levy is linked to the insurance it purchases, and decisions around policies could potentially affect the amount of levy paid. As noted, the Government has indicated a plan to review the levy-based funding mode, and it may be necessary or appropriate to review this categorisation at a future date. Transpower "Proposed amendments to input methodologies" (5 July 2019), at 1.

I214 The overall effect, from the customer and consumer perspective, is that insuring through the captive insurer directly increases Transpower's costs in the same manner as insuring the same risk (on the same terms) with an unrelated third party. From a regulatory perspective, there are questions of both whether Transpower's proposed spend is reasonable, but also whether the compensation should reflect the cost of moving the risk elsewhere (ie, through insurance) or if a lesser amount, that compensates for the losses experienced, should be allowed.[669]

I215 In response to our draft decision, Transpower provided a detailed submission, including support from its insurance broker, Marsh, and an actuary, Davies Financial and Actuarial Limited.[670]

I216 After reviewing this information, our concerns have been addressed in respect of the majority of Transpower's proposed insurance opex.

I217 In respect of three risk categories, we consider that we should continue with the EV loss approach.

I218 For material damage beneath the deductible on the main policy, and for cyber risks, we consider that the scale of the potential exposure (taking into account an allowance for loss) is sufficiently small in the context of Transpower's overall opex envelope that making an allowance for the expected loss should be sufficient to compensate.

I219 For Consumer Guarantees Act liability we note that there is no practical difference between the approaches, but mention it here for completeness.

Decision

I220 Our decision is to approve $82.0m of insurance opex. This is a decrease of $6.0m from Transpower's proposed $88m.

I221 The $6.0m reduction relates to two drivers:

I221.1 Reducing amounts paid to its captive insurance subsidiary RRL on certain policies to reflect expected loss rather than market premiums; and

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[669] Allowing a lesser amount would not preclude Transpower from insuring these policies in the same manner. Our decisions determine the revenue Transpower can earn in respect of its regulated business activities. While the revenue is determined with regard to Transpower's proposed expenditure, our decisions only set an expenditure envelope. We do not direct how Transpower prioritises expenditure within that envelope to best manage risks and other business needs.

[670] Above n 71, at 19-20 and 37-47.

I221.2 An amount attributable to the FENZ levy that Transpower will be expected to pay over RCP3. For further discussion, see Attachment J, where we discuss the FENZ levy as a recoverable cost.

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 decision for the RCP3 IPP reset.

Summary of revenue path features

J2 Our key decisions relating to Transpower's price path are to:

J2.1 set Transpower's annual maximum allowable revenue that it can use for its transmission pricing over RCP3 for a five-year period using a smoothed building blocks approach;

J2.2 smooth Transpower's annual revenue by:

J2.2.1 forecasting costs, including pass-through costs, recoverable costs,[671] and the EV account balance as at 30 June 2020, and building these into the forecast MAR building blocks;

J2.2.2 smoothing the resulting forecast MAR over RCP3 to produce annual forecast smoothed maximum allowable revenue (**forecast SMAR**) which is the maximum revenue that Transpower may use in setting its transmission pricing; and

J2.2.3 washing up any variation, between the forecast MAR and the actual revenue received, and any incentive amounts, into the EV account and accumulating this over RCP3, with the balance of the account to later be spread over RCP4;[672] and

J2.3 not partially close the forecast step from RCP2 to RCP3.[673]

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[671] Pass-through costs and recoverable costs are amounts which are usually outside of Transpower's control. IRIS amounts are a recoverable cost, despite Transpower arguably having some ability to influence these.

[672] Amounts would be carried forward at the WACC rate, to compensate for timing differences.

[673] Closing this gap would involve 'tilting' the price path by bringing revenue from later years forward, to attempt to produce a smoother transition from RCP2 to RCP3. This is discussed at paragraphs J29 to J31.

J3 The recent amendment to the Transpower IM has implemented a mechanism that will 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.[674]

J4 To support these key decisions, we have introduced 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 by requiring Transpower to publish this information within 105 working days of the end of the relevant disclosure year.

J5 Other amendments to the Transpower IM have classified two operating expenses, one as a pass-through cost, the other as a recoverable cost.

J6 Unapproved major capex projects and listed projects would be subject to similar treatment to that which applied in RCP2. We will reconsider the price path for the remaining disclosure years of RCP3 after we approve an amount of expenditure, and consider the impact that additional capex will have on the SMAR.

Background on the WACC

J7 The WACC has a significant impact on the revenue Transpower can earn over an RCP, as it determines the return Transpower earns on its RAB (this is the Return on Capital building block).

J8 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 2019. This final WACC will be used to finalise the IPP determination in November.

