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Cost of capital topic paper

Part 4 Input Methodologies Review 2023 – Final decision

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Associated documents

Publication date	Reference	Title
13 October 2022	ISBN 978-1-99-101241-8	Part 4 IM Review 2023 Framework paper
14 June 2023	ISBN 978-1-991085-66-5	Part 4 IM Review 2023 - Final decision - Financing and incentivising efficient expenditure during the energy transition topic paper
14 June 2023	ISBN 978-1-991085-69-6	Part 4 IM Review 2023 - Final decision - Cost of capital topic paper
14 June 2023	ISBN 978-1-991085-67-2	Part 4 IM Review 2023 - Final decision - CPPs and In-period adjustments topic paper
14 June 2023	ISBN 978-1-991085-68-9	Part 4 IM Review 2023 - Final decision - Transpower investment topic paper
14 June 2023	ISBN 978-1-991085-64-1	Part 4 IM Review 2023 - Final decision - Summary and context paper
14 June 2023	ISBN 978-1-991085-65-8	Part 4 IM Review 2023 - Final decision - Report on the Input methodologies review 2023 paper
14 June 2023	ISBN: 1178-2560	Airport Services Input Methodologies (IM Review 2023) Amendment Determination 2023 [2023] NZCC 34
14 June 2023	ISSN: 1178-2560	Electricity Distribution Services Input Methodologies (IM Review 2023) Amendment Determination 2023 [2023] NZCC 35
14 June 2023	ISSN: 1178-2560	Gas Distribution Services Input Methodologies (IM Review 2023) Amendment Determination 2023 [2023] NZCC 37
14 June 2023	ISSN: 1178-2560	Gas Transmission Services Input Methodologies (IM Review 2023) Amendment Determination 2023 [2023] NZCC 36
21 June 2023	ISSN: 1178-2560	Transpower Input Methodologies (IM Review 2023) Amendment Determination 2023 [2023] NZCC 38
21 June 2023	ISSN: 1178-2560	Transpower Capital Expenditure Input Methodology (IM Review 2023) Amendment Determination 2023 [2023] NZCC 39

All above documents can be found on our website.

Commerce Commission
Wellington, New Zealand

Glossary

Acronyms	Definition
the Act	Commerce Act 1986
AER	Australian Energy Regulator
AIAL	Auckland International Airport Limited
AMP	Asset Management Plan
ASCE	American Association of Civil Engineers
BARNZ	Board of Airline Representatives New Zealand Inc.
CAA	Civil Aviation Authority
Capex	Capital expenditure
CAPM	Capital Asset Pricing Model
CAR	Commission for Aviation Regulation
CEG	Competition Economics Group
CEPA	Cambridge Economic Policy Associates
CMA	Competition and Markets Authority
Commission	Commerce Commission
CPP	Customised Price-quality Path
DGM	Dividend growth model
DPP	Default Price-quality Path
DPRY	Debt Premium Reference Year
EDB	Electricity Distribution Business
ENA	Electricity Networks Association
ERA	Economic Regulation Authority
FCM	Financial Capital Maintenance
Fibre IMs	Fibre IMs set under Part 6 of the Telecommunications Act 2001
Framework	IM Review decision-making framework
FTSE	Financial Times Stock Exchange
GDB	Gas Distribution Business
GDP	Gross Domestic Product
GPB	Gas Pipeline Business
GTB	Gas Transmission Business
ID	Information Disclosure
IMs	Input Methodologies (refers to Part 4 IMs which are the subject of the IM Review, unless identified otherwise)
IM Review	Input Methodologies Review 2023
IEC	Incenta Economic Consulting
IPP	Individual Price-quality Path
LPG	Liquefied petroleum gas

Acronyms	Definition
MEUG	Major Electricity Users Group
MGUG	Major Gas Users Group
MM Theorem	Modigliani-Miller theorem
MRP	Market risk premium
NPV	Net Present Value
NSS	Nelson-Siegel-Svensson
NZAA	New Zealand Airport Association
NZD	New Zealand Dollar
NZ	New Zealand
OIA	Official Information Act 1982
Ofgem	The Office of Gas and Electricity Markets
Ofwat	The Water Services Regulation Authority
Part 4	Part 4 of the Commerce Act 1986
PIE	Portfolio Investment Entity
PQ	Price-quality
PSE	price setting event
PwC	PricewaterhouseCoopers
QCA	Queensland Competition Authority
RAB	Regulated Asset Base
RCP	Regulatory Control Period
RORI	Rate of Return Instrument
S&P	Standard and Poor
SAIFI	System average interruption frequency index
SAIDI	system average interruption duration index
SBL-CAPM	Simplified Brennan-Lally CAPM
TAMRP	Tax-adjusted market risk premium
TCSD	Term Credit Spread Differential
TMR	Total market return
UK	The United Kingdom
UK CAA	UK Civil Aviation Authority
US	The United States of America
WACC	Weighted Average Cost of Capital
WIAL	Wellington International Airport Limited

Contents

Executive summary

Purpose of this paper

X1 The purpose of this paper is to explain in relation to the cost of capital topic:

X1.1 the issues identified within this topic area;

X1.2 our responses to these issues, which include changes to the input methodologies (**IMs**);

X1.3 the reasons for our responses;

X1.4 the steps we have taken to ensure that the cost of capital parameters remain fit for purpose given changes in the overall environment faced by suppliers since the IMs were last reviewed; and

X1.5 how we have taken stakeholders' submissions into account in considering the above and in reaching our final decisions presented in this paper.

X2 This paper relates to electricity distribution businesses (**EDBs**), gas transmission business (**GTB**), gas distribution businesses (**GDBs**), Transpower and regulated airport services.

Overview of the Cost of capital topic

X3 We have reviewed our cost of capital IMs and consider they remain broadly fit for purpose. Our review included:

X3.1 re-examining the case for a trailing average cost of debt in response to the substantive stakeholder submissions on this;

X3.2 reviewing our approach to estimating the risk-free rate and debt premium;

X3.3 updating our estimates of beta and leverage to reflect more up-to-date information, including updating our sample of comparable companies;

X3.4 reviewing key parameter estimates such as the tax-adjusted market risk premium (**TAMRP**) in light of updated information; and

X3.5 reviewing the use of the 67th percentile of the Weighted Average Cost of Capital (**WACC**) for Price-quality (**PQ**) regulation of EDBs and Transpower and GPBs.

X4 Table X1 summarises our final decisions on this topic, including the areas where our analysis has led us to make changes to the IMs. We have made changes that we consider result in a better estimate of the cost of capital. The more accurate our estimate of the WACC, the better we are able to promote the purpose of Part 4 (**Part 4**) of the Commerce Act 1986 (**the Act**). These changes, as well as the parameters of the WACC that we consider do not need to change, are discussed in the following chapters.

X5 This topic paper forms part of our package of decisions papers on the Input Methodologies Review (**IM Review**). As part of the package of papers, we have also published:.

X5.1 a summary paper of our final decisions;

X5.2 a Report on the IM review, which records our decisions on whether and how to change the IMs as a result of the IM review overall;

X5.3 a framework paper, which explains the framework we have applied in reaching our decisions on the IM review; and

X5.4 amendment determinations, which give effect to our decisions.

Table X1 Summary of final decisions in relation to the cost of capital

Final decision	Reasons	Chapter
COST OF DEBT		
Maintain the current hybrid approach to estimating the cost of debt	The hybrid approach uses a prevailing estimate of the risk-free rate and a trailing average estimate of the debt premium. After reviewing the pros and cons of the hybrid approach versus the trailing average, we prefer retaining the hybrid approach primarily because it provides better incentives to invest compared with the trailing average approach.	Chapter 3
Maintain the current approach to estimating the risk-free rate	We consider the evidence supports retaining the current approach to estimating the risk-free rate, including linking the tenor of the risk-free rate to the regulatory period.	Chapter 3
Maintain the current approach to estimating the debt premium	We consider the evidence supports retaining the averaging method we use to estimate the debt premium and the benchmark tenor of five years.	Chapter 3
Update the spread premium for the TCSD for energy businesses - from 7.5 bps to 8.5 bps	This reflects an updated estimate.	Chapter 3
Maintain our current decision of not specifying a TCSD allowance for regulated airports services	We consider a TCSD allowance does not need to be specified in the IMs for regulated airports services because the impact of longer-term debt can be assessed at price setting events for airports.	Chapter 3
Maintain the allowance for debt issuance and associated costs at 20bps p.a., but allow debt issuance and associated costs at 25bps p.a. for a four-year regulatory period	Our review, including an updated confidential debt survey, supports the current allowance for debt issuance and associated costs. We also provide for a higher debt issuance and associated cost allowance for a four-year regulatory period.	Chapter 3

Final decision	Reasons	Chapter
Maintain the current credit rating of BBB+ for EDBs/Transpower and GPBs	We consider that the S&P long-term credit rating of BBB+ for energy businesses remains appropriate.	Chapter 3
Maintain the current credit rating of A- for airports	We consider that the S&P long-term credit rating of A- for airports remains appropriate.	Chapter 3
COST OF EQUITY		
Update the equity beta estimate for EDBs/Transpower - from 0.60 to 0.61	This reflects updated comparator sample analysis.	Chapter 4
Maintain the equity beta for GPBs at 0.69	This reflects updated comparator sample analysis. We do not consider the evidence supports a separate comparator sample for gas and we have retained the uplift of 0.05 to the asset beta for GPBs compared to firms in the comparator sample.	Chapter 4
Update the equity beta for airports - from 0.74 to 0.87	This reflects updated comparator sample analysis. We also decided to remove the downward adjustment of 0.05 to the asset beta for specified airport services as the evidence no longer supports the adjustment.	Chapter 4
Update the TAMRP for GPBs - from 7.5% to 7.0%	This reflects an updated estimate.	Chapter 4
Maintain a TAMRP of 7.0% for EDBs/Transpower and Airports	This result reflects rounding from an updated TAMRP estimate of 7.1% to 7.0%.	Chapter 4
Maintain our current decision of not providing an allowance for equity issuance costs	The evidence provided does not sufficiently support the need for an equity issuance costs allowance.	Chapter 4

Final decision	Reasons	Chapter
OTHER DECISIONS RELATED TO THE COST OF CAPITAL		
Use the 65th WACC percentile for EDBs and Transpower	Our review has concluded that the 65th percentile of the WACC for PQ regulation of EDBs and Transpower is more appropriate than the 67th percentile.	Chapter 6
Use the 50th WACC percentile for GPBs	Our review has concluded that it is appropriate to apply the 50th percentile of the WACC for PQ regulation of GPBs.	Chapter 6
Change the leverage estimate for EDBs/Transpower and GPBs - from 42% to 41%	This reflects updated comparator sample analysis.	Chapter 5
Change the leverage estimate for airports - from 19% to 23%	This reflects updated comparator sample analysis, and in particular the removal of firms from the sample that had very low or negative leverage.	Chapter 5
Changes to allow for a WACC estimate for a four-year regulatory period for EDBs DPPs and Transpower's IPP	We previously amended the GPB IMs to allow for a WACC estimate for a four-year regulatory period. We consider we should make the same change for EDBs DPPs and Transpower's IPPs to make sure we can determine an appropriate WACC in the event we apply a four-year regulatory period.	Chapter 6
Change the standard error of the WACC for EDBs and Transpower - from 0.0101 to 0.0108	This reflects an updated estimate.	Chapter 5
Change the standard error of the WACC for GPBs - from 0.0105 to 0.0112	This reflects an updated estimate.	Chapter 5
Change the standard error of the WACC for airports - from 0.0146 to 0.0169	This reflects an updated estimate.	Chapter 5

Final decision	Reasons	Chapter
Maintain the current approach to tax rates	We consider that our current approach to tax rates remains appropriate.	Chapter 5

Chapter 1 Introduction

Purpose of this paper

1.1 The purpose of this paper is to explain in relation to the cost of capital topic:

1.1.1 the issues identified within this topic area;

1.1.2 our responses to these issues, which include changes to the IMs;

1.1.3 the reasons for our responses;

1.1.4 the steps we have taken to ensure that the cost of capital parameters remain fit for purpose given changes in the overall environment faced by suppliers since the IMs were last reviewed; and

1.1.5 how we have taken stakeholders' submissions into account, in considering the above, and in reaching our final decisions presented in this paper.

Our decision package for the IM Review

1.2 This paper forms part of a package of decisions papers on the IM Review. Alongside this paper, we have published:

1.2.1 our EDB, GDB, GTB, Transpower, and Airports IM amendment determinations.

1.2.2 our Summary and Context paper;

1.2.3 our other topic papers, which explain our final IM policy decisions relevant to the following key topics:

1.2.3.1 Financing and incentivising efficient expenditure during the energy transition;

1.2.3.2 CPP and in-period adjustment mechanisms;

1.2.3.3 Transpower investment; and

1.2.4 our Report on the IM Review, which summarises for every IM policy decision:

1.2.4.1 any changes we are making;

1.2.4.2 where we have considered changes but not made them; and

1.2.4.3 where we have not found reason to consider changes.

Previously published papers and other materials relevant to this topic

1.3 On 23 February 2022 we published our Notice of Intention.[1]

1.4 On 20 May 2022 we published the IM Review Process and issues paper.[2]

1.5 On 13 October 2022 we published the Decision-making Framework paper.[3]

1.6 On 7 November 2022 we held our Forecasting and incentivising efficient expenditure for EDBs workshop.[4]

1.7 On 29 November 2022 we held our Price-quality path in-period adjustment mechanisms workshop where:

1.7.1 we provided stakeholders with discussion slides;[5] and

1.7.2 we asked follow-up questions from the workshop on 5 December.[6]

1.8 On 21 December 2022 we provided a Clarification note with respect to our Framework paper and s 5ZN of the Climate Change Response Act 2002.[7]

1.9 On 14 June 2023 we published our topic paper that set out and explained the reasons for our draft decisions for the Cost of capital.[8] We also published the accompanying documents:

1.9.1 Dr Martin Lally "Review of submissions on the risk-free rate and the cost of debt" (report prepared for Commerce Commission, 10 April 2023);[9]

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1 Commerce Commission "Input Methodologies Review 2023: Notice of intention to commence IM Review" (23 February 2022).

2 Commerce Commission "IM Review 2023 - Process and issues paper" (20 May 2022).

3 Commerce Commission "IM Review 2023 - Decision-making Framework paper" (13 October 2022).

4 Commerce Commission "IM Review 2023: Role of price-quality path in-period adjustment mechanisms - 'Workshop slides'" (7 November 2022).

5 Commerce Commission "IM review 2023 – In period adjustment mechanisms – Workshop 'Discussion slides'" (29 November 2022).

6 Commerce Commission "IM review 2023 – In period adjustment mechanisms – Workshop follow up questions" (5 December 2022).

7 Commerce Commission "IM Review 2023 - Decision-making Framework Clarification note- s5ZN of the CCRA" (21 December 2022).

8 Commerce Commission "Cost of capital topic paper: Part 4 Input Methodologies Review 2023 - Draft decision" (14 June 2023).

9 Dr Martin Lally "Estimation of TAMRP report" (report prepared for Commerce Commission, 10 April 2023).

1.9.2 Dr Martin Lally "Estimation of TAMRP report" (report prepared for Commerce Commission, 17 March 2023);[10]

1.9.3 CEPA "Review of Cost of Capital 2022/ 2023: response to submissions" (report prepared for Commerce Commission, 15 May 2023);[11]

1.9.4 Bela Enterprises "Report on Auckland International Airport Ltd Asset beta submission" (report prepared for the Commerce Commission, 31 January 2023);[12]

1.9.5 A Nelson-Siegel-Svensson (NSS) spreadsheet model + explanation of regressions for estimating the Term Credit Spread Differential (TCSD).[13]

1.9.6 A WACC percentile spreadsheet model + description.[14]

1.9.7 R code for asset beta, leverage, and standard error estimation.[15]

1.10 On 24 August 2023 we published an invitation to cross-submit on specific parts of an expert report provided at the cross-submission stage. The expert report, provided by Competition Economic Group (**CEG**) for New Zealand Airports Association, included new empirical analysis that did not focus on matters raised in submissions.[16,17]

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[10] Dr Martin Lally "Review of submissions on the risk-free rate and the cost of debt" (report prepared for Commerce Commission, 17 March 2023)

[11] Commerce Commission "Input methodologies review 2023 -CEPA "Review of Cost of Capital 2022/ 2023: response to submissions" (report prepared for Commerce Commission, 15 May 2023)

[12] Commerce Commission "Input methodologies review 2023 - Bela Enterprises "Report on Auckland International Airport Ltd Asset beta submission" (report prepared for the Commerce Commission, 31 January 2023)

[13] Commerce Commission "Input methodologies review 2023 - Cost of capital calculations spreadsheet: NSS spreadsheet model and WACC percentile spreadsheet model" - June 2023

[14] Commerce Commission "Input methodologies review 2023 - Cost of capital calculations spreadsheet: NSS spreadsheet model and WACC percentile spreadsheet model" - June 2023

[15] Commerce Commission "Input methodologies review 2023 - Cost of capital topic paper: Asset beta: Master R code" – June 2023; Commerce Commission "Input methodologies review 2023 - Cost of capital topic paper: Asset beta: Data extract R code" – June 2023; Commerce Commission "Input methodologies review 2023 - Cost of capital topic paper: Asset beta: Estimate - Weekly R code" – June 2023; Commerce Commission "Input methodologies review 2023 - Cost of capital topic paper: Asset beta: Estimate - four Weekly R code" – June 2023; Commerce Commission "Input methodologies review 2023 - Cost of capital topic paper: Asset beta: Estimate - daily R code" – June 2023.

[16] CEG "Review of submissions on asset best estimates for airports" (report prepared for NZ Airport Association, 9 August 2023)

[17] Commerce Commission "Input methodologies review 2023 Cost of capital: Invitation to cross-submit on specific matters" (24 August 2023)

Structure of this paper

1.11 This paper is divided into sections, each addressing a series of identified issues within the cost of capital topic. Each of the sections broadly follows the following structure:

1.11.1 summary of the final decision;

1.11.2 the background of the issue and our draft decisions;

1.11.3 A summary of issues raised in submissions and expert reports in response to our draft decisions; and

1.11.4 Our response to issues raised in submissions on the draft decisions and reasons for our final decisions

1.12 In describing the issues and assessing proposed responses, we explain how we have taken stakeholders' submissions into account and how they have helped to shape our final decisions.

Introduction to this topic

1.13 The cost of capital is the expected financial return investors require from an investment given its risk. A more detailed explanation of what the WACC is, the role it plays in Part 4 regulation, and how it is calculated, is presented in our Topic Paper from the 2016 IM Review.[18]

1.14 We identified a number of issues through consultation on our Process and issues paper and consultation on a report prepared for us by Cambridge Economic Policy Associates (**CEPA**).[19] Our analysis was also informed by submissions, our confidential cost of debt survey, the expert reports prepared for us by Bela Enterprises, CEPA, and Dr Martin Lally, and the expert reports prepared for us on behalf of submitters.[20] We have sought to address these issues and detail our approaches to dealing with them at the beginning of each section.

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[18] Commerce Commission “Input methodologies review decisions: Topic paper 4 – Cost of capital issues” (20 December 2016).

[19] Commerce Commission “Part 4 Input Methodologies Review 2023: Process and issues paper” (20 May 2022); CEPA "Report on Cost of Capital 2022/ 2023" (report to the Commerce Commission 'IM Review 2023', 29 November 2022).

[20] Commerce Commission "Input methodologies review 2023 - Bela Enterprises "Report on Auckland International Airport Ltd Asset beta submission" (report prepared for the Commerce Commission, 31 January 2023);

1.15 We considered various expert reports we commissioned when developing our draft decisions, including:

1.15.1 CEPA – Review of cost of capital 2022/2023 – New Zealand Commerce Commission (29 November 2022).

1.15.2 Dr Martin Lally – Estimation of the TAMRP (10 April 2023).

1.15.3 Dr Martin Lally – Review of submissions on the risk-free rate and the cost of debt (17 March 2023).

1.15.4 CEPA – Review of cost of capital 2022/2023: response to submissions (15 May 2023).

1.15.5 Bela Enterprises – Comment on the Auckland Airport Input Methodologies submission (31 January 2023).

1.16 We published three models alongside of our draft topic paper. These are:

1.16.1 A Nelson-Siegel-Svensson (**NSS**) spreadsheet model + explanation of regressions for estimating the Term Credit Spread Differential (**TCSD**).

1.16.2 A WACC percentile spreadsheet model + description.

1.16.3 R code for asset beta, leverage, and standard error estimation.

1.17 We published CEPA's Review of the cost of capital 2022/2023 in December 2022.[21] We have published the other expert reports alongside this topic paper. The expert reports prepared on behalf of submitters were published during the relevant submission processes.

1.18 We have also drawn on previous analysis and expert reports from the 2010 IMs setting process, the 2013 High Court decision, the 2014 amendment to the WACC percentile, the 2016 IM Review, and the 2020 fibre IMs setting process under Part 6 of the Telecommunications Act 2001 (**Fibre IMs**).