J9 To better understand the revenue impact of our decision, we have applied the WACC Transpower will use for the 2020 disclosure year, which is the most recent relevant WACC estimate available.[675] This should be seen as illustrative only.

Background on EV account

J10 Transpower's EV account is referred to throughout this attachment.

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[674] Above n 63.

[675] *Cost of capital determination for disclosure year 2020 for Transpower, gas pipeline businesses and suppliers of specified airport services (with a June year-end)* [2019] NZCC 8.

J11 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.

J12 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

J13 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.

J14 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.[676]

Decision

J15 Our decision is to set Transpower's annual RCP3 revenue by smoothing the 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).

J16 In order to describe how to convert from a forecast MAR series to forecast SMAR, we will set a rate of annual increase.[677] The rate of annual increase (the IPP revenue growth rate) will be set out in our final IPP determination.[678]

J17 Differences between the building block values used in the forecast MAR and the revenue Transpower actually earns each year will be washed up annually and included within the EV account.

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[676] 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.

[677] Given that the forecast MAR and forecast SMAR must have the same net present value (based on the WACC), and the revenue growth rate is constant over the IPP, describing the rate of growth will be sufficient to determine the resulting forecast SMAR series.

[678] The revised draft determination includes an IPP revenue growth rate of 1.0% as a placeholder, based on smoothing the indicative price path. This will be updated in our final IPP determination in November 2019.

Alternatives considered

J18 In addition to smoothing revenue for pricing purposes over RCP3, we also considered:

J18.1 Smoothing the allowable revenue over RCP3, and attempting to partially close any step when moving from RCP2 to RCP3, and RCP3 to RCP4; and

J18.2 using unsmoothed annual forecast MAR building blocks (status quo counterfactual to Transpower's proposal to smooth the price path).

Analysis

J19 An unsmoothed building block approach sets the forecast MAR directly. The building blocks used in RCP2 were:

J19.1 Capital charge;

J19.2 Forecast depreciation;

J19.3 Opex allowance;

J19.4 Forecast tax;

J19.5 Forecast TCSD;[679] and

J19.6 EV adjustments.[680]

J20 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.

J21 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.

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[679] 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.

[680] These cover both revenue adjustments for previous under/over-recovered revenues and revenue adjustments resulting from the incentive mechanisms in the regime.

J22 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).

J23 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.

J24 Transpower proposed that it would smooth its revenue over RCP3. It did not propose to close the forecast step change when transitioning between RCPs (ie, RCP2 to RCP3 and RCP3 to RCP4).

J25 Some stakeholders have identified some potential benefits of an unsmoothed price path, including:

J25.1 that the risk of additional scrutiny will incentivise Transpower to have strong justification for price changes and to minimise volatility in annual expenditure;[681]

J25.2 that volatility in prices will create greater public awareness of, participation in, and/or debate relating to regulation of Transpower;[682]

J25.3 that there is additional cost and complexity involved in revenue smoothing;[683] and

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[681] MEUG "Transpower IPP 2020 - Process, Framework and Approach paper" (15 November 2018), at [4.e]).

[682] Above n 681, at [4.e)].

[683] Fonterra Co-operative Group "Submission to Transpower NZ Ltd – Regulatory Control Period 3 Draft Proposal for Consultation" (August 2018), at 6-7.

J25.4 that costs are incurred at the time that they occur, which matches accounting treatment.[684]

J26 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 amounts). Smoothing annual revenue should still preserve visibility of general trends in revenue, attributable to expenditure and investment over RCP3.

J27 To support interested persons forming their own views on Transpower's performance, we have developed a number of information requirements that will be included within the IPP determination, or in s 53ZD notices (that have been published in draft alongside the revised draft determination):[685]

J27.1 Requiring Transpower to annually publish and explain its EV account balance and the forecast impact of its recovery on RCP4 revenues. (This is included in the revised draft IPP determination);

J27.2 Requiring Transpower to provide:

J27.2.1 information annually on the extent and effectiveness of its consultation in relation to how it has applied its actual base capex in each disclosure year of RCP3; and

J27.2.2 an annual report on post-project reviews for significant capex projects . This is discussed in Attachment K. (This is included in a s 53ZD notice); and

J27.3 Requiring Transpower to provide annual 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. (This is included in a s 53ZD notice).

J28 On balance, we consider smoothing annual revenues to be appropriate.

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[684] Above n 683, at 6-7.

[685] MEUG has indicated its support for these information requirements, and that the requirements address its concerns, identified under paragraph J25, relating to smoothing. Above 411, at [31]-[32].

J29 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).[686]

J30 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:

J30.1 The forecast step decrease is largely attributable to a reduction in the WACC in RCP3. The WACC that applied for RCP2 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.[687] Attempts to mitigate this step by bringing revenue forward would result in a flatter, or decreasing, price path over RCP3;

J30.2 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

J30.3 This would limit us to attempting to partially close only one of the potential steps.

J31 We consider that these issues make it undesirable to attempt to partially close either forecast step change when transitioning between RCPs.

5-year period

J32 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).

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[686] Transpower made a detailed submission on this point in its response to our Issues paper (above n 125, at Section 11).

[687] As noted above, the most recently available WACC that applies to Transpower for information disclosure for the 2020 disclosure year is 4.87% (above n 675). We will publish the final WACC that will apply for RCP3 in October 2019.

J33 While there is some potential uncertainty in future demand that a four-year IPP could help mitigate,[688] 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.[689] Any significant growth is expected to happen from RCP4 onwards, with no direct implications for RCP3.

J34 We have not identified that a shorter period would better meet the purposes of Part 4 and therefore our 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

J35 We consulted on potential revenue smoothing in our Process paper, in our Issues paper, and again in our Draft decisions and reasons paper.

J36 We received a number of submissions from four submitters. These are summarised in Table J1.

Table J1 Submissions on price path smoothing (our consultations)

Submitter	Document	Stance	Summary
Electricity Networks Association	Draft decisions and reasons paper	Support	Supported less volatile and more predictable year to year Transmission pricing.
MEUG	Process paper	Neutral	Considered there could be benefit in not smoothing from increased scrutiny of price changes.
	Issues paper	Opposed	
	Draft decisions and reasons paper	Support	Concerns regarding scrutiny of price changes addressed through new reporting requirements.
Transpower	Issues paper	Opposed closing of step change between RCPs	Discussed above.
Vector	Issues paper	Support	Transpower's revenue should be smoothed in a similar manner to EDBs' revenue.

[688] This was suggested by MEUG, in its response to our Process paper (above n 681, at [4.c)].

[689] Above n 53, at 51.

J37 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.

J38 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	Supported 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	Considered it reasonable to smooth.		

J39 As noted above, MEUG also submitted that we should consider a shorter RCP in order to avoid potential uncertainty with future demand forecasts.[690]

Smoothing recovery of pass-through costs and recoverable costs

J40 In RCP2, forecast pass-through costs and forecast recoverable costs do not form part of the building blocks used to set the forecast MAR.

J41 Pass-through costs or recoverable costs can add volatility to Transpower's total annual revenue.

Decision

J42 Consistent with the smoothing of the forecast MAR and the setting of the forecast SMAR, we have smoothed Transpower's recovery of pass-through costs and recoverable costs in our decision for RCP3.

[690] Above n 681, at [4.c)], and above n 382, at [8].

J43 A forecast of these amounts for RCP3 has been included within the price path and included in the forecast SMAR. The difference between the building block values in the forecast MAR and actual costs will be washed up annually, with the variances being included in the EV account.

J44 Transpower will be required to provide us with the wash-up calculation within 105 working days of the end of each disclosure year.[691]

Analysis

J45 Given that Transpower's allowable revenue is smoothed, it is undesirable for pass-through costs 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.

J46 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 its other wash-up calculations.

J47 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

J48 Our decision to smooth pass-through costs and recoverable costs is consistent with Transpower's proposal and, included with the 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.[692]

Accumulation of wash-up and incentive amounts

J49 Consistent with the approach of setting an ex-ante expectation of earning WACC and providing incentives for meeting quality measures (and negative revenue adjustments 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 faced negative revenue adjustments). However, annual recovery of these amounts would reintroduce volatility to a smoothed price path.

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[691] Under the Transpower IM, a disclosure year is a 12-month period ending 30 June.

[692] Above n 281, at 3.

Decision

J50 In accordance with our decision to amend the 'Specification of price' methodology in the Transpower IM, recovery (or repayment) of wash-up and incentive amounts in RCP3 will be deferred until RCP4, when the net balance will be recovered.[693] These amounts will be calculated annually during RCP3 and will accumulate within Transpower's EV account.

J51 The annual value of the EV account will be disclosed so that interested persons can form a view on the likely impact on RCP4 revenues.

J52 A 'release mechanism' in the Transpower IM will enable Transpower's price path to be reopened, and some of the balance of the EV account may 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.

J53 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.[694]

Analysis

J54 Wash-up and incentive amounts[695] 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.

J55 However, unlike most pass-through and recoverable amounts, these cannot be forecast in advance and their expected value is neither positive nor negative.[696] However, some fluctuation in annual amounts is expected.

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693 Above n 63.

694 This contrasts with the RCP2 approach where the forecast MAR was reset annually.

695 For example, the major capex incentive.

696 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 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.