1.19 We published three models alongside of our final decision topic paper. These are:

1.19.1 A Nelson-Siegel-Svensson (**NSS**) spreadsheet model + explanation of regressions for estimating the Term Credit Spread Differential (**TCSD**).

1.19.2 A WACC percentile spreadsheet model + description.

1.19.3 R code for asset beta, leverage, and standard error estimation.

[21] Commerce Commission "Part 4 Input Methodologies Review 2023: Process and issues paper" (20 May 2022).

1.20 We commissioned the following reports which we published alongside our final decision topic:

1.20.1 Dr Martin Lally "Review of CEG's submission on the debt tenor anomaly" (6 September 2023);[22] and

1.20.2 Dr Martin Lally "Review of further submissions " (23 September 2023).[23]

1.21 As we indicated in our Process and issues paper, we also need to determine specific values of the key parameters of the WACC calculation. We have sought to ensure that the parameters remain fit for purpose given changes in the overall environment faced by suppliers since the IMs were originally set and since the 2016 IM Review. The parameters have been updated using more recent data and our reasons for any amendments to the parameters follow the discussion of the identified issues in each section.

Who does this paper apply to?

1.22 This paper applies to the IM Determinations for:

1.22.1 EDBs;

1.22.2 GTBs;

1.22.3 GDBs;

1.22.4 Transpower; and

1.22.5 specified airport services.

1.23 Note that throughout this paper we use the term GPBs to refer to the gas pipeline businesses in general (ie, inclusive of GTBs and GDBs).

[22] Dr Martin Lally "Review of CEG's submission on the debt tenor anomaly" (report prepared for Commerce Commission, 6 September 2023)

[23] Dr Martin Lally "Review of further submissions " (report prepared for Commerce Commission, 23 September 2023)

Chapter 2 Framework and context

Purpose and structure of this chapter

2.1 This chapter highlights key elements of our IM Review decision-making framework (**Framework)** and contextual factors that are most relevant to our final decisions on the cost of capital.

Decision-making framework

2.2 In identifying which IMs to consider changing, and in reaching final decisions on changing IMs, we are guided by three overarching objectives for the IM Review. We will only change an IM if it appears likely to meet one or more of the overarching objectives:[24]

2.2.1 promoting the Part 4 purpose in s 52A more effectively;

2.2.2 promoting the IM purpose in s 52R more effectively (without detrimentally affecting the promotion of the s 52A purpose); and

2.2.3 significantly reducing compliance costs, other regulatory costs, or complexity (without detrimentally affecting the promotion of the s 52A purpose).

2.3 Our individual final decisions on the cost of capital IM are aimed at contributing towards determining an estimate of a cost of capital that will achieve the Part 4 purpose while still promoting certainty for regulated suppliers and consumers in relation to the rules, requirements, and processes applying to regulation under Part 4.[25]

2.4 We consider that the most relevant outcomes of the s 52A purpose for the cost of capital IM are:

2.4.1 s 52A(1)(a) – that regulated suppliers have incentives to innovate and to invest, including in replacement, upgraded, and new assets; and

2.4.2 s 52A(1)(d) – that regulated suppliers are limited in their ability to extract excessive profits.

[24] Commerce Commission "IM Review 2023 - Decision-making Framework paper (13 October 2022), para X20.

[25] Ibid, X21.1.

2.5 We have also considered whether our cost of capital IM decisions promote the outcomes in s 52A(1)(b) and s 52A(1)(c):

2.5.1 s 52A(1)(b) - that regulated suppliers have incentives to improve efficiency and provide services at a quality that reflects consumer demands; and

2.5.2 s 52A(1)(c) - that regulated suppliers share with consumers the benefits of efficiency gains in the supply of the regulated goods or services, including through lower prices.

2.6 In reaching our final decisions we have aimed to strike an appropriate balance between the s 52A outcomes.

2.7 In this regard, we consider that reaching our best estimate of each of the WACC parameters will help to ensure the objectives in s 52A(1)(a) to (d) are balanced and promoted appropriately.

Key economic principles

2.8 The Framework paper also describes key economic principles that can provide guidance as to how we might best promote the Part 4 purpose.

2.9 The key economic principles most relevant to this topic paper are:

2.9.1 ex-ante real financial capital maintenance (**FCM**) and FCM's practical application in the form of Net Present Value (**NPV**)=0[26]; and

2.9.2 any asymmetric consequences to consumers, over the long-term, of under-investment versus higher prices, which we consider under the WACC percentile.

2.10 For further detailed discussion on the Framework, please see the IM Review 2023 Decision Making Framework paper.[27]

Context

2.11 The cost of capital is the expected financial return investors require from an investment given its risk. Investors have choices and will not invest in an asset unless the expected return is at least as good as the return they would expect to get from a different investment of similar risk.

[26] Ibid, X24.1-X24.2 and 4.26.

[27] Commerce Commission "IM Review 2023 - Decision-making Framework paper (13 October 2022).

2.12 There are two main types of capital: debt and equity capital. Both have a cost from the perspective of the entity that is seeking funds from investors. For debt, it is future interest payments. For equity, it is the expectation of dividend payments by the firm, and where profits are retained and reinvested, the expectation of larger dividend payments by the firm sometime in the future.

2.13 The WACC reflects the cost of debt and the cost of equity, and the respective portion of each that is used to fund an investment.

2.14 The cost of capital IM comprises two parts:

2.14.1 The first and most significant component is a method for calculating the WACC. The WACC is determined for each regulated service and applies to all regulated suppliers of that service; and

2.14.2 The second component is the TCSD, which is treated as an adjustment to cash flow and will apply to qualifying firms only.

2.15 For price-quality regulated suppliers, our approach of setting a nominal WACC and treatment of inflation for a price-path together give an expectation of real financial capital maintenance (FCM). We set a nominal WACC (which inherently incorporates inflation expectations at the time it is calculated), and then we update the price-path for actual inflation and the RAB is revalued using actual inflation.[28]

2.16 As part of the IM Review process, through our Process and issues paper and CEPA report on cost of capital, we identified a number of important issues that we prioritised in reviewing the cost of capital IM. In addition to these identified issues, we have also sought to ensure that all the parameters remain fit for purpose given changes in the overall environment faced by suppliers both since the IMs were originally set, and since the 2016 IM Review.

2.17 We consider that our final decisions enable us to estimate a cost of capital that is reasonable and commercially realistic while maintaining consistency with s 52R and not increasing complexity or compliance costs. Our changes to the cost of capital are based for the most part on access to updated data, including of comparator samples, which has allowed us to update parameter estimates. Our view is that the associated revisions to the cost of capital parameter estimates in the IMs will better promotes the s 52A purpose.

[28] For a fuller explanation, see Commerce Commission "Input methodologies review draft decisions - Topic paper 1: Form of control and RAB indexation for EDBs, GPBs and Transpower" (16 June 2016), paras 240-252.

Chapter 3 Cost of debt

Purpose and structure of this chapter

3.1 The purpose of this chapter is to explain:

3.1.1 the main issues raised in relation to the cost of debt;

3.1.2 our review and analysis of the parameters that make up the cost of debt; and

3.1.3 the reasons for our decisions.

The structure of this chapter is as follows

3.2 This chapter begins with a summary of our decisions with respect to the cost of debt.

3.3 The chapter then outlines the background to our approach to estimating the cost of debt, followed by an analysis of each element that is part of the cost of debt estimate.

3.4 For each element, the chapter discusses the main issues raised in submissions in relation to our approach to estimating that element and sets out our responses.

3.5 We discuss the following cost of debt topics in sequence:

3.5.1 risk-free rate, including consideration of a trailing average approach to estimating the risk-free rate (as proposed by some suppliers);

3.5.2 the debt premium;

3.5.3 the TCSD;

3.5.4 compensation for debt issuance and associated costs; and

3.5.5 credit rating.

Final decisions for estimating the cost of debt

3.6 We have maintained our current approach to estimating the cost of debt. That is, we estimate the cost of debt as the sum of the risk-free rate, the debt premium and debt issuance and associated costs.

3.7 Our current approach for determining the risk-free rate uses prevailing rates ('the prevailing approach'). Our decision is to maintain a prevailing approach to estimating the risk-free rate.

3.7.1 We will estimate the risk-free rate using a three-month average of prevailing interest rates at the time each PQ and Information Disclosure (**ID**) WACC determination is made.

3.7.2 The risk-free rate will be estimated from the wholesale market linearly interpolated bid yield to maturity of notional benchmark New Zealand government New Zealand dollar denominated nominal bonds with a residual period to maturity equal to the regulatory period.

3.8 Our current approach for determining the debt premium uses a historical average estimate ('the trailing average approach'). Our decision is to maintain our current trailing average approach to estimating the debt premium.

3.8.1 We will determine the average debt premium for each disclosure year for ID regulation, and for each regulatory period for PQ regulation.

3.8.2 The average debt premium will be a simple arithmetic average of five annual debt premium values, estimated for the current Debt Premium Reference Year (**DPRY**) and four previous DPRYs.[29]

3.8.3 We will determine the annual debt premium for each DPRY for PQ and ID regulation. The annual debt premium will be estimated as the difference between the risk-free rate and the yield on publicly traded corporate bonds (for EDBs/Transpower and GPBs with a Standard and Poor's (**S&P**) long-term credit rating of BBB+, and for airports with a S&P long-term credit rating of A-), with a remaining term to maturity of five years.

3.9 Our decision on the TCSD is to:

3.9.1 change the spread premium to 8.5 bps for energy businesses; and

3.9.2 maintain the decision of not specifying a TCSD value for airports in the IMs. We consider a TCSD allowance does not need to be specified in the IMs for regulated airports services because the impact of longer-term debt can be assessed at price setting events (**PSEs**) for airports.

3.10 We maintain our current allowance for debt issuance and associated costs of 20 bps p.a. for a five-year regulatory period but allow for an upward adjustment for a four-year regulatory period (25 bps p.a.).

[29] For detail about the DPRY, please see: Commerce Commission "Guidelines for WACC determinations under the cost of capital input methodologies" (January 2023), p. 19.

3.11 Our decision on the credit rating is to:

3.11.1 maintain the current long-term credit rating of BBB+ for EDBs/Transpower and GPBs; and

3.11.2 maintain the current long-term credit rating of A- for airport services.