J57 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, if such an event were to occur, clause 3.7.4(1)(a)(v) of the Transpower IM would enable us to reconsider the price path, and we could spread the accumulated EV account balance over the remaining years of RCP3, in addition to RCP4. Spreading over this longer period would help reduce the overall impact.

J58 Under the Transpower IM we may reopen the price path where the forecast balance, at the last day of a regulatory period would, if pro-rated over the length of the current IPP, be more than 10% of the value of the forecast SMAR for the last year. In such an event, we could reopen the RCP3 revenue path and spread some of the balance over the remainder of RCP3, and RCP4 as well.

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 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.[697] Vector expressed a preference for Transpower to accumulate incentive amounts in the same way as EDBs, to reduce volatility. We did not receive submissions on this aspect of our Draft decisions and reasons paper.

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.

Table J3 Submissions on accumulation of wash-up and incentive amounts (Transpower's proposal consultation)

Supported		Did 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**	Preferred annual adjustment due to potential for RCPD[698] 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 cost and recoverable cost

Background

J64 Two costs have been identified that are largely outside Transpower's control for RCP3 and have not previously been included as a pass-through cost or recoverable cost for Transpower. 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 cost.

[697] Above n 55, at [10.31.3] and [10.31.4].

[698] Regional Coincidental Peak Demand – a pricing methodology that allocates the interconnection charge according to customers' contributions to the regional coincident peak load.

J65 In our Draft decisions and reasons paper, we suggested that an IM amendment could result in these amounts becoming a pass-through cost and a recoverable cost. Although these costs have been addressed under an IM amendment, we consider it useful to close off the discussion that was initiated here in the Draft decisions and reasons paper.

Summary of IM amendment

J66 Our recent IM amendment included Energy Complaints Scheme levies as a pass-through cost, and FENZ levies as a recoverable cost.[699]

Comment – Energy Complaints Scheme levies

J67 Transpower is a member of the Energy Complaints Scheme, operated by Utilities Disputes Limited, 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. The Energy Complaints Scheme is an approved scheme under Schedule 4 of the Electricity Industry Act 2010.

J68 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.

J69 Under the recent amendment to the Transpower IM, this amount is now a pass-through cost.[700]

Comment – FENZ levies

J70 As discussed in Attachment I, 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.

J71 As the levy amount is largely outside Transpower's control, our Draft decisions and reasons paper noted that it would be appropriate for this to be a recoverable cost, in accordance with proposed draft amendments to the Transpower IM.

J72 The IM amendment has now been finalised and FENZ levies are now recoverable costs.[701]

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[699] Above n 63.

[700] Above n 63.

[701] Above n 63.

J73 We note that removing this expense from opex and enabling it to be directly recovered is consistent with the approach proposed to be adopted under the DPP in relation to EDBs. This was supported by Electricity Networks Association (**ENA**)[702] in its submission on our Draft decision and reasons paper, and Transpower in its submission on our proposed IM amendments.[703]

Price path reporting features

Summary

J74 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

J75 The decisions in Table J4 are to support our substantive 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.

[702] Above n 667, at 6.

[703] Transpower, above n 668, at 1.

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 amount of revenue used to set prices under the TPM.
Compliance with price path (ex-post)	Report on compliance with wash-up calculations. Certified by Directors and independently audited. Provided within 105 working days of the end of each disclosure year.
Wash-up calculation, incentive calculations, and EV account disclosure	Disclosure and publication of the wash-up calculation, incentive calculations,[704] 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 for a pricing year. Summary of actual pass-through and recoverable costs for a pricing year. Explanations for voluntary revenue reductions (if any).[705] Provision and publication of proposed updated forecast MAR and forecast SMAR, when proposing the price path be reopened.

Reopening the price path – major capex projects and listed projects

J76 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.

J77 Transpower's price path will be reopened and its forecast MAR and forecast SMAR updated, following our approval of an amount of expenditure for a major capex project or a listed project.

[704] This includes amounts of incentives from IRIS, incentives arising under the Capex IM, and incentives relating to Grid Output Measures and Quality Standards.

[705] 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).

J78 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 decision, Transpower to provide a director-certified and independently assured proposed new forecast MAR for the remaining years of RCP3, within 80 working days of the end of the disclosure year in which we have approved expenditure for a major capex project, a listed project, or an E&D base capex project.

Analysis

J79 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.

J80 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.[706]

J81 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.

J82 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.

Possible impacts on the smoothed price path

J83 The listed projects that Transpower has proposed for RCP3 are set out in Table J5.

[706] Clause 1.1.5 of the Capex IM.