Background to our approach to the cost of debt

3.12 Our current approach to estimating the cost of debt is by estimating the risk-free rate proxied by the interest rate paid by the New Zealand Government, and the additional premium (the 'debt premium') that corporate borrowers pay to compensate investors for the additional risks of lending to them (relative to the Government debt). We also allow for the direct costs of issuing debt, the cost of entering interest rate swaps to alter the term of the debt and better align it to the length of the regulatory period, and other 'potential' debt issuance and management costs.[30]

3.13 We use a 'simple approach' to estimating the cost of debt, that is, we only consider credit-rated publicly traded corporate bonds denominated in New Zealand dollars when estimating the debt premium and debt issuance and associated costs.[31]

3.14 A separate TCSD allowance is calculated for qualifying suppliers reflecting the additional costs associated with holding a longer-term debt portfolio (above the five-year term allowed for in the debt premium).[32] The TCSD is used to adjust cash flows under ID and Default Price-quality Path (**DPP**) regulation and is applied to allowable revenue calculations in CPP regulation. A TCSD does not apply for Airports, but we can take Airports' specific circumstances into account as part of the PSE reviews.

3.15 We received several submissions on issues in relation to our approach to estimating the cost of debt, risk-free rate, debt premium, TCSD, debt issuance and associated costs, and credit rating. We discuss these issues below.

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[30] We use a benchmark cost of capital including debt issuance and associated costs in setting the price path. Supplier actual financing costs and debt issuance costs are excluded from the expenditure allowances in the price path because these are recovered through the return on capital (ie, through the cost of capital).

[31] In principle, there are two generic ways of estimating the cost of debt. The 'simple approach' only considers credit-rated publicly traded corporate bonds denominated in New Zealand dollars. The 'complex approach' acknowledges that firms may raise debt capital through a number of channels in addition to issuing bonds in New Zealand.

[32] Qualifying suppliers are suppliers which have a debt portfolio with a weighted average original tenor exceeding the tenor of the debt premium.

Risk-free rate

Final decisions

3.16 Our final decision is to retain a prevailing approach for estimating the risk-free rate. This is the same as our draft decision and unchanged from the pre-review IMs. Therefore, our decision is to maintain a hybrid cost of debt approach where we set a prevailing risk-free rate and trailing average debt premium.

Our method

3.17 The risk-free rate is an input in estimating both the cost of debt and the cost of equity. We use the same approach to estimating the risk-free rate for both debt and equity.

3.18 Our overall approach to estimating the risk-free rate involves:

3.18.1 identifying a suitable proxy, as the risk-free rate is not observable in practice;

3.18.2 deciding whether to use the prevailing risk-free rate or an historical average of the risk-free rate;

3.18.3 deciding whether to use spot rates (zero coupon rates) or yields to maturity on New Zealand government coupon paying bonds as a proxy for spot rates;

3.18.4 deciding what time window to use to estimate the risk-free rate; and

3.18.5 deciding on the appropriate maturity of the bonds used to estimate the risk-free rate.

3.19 The detailed steps for practically estimating the risk-free rate are set out in our WACC guidelines (noting that our approach in the IMs has been maintained in our final decision).[33]

[33] Commerce Commission "Guidelines for WACC determinations under the cost of capital input methodologies" (January 2023), pp. 14-15.

Background

Prevailing versus trailing average approach

3.20 In the original 2010 IMs we decided on a prevailing approach for the risk-free rate. We noted the trade-offs between setting historical versus current rates:[34]

> Using historical rates reflects long-term average actual risk-free rates and will lead to estimated costs of equity and debt which tend to be relatively stable over time. In a price setting context, this relative stability will tend to lead to relatively stable returns to suppliers and prices to consumers over time. However, this apparent stability could blunt the signals from structural changes in the financial markets with respect to new investment in infrastructure, as significant changes in interest rates only slowly affect the specified cost of capital.
>
> The use of current rates will lead to estimated costs of equity and debt which more closely reflect changes in expectations in the financial markets. That is, they are more up-to-date estimates of interest rates and therefore the cost of capital. In a price setting context, using current rates means changes in expectations in the financial markets will be signalled more rapidly to suppliers, and to consumers.

3.21 We concluded that the use of current rates better achieved the Part 4 purpose, and the potential dynamic efficiency benefits of investment, than using historically averaged rates.

3.22 In the 2016 IM Review, we retained the prevailing approach to estimate the risk-free rate element of the cost of debt. We maintained our view from 2010 that using prevailing rates enables firms to have an expectation of achieving a normal return on their investment, promotes the potential dynamic efficiency benefits of investment and, therefore, better promotes the Part 4 purpose.

Annual updating of the risk-free rate

3.23 In the original 2010 IMs we stated that the risk-free rate is subject to volatility and so we would update it every time that we estimate the cost of capital for regulated purposes.[35] We set a nominal risk-free rate (as part of the overall nominal WACC) at the beginning of a regulatory period, and then we update the price-path for actual inflation. This approach effectively provides suppliers the expectation of a real return that was expected at the beginning of a regulatory period.

3.24 We maintained our 2010 decision in the 2016 IM Review.

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[34] Commerce Commission "Input Methodologies (electricity distribution and gas pipeline services) Reasons Paper" (December 2010), paras H4.11-H4.12.

[35] Commerce Commission "Input Methodologies (electricity distribution and gas pipeline services) Reasons Paper" (December 2010), para H4.28.

Term of the risk-free rate

3.25 In the original 2010 IMs we decided that the term of the risk-free rate should be equal to the length of the regulatory period. We noted:[36]

> Regulated suppliers can reset their prices at the end of each regulatory period to reflect, among other things, changes in the risk-free rate if this has altered the cost of capital. Through the regular resetting of prices the uncertainty over the level of long-term interest rates is borne by users, rather than suppliers. Accordingly, suppliers' prices should not reflect a premium for the uncertainty of risk-free rates beyond the length of the pricing period.

3.26 We maintained our 2010 decision in the 2016 IM Review noting that suppliers can use interest-rate swaps to fix a supplier's interest rate payments such that they broadly match the risk-free rate (which is set by us for the length of a regulatory period).

Issues raised in submissions that informed our draft decision

3.27 We received several submissions that informed our draft decisions in relation to our method for estimating the risk-free rate (as discussed in paragraph 3.18 above). These are summarised below.

Prevailing versus trailing average approach

3.28 We received several submissions from regulated suppliers who prefer the trailing average approach to estimating the risk-free rate. Submitters raised two main issues that are related to the use of the prevailing approach to estimating the risk-free rate:

3.28.1 Large suppliers may not be able to enter swap contracts for the risk-free rate component within the refinancing window specified by the Commission due to the market disruption caused by the large size of their contracts. Therefore, suppliers may be exposed to the risk that their cost of debt will not match the regulatory benchmark allowance.[37]

[36] Commerce Commission "Input Methodologies (electricity distribution and gas pipeline services) Reasons Paper" (December 2010), para 6.3.10. For further explanation see Commerce Commission "Input Methodologies (electricity distribution and gas pipeline services) Reasons Paper" (December 2010), paras H4.31-HH4.34.

[37] Submissions by Chorus, Transpower on the Commerce Commission "IM Review 2023 - Process and issues paper" (20 May 2022), and Commerce Commission "IM Review 2023 - Draft Framework paper" (20 May 2022). Submissions available on our website.

3.28.2 The volatility of the risk-free rate component of the debt proportion of the WACC introduces volatility into regulatory determinations, which results in volatility in allowed revenues for regulated suppliers and prices for consumers between regulatory control periods.[38]

Annual updating of the risk-free rate

3.29 The Oxera report commissioned by the 'Big Six' EDBs proposed that the risk-free rate used in setting the allowed cost of debt be reset annually during a regulatory period so as to reduce the exposure of the EDBs to market movements in interest rate risks.

3.30 Oxera considered that the upward pressure on rates and the volatility of interest rates introduced uncertainty about movements in the market which are beyond companies' control, and annual updating of the risk-free rate as well a number of tools (eg, pass-through mechanisms, 'true-ups', triggers or reopeners to instigate changes to allowances within the period) could be used to reduce suppliers' exposure to interest rate risk.[39]

Term of the risk-free rate

3.31 The Oxera report proposed that the Commission consider a range of evidence on yields of government bonds with maturities between five and 20 years.[40]

[38] Submissions by Chorus, ENA, First Gas, Transpower, Unison, Vector on the Commerce Commission "IM Review 2023 - Process and issues paper" (20 May 2022), and Commerce Commission "IM Review 2023 - Draft Framework paper" (20 May 2022); and the Oxera (report prepared for 'Big 6' EDBs) and CEG (report prepared for Electricity Networks Association - Appendix C) submissions on the CEPA "Reoprt on Cost of Capital 2022/2023" (report to the Commerce Commission 'IM Review 2023' (29 November 2022). Submissions available on our website.

[39] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), pp. 11, 15-16.

[40] Ibid, pp. 11-13.

Reasons for our draft decisions

Our consideration of the trailing average approach

3.32 The trailing average was a key topic in submissions up to the Draft decisions. The issues noted 3.28 above in relation to the trailing average approach were raised by suppliers in the 2016 IM Review, and we provided detailed responses in our 2016 final reasons paper.[41] We noted that suppliers did not provide substantial new evidence in their submissions up to our draft decision for the present review. Nevertheless, we provided a detailed analysis of the proposed trailing average approach and responded to the two issues (the difficulty of hedging the risk-free rate volatility and the volatility of returns and prices) raised by submitters in detail below.

The prevailing versus trailing average approach

3.33 Regulated suppliers submitted that a staggered portfolio reflects the need to finance investment in long-lived assets, and to spread borrowing requirements over time to reduce overall refinancing risk. We recognised this point when adopting the trailing average approach for the debt premium in the 2016 IM Review.[42]

3.34 Regulated suppliers proposed in this review that we switch to the trailing average approach to estimating the risk-free rate. We discussed the two main concerns (the difficulty of hedging the risk-free rate volatility and the volatility of returns and prices) raised in submissions in relation to the prevailing approach.

Issue 1: The difficulty of hedging the risk-free rate volatility

3.35 Suppliers, in particular Chorus and Transpower, submitted that there are difficulties using interest rate swaps.[43]

[41] Commerce Commission "Input methodologies review - Topic paper 4: Cost of capital issues" (20 December 2016), paras 85-137.

[42] However, we consider that the prevailing approach is also consistent with the assumed debt management strategy. The main difference is that a firm's efficient debt financing practice involves the use of interest rate swaps under the prevailing approach and no use of interest rate swaps under the trailing average approach. As we found in our confidential debt surveys for the current IM Review, the use of interest rate swaps is a common practice among regulated suppliers under the current regime.