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

J84 Transpower has forecast the revenue impact of these potential projects on its HVAC customers as being an additional $3.8m in 2023/24 and $7.8m in 2024/25 (based on the proposed amounts and the WACC at the time of its proposal). The actual revenue impact will depend on the amount approved as well as the final WACC.

J85 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

J86 The revenue impact of these projects on HVAC customers 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

J87 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 and forecast SMAR for the remainder of the RCP is updated.

J88 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,[707] with a consistent annual effect thereafter.

[707] 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 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.[708, 709] By incorporating robust and timely consultation into its decision-making processes, Transpower's understanding of its customers' preferences will improve.

K3 Open and transparent customer engagement also provides opportunities for the identification and consideration of transmission alternatives, which can 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.[710]

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[708] The ENA, representing a significant customer group of Transpower's, "agrees with the Commission's focus on meaningful and reportable engagement between Transpower and consumers", noting that, "Transpower needs to better understand consumer… preferences regarding price-quality trade-offs, and take these into account when making asset management, planning and investment decisions." Above n 667, at 4-5.

[709] The ENA, in its submission on our draft decision, noted the importance of using clear language in defining the terms 'customer' and 'consumer' (Above n 667, at 4.) We agree, and note that we transposed the definitions of 'customer' and 'consumer' in our draft IPP determination. We have corrected this in our revised draft determination such that: 'consumer' links to the definition in s 52C of the Act ('a person that consumes or acquires regulated goods or services'); and 'customer' is defined as 'any generator, distribution business, end user, or other entity in New Zealand that is connected, or applies to be connected, to the grid'.

[710] As noted at paragraph A7.2, this is consistent with s 54Q of the Act.

Approach set out in our Process paper, Issues paper and Draft decisions and reasons paper

K4 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.[711, 712] 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:

K4.1 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

K4.2 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).

K5 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.[713]

K6 We set out our views on:

K6.1 expectations on Transpower to consult with stakeholders during RCP3, including how Transpower should consider transmission alternatives in its customer engagement and project prioritisation; and

K6.2 the effectiveness of Transpower's consultation with customers in preparing its proposal, and our expectations for how this should improve for RCP4.

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[711] Above n 55, at [4.25-4.31].

[712] 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).

[713] Above n 55, at [4.4].

K7 In our Draft decisions and reasons paper, we proposed a number of new reporting obligations on Transpower regarding customer consultation, which we have subsequently adopted as our final decisions with only minor technical changes. Our final decisions, including the minor technical changes, are explained below.

Summary of decisions

K8 In relation to consultation on Transpower's expenditure decisions during RCP3, our decision is to place new obligations on Transpower to:

K8.1 produce its customer engagement plan for RCP3 within 105 working days after the end of the last disclosure year of RCP2;

K8.2 provide a report in relation to aspects of its customer consultation on how it has applied its actual base capex allowance within 105 working days of the end of the disclosure year to which it relates; and

K8.3 undertake a post-project review for significant capex projects upon the completion of the project, and to provide a report on that post-project review within 105 working days from the end of the disclosure year to which it relates.

K9 In relation to consultation on Transpower's RCP4 proposal, our 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.

K10 These decisions are explained further below.

Transpower's consultation during RCP3

Problem definition

K11 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.

What we said in our Issues paper

K12 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.[714, 715]

K13 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.[716] 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.[717, 718]

K14 We acknowledged Transpower's efforts to:[719]

K14.1 integrate stakeholder engagement into its 'business-as-usual' activities;[720]

K14.2 implement initiatives such as the establishment of its Consumer Advisory Panel and the release of Te Mauri Hiko;[721, 722] and

K14.3 commit to developing its approach to customer consultation further.[723]

K15 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.[724]

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[714] Above n 73, 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].

[715] Above n 55, at [4.23-4.26].

[716] Above n 116 , at [315].

[717] Transpower "Capex IM draft decisions cross-submission" (16 January 2018), at 2.

[718] Above n 55, at [4.27].

[719] Above n 55, at [4.28].

[720] Above n 53, at 90.

[721] For information on Transpower's Consumer Advisory Panel, see: https://www.transpower.co.nz/keeping-you-connected/consumer-advisory-panel.

[722] Transpower "Te Mauri Hiko Energy Futures" (2018), available at: https://www.transpower.co.nz/resources/te-mauri-hiko-energy-futures.

[723] Above n 51, at 36.

[724] Above n 55, at [4.29].

K16 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:[725, 726]

K16.1 whether Transpower consulted with stakeholders (including customers) and, if so, how it consulted;

K16.2 how effective Transpower considered that consultation was; and

K16.3 how satisfied stakeholders were with the consultation process based on the views they expressed.