[43] Submissions by Chorus, Transpower on the Commerce Commission "IM Review 2023 - Process and issues paper" (20 May 2022), and Commerce Commission "IM Review 2023 - Draft Framework paper" (20 May 2022). Submissions available on our website.

3.36 Incenta Economic Consulting (**IEC**) in its report for Chorus stated:[44]

> We note that the Commission has emphasised in past decisions that its cost of debt allowance – in which the risk-free element is determined with reference to spot rates around the time of determination – can also be replicated by firms using interest rate swaps to lock-in that spot risk-free rate. However, we understand that the size of Chorus relative to the New Zealand market is likely to make this hedging activity infeasible. Chorus, and other large, regulated firms, may therefore face a considerable mismatch between the allowance received for the cost of debt and the embedded cost.

3.37 Transpower stated:[45]

> The trailing average approach, implemented well, will go a considerable way to addressing the main problems with the current rate-on-the-day methodology. These problems include:
>
> 1. Large exposures to refinancing risks implicit in the current approach
>
> 2. Market disruption (ie, elevated spreads, inability to hedge risk) due to the narrow refinancing window assumed
>
> 3. Inability of prudent and efficient suppliers to match their actual debt service costs to the regulatory allowance.

3.38 We addressed this issue in detail in our 2010 and 2016 IM Reviews. In particular, we noted that we had been provided with limited evidence that suggests the interest rate swap market is significantly affected by the actions of the regulated suppliers concentrating hedging in a small determination window.

3.39 Firms in general have a mix of debt maturities to manage refinancing risk, including issuing long-term debt, but long-term debt typically has a greater cost than medium or short-term debt. The use of interest rate swaps allows firms to adjust the period for which their interest rate is fixed, generally in order to benefit from a lower rate of interest, while bearing some interest rate risk during refinancing. Using swaps allows a firm to choose the interest rate re-pricing period it faces, independent of the maturity date of the debt.

3.40 As part of the evidence that we gathered for this review, we conducted a confidential debt survey. We asked businesses about their current debt portfolio and use of swaps to hedge interest rate exposure. The information on debt profiles that we obtained from regulated suppliers in New Zealand shows that they are able to use interest rate swaps to achieve greater alignment of their interest rate re-pricing periods with the regulatory periods.[46]

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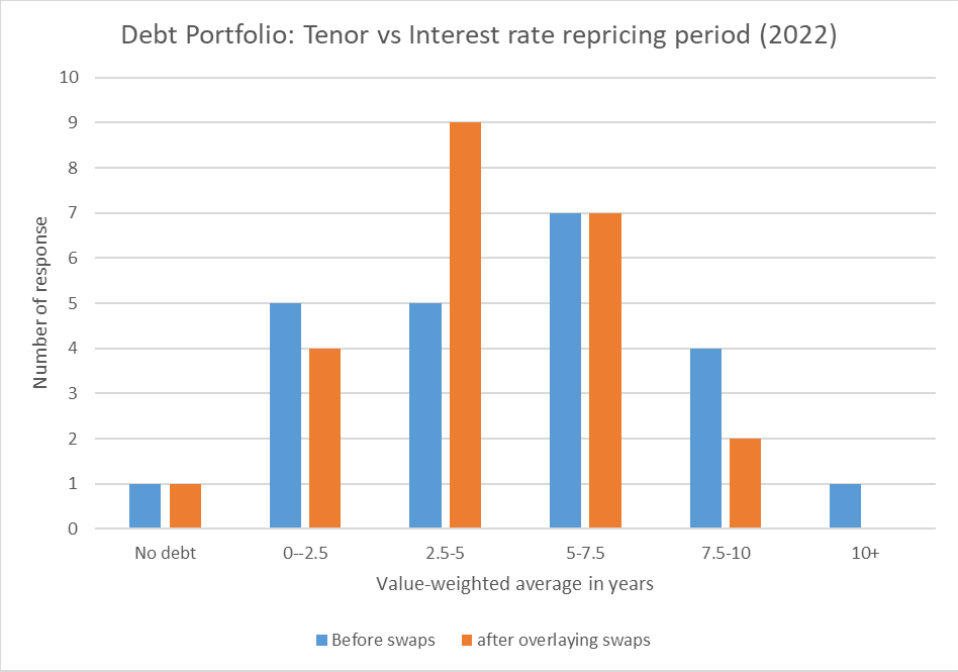
[44] Incenta Economic Consulting "Measures to improve the stability in WACC estimates" (report prepared for Chorus, 11 July 2022), p. 2.

[45] Transpower NZ Ltd "Submission on IM Review Process and Issues paper and draft Framework paper" (11 July 2022), pp. 19-20.

[46] We understand that some regulated suppliers choose to use interest rate swaps to seek alignment with the regulatory period and some do not.

3.41 Figure 3.1 compares the weighted average original tenor for regulated suppliers' debt with the weighted average interest rate re-pricing period for that debt, based on our 2022 confidential debt survey. The data on the actual interest rate repricing period faced by regulated suppliers illustrates regulated suppliers' ability to use swaps to alter their interest rate repricing period and align it more closely with the regulatory period.

Figure 3.1 Regulated Suppliers' Debt Portfolios: Tenor vs. Interest Rate Repricing Period



Source: New Zealand Commerce Commission analysis of 2022 confidential debt survey.

3.42 In the 2016 IM Review, we decided to extend the risk-free rate determination period from a one-month window to three months, to mitigate some concern in submissions that suggest the swap market is significantly affected by the actions of the regulated suppliers concentrating hedging in a small determination window. In response to that decision, submissions agreed that this concern has been alleviated to some degree by the extension of the determination window to three months.

3.43 Overall, the evidence before us suggests that regulated suppliers can use interest rate swaps to materially hedge their risk-free rate exposure without significant hurdles. Our three-month determination window for the risk-free rate further mitigates the difficulty of hedging.

Issue 2: Volatility of returns and prices

3.44 A number of suppliers submitted that the prevailing approach would result in volatile estimates of the WACC that can change significantly from one regulatory period to another.[47] They suggested that the volatility affected their own costs and it also has a detrimental impact on consumers who may be subject to significant price changes between regulatory periods.

3.45 First Gas suggested:[48]

> To better align with how debt is raised in practice and to reduce price and revenue volatility, we consider that the Commission should adopt a trailing average approach to estimate the cost of debt.

3.46 Transpower stated:[49]

> The trailing average approach, implemented well, will go a considerable way to addressing the main problems with the current rate-on-the-day methodology. These problems include: ... 4. Volatility in transmission prices between Regulatory Control Periods (**RCPs**).

3.47 The Electricity Networks Association (**ENA**) stated:[50]

> The current on-the-day approach to cost of debt can result in step changes in MAR between regulatory periods, as noted in chapter 5 of the Process and issues paper. The Commission should examine if the approach to estimating the cost of debt (trailing average) used in other jurisdictions (most notably the **AER**) would address this issue.

3.48 Unison suggested:[51]

> These extremes have highlighted that the approach to setting the risk-free rate on a three month window potentially can cause quite volatile outcomes that then become locked in for a five year period. It is not evident that this concentration risk is to the long-term benefit of consumers and we think the Commission should reconsider the appropriate measurement window for the risk-free rate.

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[47] Submissions by Chorus, ENA, First Gas, Transpower, Unison, Vector on the Commerce Commission "IM Review 2023 - Process and issues paper" (20 May 2022), and Commerce Commission "IM Review 2023 - Draft Framework paper" (20 May 2022), and the Oxera (report prepared for 'Big 6' EDBs) and CEG (report prepared for Electricity Networks Association - Appendix C) submissions on the CEPA "Report on Cost of Capital 2022/ 2023" (report to the Commerce Commission 'IM Review 2023' (29 November 2022). Submissions available on our website.

[48] First Gas Limited "Submission on IM Review Process and issues paper and draft Framework paper" (13 July 2022), p. 25.

[49] Transpower NZ Ltd "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022), pp. 19-20.

[50] Electricity Networks Aotearoa "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022), p. 14.

[51] Unison – "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022)

3.49 Competition Economics Group (**CEG**), in a report for ENA, stated:[52]

> In our view, the trailing average approach is to be preferred because it is simpler to hedge to and is more stable (which benefits both EDBs and customers).

3.50 We agreed with submissions that the main benefit of the trailing average approach is that it would support greater price stability between regulatory periods. However, we considered that we have tools other than the WACC for smoothing prices at PQ resets, as per s 53P (8).[53] In particular, we can apply the rate of change mechanism to smooth prices within a regulatory period to mitigate any significant impacts on consumers or suppliers.[54]

3.51 In regard to the impact on consumers, we noted that submissions focused on price stability between regulatory periods. However, price stability within a regulatory period is also important.

3.52 Our review of the annual revenue wash-up found that revenue and price stability within a regulatory period can be improved by aligning the assumptions underlying the revenue washup mechanism with the assumptions underlying the hybrid cost of debt (prevailing risk-free rate and trailing average debt premium).

3.53 In our draft decision we proposed a change to the annual revenue wash-up that would have fixed debt servicing costs in nominal terms for the regulatory period. We discussed this change in detail in chapter 5 of the Financing and Incentivising Efficient Expenditure during the Energy Transition topic paper of the Draft decisions.[55]

3.54 We considered it is more straightforward to achieve revenue and price stability during a regulatory period under the hybrid approach than under the trailing average approach.[56]

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[52] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Authority Networks, February 2023), p. 8.

[53] The Act s 53P (8):

The Commission may set alternative rates of change for a particular supplier—

(a) as an alternative, in whole or in part, to the starting prices set under sub-section (3)(b) if, in the Commission's opinion, this is necessary or desirable to minimise any undue financial hardship to the supplier or to minimise price shock to consumers.

[54] For example, in our Gas DPP3 Decisions, we have smoothed prices over DPP3 to minimise price rises for consumers of gas pipeline services. For details please see: Commerce Commission "Default price-quality paths for gas pipeline businesses" (1 October 2022). Final Reasons Paper" (May 2022), p. 15.

[55] Commerce Commission, Part 4 IM Review 2023 - Final decision - Financing and incentivising efficient expenditure during the energy transition topic paper, (13 December 2023), chapter 5.

[56] And therefore, it is also more complicated, using our modelling approach, to demonstrate NPV=0 is achieved under the trailing average method. However, we considered it would be possible to design an

3.55 An important consideration in setting the WACC is estimating the opportunity cost of capital. We considered that the stability of expected returns associated with the trailing average could weaken the signals with respect to new investment in infrastructure. As the cost of debt calculated using a trailing average is based on mostly historical nominal interest rates which generally depart from the current market conditions, it is less likely to represent an expected return that reflects the opportunity cost of new investment.