K17 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.[727]

Response in submissions

K18 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:[728]

K18.1 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;[729, 730] and

[725] Above n 116, at [306].

[726] Above n 55, at [4.30].

[727] Above n 55, at [4.31].

[728] 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.

[729] Wellington Electricity "Wellington Electricity's submission on Transpower IPP 2020 Issues Paper" (28 February 2019), at 1-2.

[730] Above n 281, at 3.

K18.2 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.[731] 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.[732]

K19 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.[733, 734]

K20 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.[735]

K21 In its submission on the Issues paper, Transpower provided more details about its ongoing engagement with its customers during the regulatory period:[736]

> 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.

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[731] Major Electricity Users' Group "Transpower's IPP Issues paper – cross-submission" (7 March 2019), at [17-20].

[732] Above n 731, at [24].

[733] Above n 731, at [11].

[734] Above n 111, at 6.

[735] Independent Electricity Generators Association "Submission on Transpower IPP 2020 – Issues Paper" 28 February 2019), at 2.

[736] Above n 125, 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.

K22 Transpower submitted it had been developing detailed plans for engaging with its customers and stakeholders during RCP3, including through its Consumer Advisory Panel.[737]

K23 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.[738] Transpower submitted:[739]

> 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.

K24 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.[740]

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[737] Above n 125, at 8.

[738] Above n 125, at 11.

[739] Above n 125, at 11.

[740] Transpower "Cross-submission on Transpower's individual price-quality path for the next regulatory control period: issues paper" (7 March 2019), at 2.

Our decision on Transpower's consultation on projects during RCP3

K25 While Transpower considered 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.

K26 We want to encourage Transpower to become more open and transparent in its customer engagement during RCP3, so that Transpower's customers will:

K26.1 feel they have an opportunity to engage with Transpower to influence more of its investment decisions throughout the regulatory period; and

K26.2 become more confident that Transpower is efficiently investing and operating in a way that reflects customer preferences.

K27 Therefore, in relation to Transpower's consultation with customers on its expenditure decisions during RCP3, our decision is to place new obligations on Transpower to:

K27.1 produce its customer engagement plan for RCP3 within 105 working days of the end of the last disclosure year of RCP2. Our expectation is that Transpower would engage with stakeholders in developing this engagement plan, and we may, through a further 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. We will require Transpower to provide us with its proposed high-level scope of the customer engagement plan by 15 May 2020,[741] which must include:

K27.1.1 the business objective or objectives that are to be advanced;

K27.1.2 the communications/engagement objectives that support the business objectives;

K27.1.3 the success measures for each objective; and

K27.1.4 the expected times when consultation documents may be available;

[741] The Commission may provide Transpower with comments on the high-level scope.

K27.2 provide a report within 105 working days of the end of the disclosure year to which it relates on the following matters in relation to its actual base capex:

K27.2.1 whether Transpower consulted with stakeholders (including customers) and, if so, how it consulted;

K27.2.2 the matters included in those consultations;

K27.2.3 the extent of involvement in those consultations from providers of transmission alternatives;

K27.2.4 how effective Transpower considers the consultation was; and

K27.2.5 how satisfied customers and others were with the consultation processes, based on the feedback they provided; and

K27.3 undertake post-project reviews for significant capex projects upon the completion of the project; and

K27.4 within 105 working days from the end of the disclosure year to which the report relates, provide us with an annual report on those post-project reviews. Our expectations are that:

K27.4.1 the threshold for significant capex projects subject to post-project reviews would be those projects that required approval from Transpower's Board to proceed; and

K27.4.2 each 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.

K28 We consulted on these new measures to improve customer engagement in our Draft decisions and reasons paper, and they were supported in submissions by the ENA and MEUG.[742] Transpower also supported, in principle, "the Commission's approach to reporting and its desire to increase visibility of our activities to stakeholders", while suggesting "clarity and practicability adjustments that should be made to the proposed reporting requirements."[743] We have considered these in updating the drafting of the IPP determination and in drafting the draft information gathering notices.

[742] Above n 667, at 4-5; and above n 411, at 2.

[743] Above n 71, at 23.

K29 In moving from our draft determination to our revised draft IPP determination and draft information gathering notices, we have made minor technical changes:

K29.1 We have moved the new customer consultation requirements from the Draft IPP determination to the draft information gathering notices. The reason for this is explained in Chapter 1. In doing so, we have replaced the requirement for Transpower to publish the information on its website, to instead require Transpower to report it to us, with an option for Transpower to fulfil this obligation by publishing the information on its website.[744]

K29.2 We have increased the reporting timeframe for the requirements outlined at paragraphs K27.2 and K27.3 from 80 days to 105 days in response to Transpower's submission.[745]

K30 In addition to the measures we are introducing to promote greater customer engagement by Transpower, MEUG also suggested it "would be convenient if Transpower had a web page with a calendar setting out the dates or prospective dates of future engagement so that the information is in one-stop-shop easy to access source rather than dates scattered across multiple web pages".[746] This is something we would encourage Transpower to consider.