3.56 There is debate about the extent that the cost of debt should reflect the opportunity cost of new investment. For example, in the Australian Energy Regulator (**AER**)'s 2022 Rate of Return Instruments (**RORI**) concurrent evidence session, various views were provided on this issue.

3.56.1 Professor Partington considered that the NPV=0 principle requires the use of current opportunity cost of debt determined by the capital market and this is the rate to be applied to new investments.[57]

3.56.2 Dr Hird considered that a properly weighted trailing average approach does not create incentive distortions even when the trailing average rate differs from the prevailing rate, because any financing costs incurred today would enter into Regulated Asset Base (**RAB**) and be recovered over the trailing average period.[58]

3.57 Professor Partington and Dr Lally shared the view that new investment should use the prevailing cost of debt. Dr Hird's argument, on the other hand, seemed to suggest that the opportunity cost of debt is less important for an investment decision than whether the firm recoups its debt financing costs.

3.58 We note that this debate partly depends on whether the trailing average method can be designed in a way that assigns the appropriate weight to new capital expenditure (**capex**). However, when there is large new capex relative to historic capex, there is a practical issue with the trailing average approach in relation to the weighting assigned to new capex which we discuss in paras 3.63 to 3.65. As it is likely that annual capex for Transpower and the EDBs over the next few regulatory periods will be greater than in the past, this practical issue becomes a more significant concern. As we note in the next section, attempting to apply appropriate weightings can introduce significant implementation issues (see the AER discussion in paragraphs 3.64 to 3.65 and 3.116 to 3.119).

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annual revenue wash-up that adjusted for the difference between the assumed cost of debt and the trailing average cost of debt, but it would require an annual update to the cost of debt (or a wash-up at the end of the regulatory period).

[57] AER "Rate of Return Instruments Concurrent Evidence Session 2" (February 2022), pp. 48-52.

[58] AER "Rate of Return Instruments Concurrent Evidence Session 2" (February 2022), pp. 81-82.

3.59 In general, we were mindful that when making investment decisions, investors compare the expected return on an asset with their opportunity cost for that investment, and the opportunity cost is typically reflected in the current market rates. While we agreed that it is important that our regulatory settings provide ex ante NPV=0, this does not mean that firms need to have the recovery of their actual debt financing costs assured.

Potential implementation issues with the trailing average approach

3.60 If we were to adopt a trailing average approach applying to both the risk-free rate and the debt premium, we would need to consider a number of practical implementation issues, including:

3.60.1 requiring an estimate of an efficient benchmark term of debt;

3.60.2 the choice between a simple or a weighted trailing average;

3.60.3 the possible need for a transitional arrangement to ensure no windfall gains or losses due to the change; and

3.60.4 other potential adjustments such as annual updating of the debt allowance, all of which would introduce additional complexity and potential errors.

3.61 Lally (2013) and Lally (2016) pointed out that a benchmark debt term under a trailing average approach requires knowledge of the interest rate swap contracts that the regulated firm would have entered into in the absence of regulation, in order to determine the effective risk-free rate term on their debt in the absence of regulation, and this is not observable. Thus, in respect of the risk-free rate component of the cost of debt, the benchmark debt maturity under the trailing average approach is indeterminable.[59, 60]

3.62 Lally (2023) again noted that the difficulty in determining the benchmark efficient debt term is more challenging with the trailing average approach than with the Commission's hybrid cost of debt approach because errors in estimating the correct term for the trailing average approach affect the entire cost of debt rather than just the debt premium. The estimation errors of benchmark debt term would lead to an allowed cost of capital that is too high or too low.[61]

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[59] Dr Lally "Estimating the cost of debt of the benchmark efficient regulated energy network business" (August 2013), p. 11.

[60] Dr Lally "Review of further WACC issues" (May 2016), p. 23.

[61] Dr Martin Lally "Review of submissions on the risk-free rate and the cost of debt" (report prepared for Commerce Commission, 17 March 2023), p. 3.

3.63 We also noted that the simple (equally weighted) trailing average approach is unlikely to reflect suppliers' efficient debt costs if there are large, uneven amounts of capex (and associated debt raising that departs from the assumed benchmark capital structure) during a regulatory period. This issue is particularly pertinent now with the expected large increase in capex with electrification in New Zealand.

3.64 The AER noted that the mismatch due to uneven amounts of capex would generally result in a departure from the NPV=0 condition and could lead to an inefficient outcome. [62] The AER's concern highlights the conceptual problem of the trailing average approach, ie, relying on the historical rates does not reflect the opportunity cost of capital and may not provide proper incentives for efficient new investment.

3.65 The AER has considered introducing a weighted trailing average to address the problem identified above but decided against it in its latest RORI review decision. The AER decided against a weighted trailing average due to the lack of clarity in regard to a benchmark entity's efficient debt financing practice for the potential large capital investments, as well as significant practical difficulties of implementing a weighted trailing average approach.[63] We considered that the AER's decision reflects the uncertainties with some key assumptions underlying the support for a trailing average, in this case a benchmark entity's efficient debt financing practice.

Our draft decision conclusion on the trailing average approach

3.66 For the draft decision, we considered the proposed change to the trailing average approach for the cost of debt. The trailing average has the advantage of smoothing the volatility in the estimated risk-free rate between regulatory periods, which tends to lead to more stable allowed cost of debt and prices for consumers over time. The trailing average approach also reduces the need for regulated suppliers to hedge the interest rate exposure as the allowance aims to match their efficient costs under the assumed benchmark debt portfolio.[64]

[62] AER "Rate of return instrument explanatory statement" (February 2023), pp. 233-234.

[63] Ibid, pp. 235-236.

[64] This reduced risk would be taken into account when we set the allowance for debt issuance and associated costs.

3.67 On the other hand, the prevailing approach uses up-to-date estimates of interest rates at the reset and therefore better represents the opportunity cost of capital. Using prevailing rates at the reset means that changes in expectations in the financial markets will be signalled more rapidly to regulated suppliers and provide more timely investment incentives.[65] As such, it is more likely to promote the s 52A(a) purpose of providing efficient incentives to invest. We reached a similar conclusion in 2010 and 2016.[66, 67]

3.68 After taking into account these factors, we considered that, on balance, our current prevailing approach provides better incentives to invest than under a trailing average approach.

Our considerations of the term of the risk-free rate

3.69 The discussion of the term of the risk-free rate was mainly focused on the cost of equity, so the reasons for our Draft decisions are outlined in the cost of equity section.

Our considerations of annual updating of the risk-free rate

3.70 Oxera recommended that:[68]

> the NZCC reassess its decision against annually updating the RFR estimate (ie, 'indexation'), as not doing so would leave the EDBs in New Zealand exposed to the rising interest rate risks that would materialise over a multi-year price control period.

3.71 Oxera observed that the bond yields of New Zealand government bonds have become increasingly volatile since the 2016 IM Review. Therefore, the decision not to update the risk-free rate more frequently is likely to be more problematic in future regulatory periods. Oxera considered that indexation or other measures could address the problems arising from the risk-free rate volatility.[69]

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[65] For example, with a 10-year trailing average approach, the cost of debt as estimated at a price-quality reset will include information from up to 10 years ago (which would then be updated each year during the regulatory period). However, with a prevailing approach, the cost of debt is the current rate estimated at the reset.

[66] Commerce Commission "Input Methodologies (EDBs & GPBs) Reasons Paper" (December 2010), para H4.11-H4.12, p. 436.

[67] Commerce Commission "Input Methodologies Review Decisions. Topic paper 4: Cost of capital issues" (December 2016), p. 25. We note similar issues were also raised when we set the initial IMs for fibre under Part 6 of the Act, please see: Commerce Commission "Fibre input methodologies: Main final decisions - reasons paper" (13 October 2020), paras 6.92 to 6.119.

[68] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), pp. 11.

[69] Ibid, pp. 15-16.

3.72 We sought advice from Dr Lally on this issue. Lally (2023) considered that it is implicit in our current approach to the cost of debt that regulated firms will (at the commencement of each five-year regulatory cycle) transform the risk-free portion of their interest payment obligations to a five-year term, and it would be rational for them to do so in order to avoid interest rate risk. Furthermore, we allow for the transaction costs of these swap contracts.[70]

3.73 We also noted our draft decision to change the revenue wash-up (see Chapter 5 of the Financing and Incentivising Efficient Expenditure during the Energy Transition topic paper draft decision[71]). We noted that it would make annual revenue adjustments for inflation consistent with the assumption that firms would convert the interest rate component of their cost of debt to five-year debt (that is annual revenue adjustments would exclude the effect inflation has on the cost of debt).

3.74 We considered that a modification to this approach involving separately updating the risk-free rate, as suggested by Oxera, would not better promote the purpose statement.

Stakeholder views on our draft decisions

Prevailing versus trailing average approach

3.75 Several stakeholders criticised our draft decision to maintain the current hybrid approach to estimating the cost of debt, rather than moving to a trailing average cost of debt.[72] Some stakeholders considered that moving to a trailing average approach would benefit both regulated suppliers and consumers through less price volatility between regulatory periods and lower cost risk management.[73]

[70] Dr Martin Lally "Review of submissions on the risk-free rate and the cost of debt" (report prepared for Commerce Commission, 17 March 2023), pp. 12-13.

[71] Commerce Commission "Part 4 Input methodologies Review 2023 - Draft decision - Financing and incentivising efficient expenditure during the energy transition topic paper" (14 June 2023), chapter 5.

[72] For example, see Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.3; Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 156, p. 35; Unison Networks "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 2; Chorus "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 3.

[73] Entrust "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.1.

3.76 Transpower continued to advocate for a trailing average approach to determining the risk-free rate. It notes:[74]

> While the Commission has discretionary tools to smooth prices at PQ resets, these tools only mitigate the transitionary impact between regulatory periods. The tools cannot alter the aggregate allowed revenue (in real terms) within a regulatory period. A trailing average approach can be a preventative tool to reduce price shock (between control periods) by protecting against any volatility driven by the determined risk-free rate.

3.77 Transpower suggested that assuming a benchmark efficient firm will fix its debt for a regulatory period conflicts with our acknowledgement that an efficient debt financing strategy is a staggered approach.[75]

3.78 Transpower, Vector and Chorus raised concerns that larger regulated firms may be unable to sufficiently hedge against the risk-free rate component. [76] Chorus notes:[77]

> The hedging activity assumed by the Commission, in support of retaining the hybrid approach to estimating the cost of debt, is impractical for large, regulated firms.

3.79 Chorus also noted that the evidence provided in our draft decision that regulated firms are able to use swaps does not prove that most firms adopt this approach or that large firms use swaps to reprice all their debt.[78]

3.80 Similarly, Chorus did not consider that we had sufficiently addressed submissions that supported the move to a trailing average approach as a way to reduce price volatility between regulatory periods in our draft decision, instead focusing on options to address price path volatility within periods.[79]

3.81 ENA asserted that our draft decision to maintain the current hybrid approach to estimating the cost of debt contradicted regulatory precedent as the trailing average approach is "almost universally adopted" in other jurisdictions, particularly as we have based other decisions (such as moving away from the 67th WACC percentile) on grounds of regulatory precedent.[80] Vector also noted that "no other regulator sets the risk-free rate in this way".[81]

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74 Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 156, p. 35.

75 Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 157, p.35.

76 Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.23, para. 61-64; Chorus "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 3; Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 157, p.35.

77 Chorus "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 3.

78 Ibid, p. 4.

79 Chorus "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 4.

80 Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 3.

81 Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 23, para 64.

3.82 ENA would also prefer the Commission to move to a 10-year trailing average cost of debt to avoid the need for a TCSD allowance.[82]

3.83 Some stakeholders supported our decision to maintain the prevailing risk-free rate approach.[83] Air New Zealand considered that using the prevailing rate as the risk-free rate better reflects expected market conditions and better promotes investment incentives:[84]

> Matching the term of the risk-free rate to the regulatory period remains a valid approach as it provides compensation for risk faced during the regulatory period.

3.84 Alpine Energy and GasNet supported our current approach to estimating the risk-free rate but recommended that we consider a longer observable period than the existing three-month window when setting the risk-free rate used in the WACC calculations. This could avoid periods of volatility in global capital markets resulting in perverse outcomes over the regulatory period.[85]

3.85 The ENA stated that a trailing average cost of debt approach would not create more work for the Commission or regulated suppliers:[86]

> Dr Lally's only criticism is that the trailing average approach would create more work for the Commission and regulated businesses. That is not the case as the Commission already makes annual WACC determinations for all businesses covered by the IMs, and this WACC is subsequently, used for information disclosure reporting and analysis.

Annual updating of the risk-free rate

3.86 Air New Zealand did not support annual updating of the risk-free rate for the cost of debt as this would introduce volatility and suppliers are able to hedge changes in the risk-free rate.[87]

Term of the risk-free rate for the cost of debt

3.87 Submissions on the term of the risk-free rate were generally raised in relation to estimating the cost of equity (rather than the cost of debt). We discuss the term of the risk-free rate in the cost of equity section at paragraph 4.6 onwards.

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82 Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 6

83 GasNet Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 6; Alpine Energy Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 21, p. 5; Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 1.

84 Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 1

85 Alpine Energy Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 21, p. 5.

86 Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9.

87 Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 1

Reasons for our final decisions

Prevailing versus trailing average approach

3.88 One of the main issues raised by a number of submitters is the approach to estimating the risk-free rate for the cost of debt. We have previously considered whether to adopt a trailing average cost of debt in the decisions in the 2010 IMs, 2016 Part 4 IM Review, Fibre IMs and have considered this issue extensively as part of this 2023 Part 4 IM Review.

3.89 A trailing average approach to estimating the risk-free rate involves using a long-term average of historical interest rates. The trailing average approach seeks to replicate the debt financing practice of issuing staggered debt over time. For example, a simple trailing average cost of debt (ie, risk-free rate and debt premium) averaged over 10 years assumes that all debt is issued for a term of 10 years and 10 per cent of the total debt is refinanced each year.[88] The trailing average cost of debt would be updated annually during the regulatory period, and revenue would be adjusted to reflect the updated cost of debt.

3.90 As noted above, the main arguments raised by submitters in response to our draft decision to not move to a trailing average are:

3.90.1 regulatory precedent does not support maintaining a hybrid cost of debt approach;

3.90.2 large, regulated suppliers may be unable to sufficiently hedge against the risk-free rate; and

3.90.3 a trailing average approach results in less price volatility between regulatory periods.

3.91 We discuss these issues, as well as other considerations, below.

Regulatory precedent for approach to estimating the cost of debt

3.92 In its submission on our draft decision, Vector stated:[89]

> Unsurprisingly, no other regulator sets the risk-free rate in this way. The continued novelty of the Commission's approach should cause it to pause and reconsider its position.

[88] We would need to determine the 'efficient' term of debt for regulated suppliers, but 10 years was proposed by suppliers in submissions which would then remove the need for the TCSD.

[89] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 23, para 64.

3.93 We do not agree that we are the only regulator that sets the risk-free rate in this way. We note that the Economic Regulation Authority of Western Australia (ERA) also applies the hybrid cost of debt approach, which includes setting the prevailing risk-free rate at the beginning of a regulatory period with a term equal to the length of the regulatory period.[90]

3.94 The ERA has recently finalised its review of its rate of return instrument and maintained the hybrid approach to estimating the cost of debt (prevailing risk-free rate and trailing average debt premium). The ERA's independent Panel considered that the hybrid approach offers a sensible approach, minimising interest rate and refinancing risk, and is implementable and replicable.[91]

3.95 The ERA states in its explanatory statement for the 2022 final gas rate of return instrument:[92]

> The ERA considers its hybrid trailing average approach best approximates the NPV=0 principle while also recognising interest rate risk, refinancing risk and the staggered nature of debt portfolios.

3.96 In its recent decision on Australia Post's 2022 price notification, the Australian Competition and Consumer Commission (ACCC) estimated a forward-looking (prevailing) cost of debt based on a 10-year bond yield over a 20-trading day averaging period. It states:[93]

> The ACCC holds the view that the cost of debt should be estimated based on a forward-looking expected cost of debt to the firm, with the cost of debt set with reference to a benchmark business facing similar risks to Australia Post's reserved services.

3.97 The precedent established by other regulators can provide a useful cross-check but does not mean that there is one correct solution. Regulatory and economic context are also important for analysing which approach is most appropriate in a given situation.

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[90] Economic Regulation Authority "Explanatory statement for the 2022 final gas rate of return instrument" (16 December 2022), Section 9 - Return on debt.

[91] Economic Regulation Authority "Explanatory statement for the 2022 final gas rate of return instrument" (16 December 2022), paras 287-288.

[92] Economic Regulation Authority "Explanatory statement for the 2022 final gas rate of return instrument" (16 December 2022), para 382.

[93] Australian Competition and Consumer Commission (ACCC) " Decision on Australia Post's 2022 price notification" (December 2022), Appendix A: ACCC approach to cost of capital parameters.

Difficulty of hedging the risk-free rate

3.98 We received submissions from a number of regulated suppliers suggesting that it may not be feasible for large suppliers to hedge their risk-free rate exposure in the way assumed by our hybrid approach.[94] Submissions did not provide any new evidence on how they have tried to, but were not able to, enter into interest rate swaps to align debt with the regulatory period.

3.99 As noted in our draft decision, we discussed the ability of regulated suppliers to hedge changes in the risk-free rate previously in our 2010 and 2016 decisions. We concluded in the draft decision that the evidence before us was that regulated suppliers have used interest rate swaps to better align their exposure to changes in the risk-free rate for the length of the regulatory period.

3.100 Suppliers can use interest rate swaps to align the average tenor of their debt portfolio to the length of the regulatory period, so that they effectively align the term of their cost of debt to the term of the benchmark cost of debt.

3.101 In our draft decisions we proposed a change to the annual revenue wash-up that would allow suppliers to undertake hedging activities to align their cost of debt with the benchmark cost of debt. However, following consultation on the draft and a further round of consultation, we have concluded that the proposed changes would not be better than the status quo (see Topic 4b of the Financing and incentivising efficient expenditure during the energy transition topic paper).

3.102 We have not seen any new evidence that large, regulated suppliers have tried to, and were not able to, hedge the risk-free rate portion of their debt to align their average remaining debt tenor to the length of the regulatory period. In our draft decisions we outlined some results from our confidential debt survey noting that large, regulated suppliers had been able to use interest rate swaps to more closely align the term of debt to the length of the regulatory period. We also note that other large, regulated suppliers, that are not subject to price-quality regulation, also have significant levels of interest rate swaps.[95]

[94] We received submissions on this point from Chorus, Vector and Transpower.

[95] For example, Auckland Airport has a significant notional amount of hedging of its debt portfolio. See Auckland Airport Annual Report 2023, p. 67-69. Wellington Airport also has a significant notional amount of hedging of its debt portfolio. See Wellington Airport Annual Report 2023, p. 20.

3.103 Transpower suggested that the assumption of a benchmark efficient firm fixing its debt at the beginning of each regulatory period conflicts with our acknowledgement that an efficient debt financing strategy is a staggered approach.[96] Transpower believe a more efficient debt financing strategy could be adopted under a trailing average approach.

3.104 Regulated suppliers can align existing debt and any new debt at the time of the determination window to the term of the regulatory period. New debt issued during the regulatory period could be potentially managed, to some extent, through forward starting swaps or timing of investments. The degree to which a supplier will manage interest rate exposure will depend on the trade-off between the cost of the risk mitigation measure against the residual risk exposure.

3.105 As we noted in our 2016 Reasons paper, it is unlikely to be efficient to aim to perfectly hedge all debt associated with planned investment during a regulatory period because the 'cost' of any mismatch risk may be less than the cost of the hedging transactions.[97] We are setting a benchmark cost of debt for regulated suppliers that is replicable, not compensating for actual debt costs.

3.106 We consider that a staggered debt financing strategy is consistent with the hybrid approach. The hybrid approach recognises that suppliers issue debt consistently over time but are not able to hedge the debt premium portion of their debt portfolio, so it provides for a historical average. This is also noted by Lally in his consideration of possible approaches to matching the allowed and incurred cost of debt.[98] He states that the hybrid approach that we apply is viable, consistent with staggered debt issuance and can provide for an expectation of NPV=0.[99]

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96 Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 157, p.35.

97 Commerce Commission "Input methodologies review decisions Topic paper 4: Cost of capital issues" (December 2016), para 121.

98 Dr Martin Lally (for the Australian Energy Regulator) "The appropriate term for the allowed cost of capital" (9 April 2021), Table 2, p. 26.

99 Dr Martin Lally (for the Australian Energy Regulator) "The appropriate term for the allowed cost of capital" (9 April 2021), Table 2, p. 26.