Transpower's consultation ahead of RCP4

Problem definition

K31 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

K32 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.

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[744] This approach is consistent with other statutory requirements, such as under the Code, requiring Transpower to provide or publish information.

[745] Above n 71, at 23-24.

[746] Above n 411, at 2.

K33 Overall, the Verifier's view was that Transpower's consultation had been moderately effective. In its report, the Verifier commented:[747]

> 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.

K34 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.

K35 The Verifier further explained that an outcomes-focussed consultation usually includes:

K35.1 the relevant business objectives;

K35.2 the consultation objectives that support such business objectives (which should be specific, measurable, achievable, realistic, time based); and

K35.3 relevant success measures for each objective.

K36 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

K37 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.

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[747] Above n 53, at 90.

K38 The Verifier considered Transpower's price-quality testing to be "well-intentioned", but it had doubts that it could effectively play the role it intended consultation to have. In particular, the Verifier considered that:[748]

> …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.
>
> …
>
> 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.

[748] Above n 53, at 383-384.

What we said in our Issues paper

K39 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:[749, 750]

K39.1 Transpower's consultation lacked clearly defined outcomes, and some meaningful and quantifiable success measures that could have been used to assess its effectiveness;

K39.2 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

K39.3 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

K40 MEUG and Meridian raised concerns about Transpower's consultation in preparing its proposal:

K40.1 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.[751]

K40.2 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.[752]

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[749] 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 51, at 36).

[750] Above n 55, at [4.10-4.21].

[751] Above n 382, at [9].

[752] Above n 382, at [10].

K40.3 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.[753]

K40.4 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.[754]

K41 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).[755]

Our decision on Transpower's pre-proposal engagement processes ahead of RCP4

K42 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.

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[753] Above n 382, at [11].

[754] Above n 111, at 5.

[755] Above n 125, at 11.

K43 However, to mitigate the risk that Transpower fails to follow through on these intentions and therefore undermines the quality of the RCP4 proposal, our decision is to require Transpower to engage an independent expert to undertake a mid-period review and provide an expert report on Transpower's proposed engagement process leading up to submission of its RCP4 proposal.[756] The expert report must:

K43.1 set out the qualifications, relating to customer engagement, of the independent expert; and

K43.2 assess Transpower's proposed customer engagement processes leading up to the preparation and submission of its RCP4 regulatory proposal.

K44 We consider this decision will improve Transpower's customer engagement ahead of RCP4, so that:

K44.1 Transpower's customers are able to better understand Transpower's proposed investment decisions relative to risk;

K44.2 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

K44.3 Transpower is better able to identify customer preferences, and can demonstrate how customer preferences are driving the ranking of expenditure priorities.

[756] Transpower submitted that an independent expert should instead be used to assist Transpower in its development of its stakeholder engagement plan for RCP4 (Transpower "Transpower NZ Ltd submission on IPP draft determination" (11 July 2019), at clause 22.5). We encourage Transpower to seek expert advice in developing its stakeholder engagement plan should it feel the need to do so. However, we have decided to retain the requirement for a mid-period expert review of Transpower' proposed engagement process, to give us an independent view on Transpower's progress.

K45 This decision – to require Transpower to engage an independent expert to undertake a mid-period review and provide an expert report on Transpower's proposed engagement process leading up to submission of its RCP4 proposal – reflects our draft decision on this matter, which received high-level support from MEUG and the ENA.[757] At the draft stage, we included this new requirement in the Draft IPP determination. For the reasons outlined at paragraph 1.23, we instead now include it in the draft information gathering notice regarding customer consultation which we published today.[758]

[757] Above n 667, at 4-5; and above n 411, at 2.

[758] Above n 68.

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.[759]

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.[760]

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.

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[759] Above n 116, at [A15].

[760] 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.[761]

L7 There are two key inputs to an asset management approach informed by a risk-based investment decision-making framework: 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.[762]

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.

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[761] Above n 50, at [4.19].

[762] Above n 55, at Chapter 6.

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.[763]

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.[764]

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);[765]

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[763] 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.

[764] 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 447, at 67).

[765] Having a credible tool to prioritise expenditure is particularly important when dealing with pooled allowances for fungible expenditure such as the base capex allowance.

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;[766] 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.

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.[767]

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:[768, 769]

L18.1 lacked confidence in the level of asset health and condition data Transpower had in several asset classes;[770]

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

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[766] 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.

[767] 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).

[768] Above n 53, at Chapter 5.

[769] Above n 53, at Chapter 7.

[770] Above n 53, at Table 29.

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:[771]

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;

L19.2 developing asset health models for transmission lines – existing models in Excel to be transferred to CBRM models;[772] 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.[773]

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.

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[771] Above n 53, at 125.

[772] 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.

[773] Above n 53, at 221.

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.

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.[774] We agree.

L26 On this topic, 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:[775]

> 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 <u>should</u> be achieved in another 6-years, we suggest it <u>must</u> 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;

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[774] 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 681, at [4(a)].

[775] Above n 681, at [4(a)].

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

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.[776, 777, 778]

[776] Above n 591, at 1.

[777] Above n 111, at 6.

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:[779]

> 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:[780]

> 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:[781]

> 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:[782]

> 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.

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[778] Above n 382, at [5].

[779] Above n 382, at [5].

[780] Above n 382, at [4(b)].

[781] Above n 382, at [6].

[782] Above n 382, at [10].

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:[783]

> 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.

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:[784]

> 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.[785]

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.[786]

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[783] Above n 125, at 17.

[784] Above n 125, at 17.

[785] Above n 53, 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.

[786] 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.

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.

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;[787]

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;[788] 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:[789]

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.[790]

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[787] Above n 125, at Section 7 and Appendix B.

[788] Above n 125, at Section 7 and Appendix B.

[789] 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 288, at 19).

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.

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":[791]

> 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 will encourage this with some reporting requirements over RCP3.

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[790] Above n 391.

[791] Above n 125, at 17.

L53 As such, for RCP3 we will 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

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 index of 8 or above (an asset health index of 1 indicates an asset in the best condition and an asset health index of 10 indicates an asset in the worst condition) at the end of the period than at the beginning.[792]

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:[793]

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;

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[792] Above n 288, at Table 8.

[793] Above n 391.

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 index is 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 Transpower's 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.

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:[794]

> 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.

Addressing 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 decided to introduce the following new reporting requirements:

L61.1 Transpower to develop a plan for developing its asset health, asset life-extension and asset/network risk modelling;

L61.2 Transpower to report annually on its progress in developing its asset health, asset life-extension and asset/network risk modelling; and

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[794] Above n 391.

L61.3 Transpower to obtain a mid-RCP3 independent expert report on Transpower's progress in developing its asset health, asset life-extension and asset/network risk modelling.

L62 As discussed previously, we consider that one of the key areas of development Transpower should be progressing is an ability to understand risk across the asset fleet.

L63 In the absence of a properly functioning risk model, and as an interim measure, we have set quality standards associated with two 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.

L64 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.

L65 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.

L66 In their submissions on our draft decision, both MEUG and the ENA expressed support for a more granular focus on price/quality trade-offs made by Transpower. MEUG stated that:[795]

> We therefore agree with the Commission's focus in RCP3 to match discovery at a more granular level of consumer needs and price-quality trade-offs with Transpower's asset management processes. This will lead to a more market driven approach to planning the future of the grid beyond RCP3 and away from relying on more centrally planned scenario forecasting approaches such as Transpower's Te Mauri Hiko report.

L67 While ENA stated that:[796]

> we agree that Transpower needs to better understand consumer (using the above definition) preferences regarding price-quality trade-offs, and take these into account when making asset management, planning and investment decisions.

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[795] Above n 411, at [8].

[796] Above n 667, at 4.

L68 We agree with MEUG's submissions on our Issues paper and Draft decisions and reasons paper 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.

L69 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.[797]

L70 Our decision is to require annual information provision and a mid-RCP3 expert opinion, the details of which will be set out in a notice issued under s 53ZD of the Act.[798]

Our conclusions

L71 Our decision is to introduce the following s 53ZD information requests and review requirements:

L71.1 Transpower to produce a roadmap at the start of RCP3 (within 105 working days after the end of the last disclosure year of RCP2) for the development of its asset health, asset life-extension and asset/network risk modelling during RCP3, in preparation for its RCP4 proposal. This roadmap must detail how Transpower plans to develop its risk modelling in order that it can:

L71.1.1 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);

L71.1.2 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

L71.1.3 set forward-looking performance measures.

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[797] 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.

[798] Above n 67. We are seeking technical submissions on this draft notice.

L71.2 Transpower to report annually on its progress towards implementing the roadmap; and

L71.3 Transpower to obtain a mid-RCP3 independent expert report on Transpower's progress in developing its asset health, asset life-extension and asset/network risk modelling.

L72 Our decisions in this area reflect our draft decisions, which received high-level support from submitters.

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;

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[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;

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[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**.