Volatility of returns and prices and incentives to invest

3.107 Some submitters noted that price stability between regulatory periods is greater with the trailing average approach over the hybrid. Entrust states that a trailing average would benefit consumers through less price volatility between regulatory periods.[100] Transpower notes that, while we have tools to smooth prices at price-quality resets, these tools only mitigate the transitionary impact between periods and a trailing average can be a preventative tool to reduce price shocks for consumers.[101]

3.108 When considering the approach to the cost of debt, we are guided by which approach will best promote the Part 4 purpose. Price stability between regulatory periods can be beneficial for consumers, although this is not explicitly an objective in the Part 4 purpose. We also note that price stability within a regulatory period can be beneficial for consumers.

3.109 If the trailing average approach resulted in prices adjusting more slowly over time, this could allow consumers to adjust to higher (or lower) prices. However, delaying an increase (or decrease) in revenues and prices could potentially reduce allocative efficiency and cause issues with incentives to invest as the allowed WACC would not reflect the opportunity cost of capital.

3.110 We note that we have other tools that we can use to smooth revenues outside of the WACC. If smoothed revenues (and prices) are beneficial for consumers then we can use these other smoothing tools at a price-path, without needing to change approaches to setting the WACC to do so.

3.111 As we noted in our draft decisions, we consider that the stability of expected returns associated with the trailing average could weaken the signals with respect to new investment in infrastructure. A trailing average is based on mostly historical interest rates which generally depart from the current market conditions, and so does not represent an expected return that reflects the opportunity cost of new investment. As such, it does not better meet the s 52A(1)(a) purpose of providing efficient incentives to invest (ie, incentives that reflect current market conditions) than our hybrid approach.

[100] Entrust "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.1.

[101] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 156, p. 35.

Potential implementation issues with the trailing average approach

3.112 As noted above, the ENA states that Dr Lally's only criticism of the trailing average approach is that it will create more work for us and regulated suppliers.[102] It is not true that the only criticism of the trailing average is more work, and Dr Lally has previously discussed the advantages and disadvantages of a trailing average approach. For example, Dr Lally notes some other disadvantages of the trailing average include:[103]

3.112.1 giving rise to greater incentive problems (or greater complexity if these problems are addressed);

3.112.2 requires a transitional regime that will embody some drawback regardless of the choice of transitional regime; and

3.112.3 may allow too high a cost of debt by failing to mirror the behaviour of otherwise similar unregulated firms.

3.113 The ENA also notes that the trailing average approach would not result in more work for us or regulated suppliers because we already make annual WACC determinations for information disclosure.[104]

3.114 We note that annual WACC determinations are not the additional complexity that we reference when considering whether to introduce a trailing average cost of debt approach. The complexity in implementation of the trailing average approach compared with the hybrid approach comes from:

3.114.1 updating the price-path every year to incorporate the new cost of debt rolling average;

3.114.2 the transitional implementation process required to ensure that there are no windfall gains to suppliers or consumers;

3.114.3 we must estimate the appropriate term of debt for suppliers which may be difficult in practice and vary between suppliers (estimating the appropriate debt term of an efficient notional supplier is more important for a trailing average approach and errors in the appropriate term are more pronounced);[105] and

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[102] Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9.

[103] Lally (for the QCA) "The trailing average cost of debt" (March 2014), p. 4-5.

[104] Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9.

[105] Dr Martin Lally "The appropriate term for the allowed cost of capital" (prepared for the AER, 9 April 2021), p. 34.

3.114.4 whether a simple trailing average should be applied or whether a more complicated weighting mechanism should be used to better match actual debt costs (this is explained further below).

3.115 Under a trailing average approach, there are still likely to be mismatches between the regulatory allowance and a supplier's actual cost of debt. Lumpiness of capex (and hence debt raising) and timing of issuances mean that a trailing average may not necessarily reflect a notional efficient supplier's cost accurately.

3.116 While there is a high degree of uncertainty, EDBs have indicated higher expected capex associated with decarbonisation (amongst other reasons). Where large increases in capex are expected, an unweighted trailing average may not be appropriate. The AER considered this issue in its recent rate of return instrument review where it considered and rejected a weighted trailing average.

3.117 As the AER notes in its final rate of return instrument decision:[106]

> If the benchmark business has significantly increasing (or decreasing) debt balances along with large changes in prevailing interest rates, using a simple trailing average might result in a mismatch between its efficient debt financing costs and the allowed return on debt. This mismatch would generally lead to a departure from the NPV=0 condition and could lead to an inefficient outcome.

3.118 In reaching its final decisions on the 2023 Rate of return instrument, the AER considered options to introduce weights to the trailing average due to concerns of large, expected increases in expenditure (and hence debt). It considered that the simple trailing average might not operate effectively when regulated suppliers finance large capex by raising more debt in a rising interest rate environment.[107]

3.119 However, the AER decided to stay with a simple trailing average. Some reasons for not applying a weighted trailing average included:[108]

3.119.1 The practical difficulties and additional administrative complexity associated with implementing a weighted trailing average; and

3.119.2 The practical difficulty of determining whether to set trailing average weights using forecasts or through a true-up based on actual capex. The AER has observed that the forecast capex in its revenue model differs, in both timing and magnitude, from actual capex. If actual capex was used for weights, then it would require a separate true-up mechanism which would add complexity and may result in uncertainty.

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[106] Australian Energy Regulator "Rate of Return Instrument - Explanatory Statement" (February 2023), p. 233-234.

[107] Ibid, p.234.

[108] Ibid, p.235.

Our final decision on the trailing average approach

3.120 We received a number of submissions on our draft decisions on the approach to estimating the cost of debt. We have reviewed and considered the points raised in submissions along with the evidence that we have before us.

3.121 We consider that, even though the trailing average approach has some advantages, mainly stability of prices between regulatory periods the hybrid approach has advantages in other respects. Overall, we consider that maintaining the hybrid approach would best promote the Part 4 purpose compared with a transition to a trailing average approach.

3.122 We consider that for the risk-free rate, the prevailing approach:

3.122.1 best promotes incentives to invest efficiently and to respond to current market conditions by reflecting the forward-looking opportunity cost of capital;

3.122.2 in general, is more likely to lead to an appropriate cost of debt for consumers, and limit excess profits for suppliers, compared with a trailing average approach based on the assumption of a 10-year trailing average risk-free rate (as suggested in submissions) and assuming an upward sloping yield curve;[109]

3.122.3 is less complex than a trailing average approach (avoids implementation issues); and

3.122.4 best approximates the ex-ante NPV=0 principle.

Annual updating of the risk-free rate

3.123 We have decided to not update the risk-free rate during a regulatory period. We consider that this could introduce volatility during a regulatory period and suppliers are able to align interest rate exposure with the regulatory period through interest rate swaps. We set a benchmark cost of capital for the regulatory period, which suppliers are able to reasonably replicate, and suppliers are able to use the debt management strategies that they consider appropriate.

[109] Tied to this conclusion is the term of the risk-free rate which is discussed in paragraphs 3.124 to 3.126 below.

Term of the risk-free rate

3.124 Related to the cost of debt approach was the appropriate term to use for the cost of debt. Some submissions suggested a term of 10 years should be used with a trailing average approach which would avoid the need for a TCSD. As noted in our Draft decisions, the value-weighted average original term to maturity of the regulated suppliers from our 2022 confidential debt survey was 7.25 years.[110]

3.125 If we were to move to a 10-year trailing average cost of debt, we would overcompensate regulated suppliers on average (particularly smaller suppliers with shorter tenors of debt). The TCSD is appropriate with our current approach because it does not overcompensate those suppliers with short tenors, and appropriately compensates those suppliers with qualifying debt with tenors above five years.

3.126 Submissions on the term of the risk-free rate were generally raised in relation to estimating the cost of equity (rather than the cost of debt). We discuss the term of the risk-free rate in the cost of equity section at paragraph 4.6 onwards and retain our decision to use a risk-free rate term equal to the length of the regulatory period.

Length of risk-free rate determination period

3.127 We have maintained our existing approach to estimate the risk-free rate over a three-month determination window. The purpose of the three-month determination window is to allow suppliers to refinance any debt that has a tenor that differs from the length of the regulatory period. This is consistent with the NPV=0 principle which allows suppliers with an opportunity to closely match the term of the allowed cost of debt.[111]

3.128 We acknowledge submissions that suggested a longer determination window but consider that three months balances the ability of suppliers to enter swap arrangements and the timely estimation of 'prevailing' rates appropriately.

3.129 We considered this decision in the original 2010 IMs as well as in the 2016 IM Review. In 2016 we changed the length of the determination window from one month to three months help to mitigate some of the issues raised by stakeholders on swap market operation. Evidence from our confidential debt survey indicates that suppliers did not have difficulty engaging in swap market activities over the three-month period.

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[110] Commerce Commission "input methodologies review 2023 – Draft decision – Cost of capital topic paper" (14 June 2023), para 3.91.

[111] Our modelling demonstrates that our current approach promotes the NPV=0 principle by applying the hybrid real cost of debt approach with annual inflation wash-ups.

Debt premium

Final decisions

3.130 Our final decision is to maintain our approach to estimating the debt premium based on a historical average approach.

3.131 Our final decision on the 'tenor anomaly' is not to incorporate any of the changes to the cost of capital IMs proposed by CEG (see paras 3.180-3.180.3).

Our methodology

3.132 The 2016 IMs specified that, in estimating the debt premium, we will:

3.132.1 use data on bonds issued by relevant corporates with a target credit rating consistent with our notional rating for the regulated sector;

3.132.2 use a simple benchmark of New Zealand issued, New Zealand dollar denominated corporate bonds;[112]

3.132.3 use a five-year average of annual debt premium estimates;

3.132.4 use data on bonds with a five-year target term to maturity; and

3.132.5 provide a TCSD for qualifying suppliers (where a supplier's average tenor of all debt is greater than 5 years).

3.133 Our detailed steps for estimating the debt premium are set out in our WACC guidelines.[113]

3.134 Details of the TCSD, debt issuance and associated costs and credit ratings are discussed in paragraphs 3.209 to 3.330.

[112] The IMs also prioritise the corporate bonds to be used and allow us to have reference to the NSS curve. For more details please see: Commerce Commission "Guidelines for WACC determinations under the cost of capital input methodologies" (January 2023).

[113] Commerce Commission "Guidelines for WACC determinations under the cost of capital input methodologies" (January 2023), pp. 18-26.

Issues raised in submissions up to the draft decision

3.135 We received submissions in relation to the averaging period, the benchmark tenor of debt, and annual updating of debt premium. This is summarised below:

3.135.1 The Oxera report considered that there is a mismatch between the averaging periods for the risk-free rate and the debt premium, which requires correction.[114]

3.135.2 The Oxera report proposed that the benchmark tenor of debt of the EDBs be raised from five years.[115] The CEG report commissioned by ENA also recommended that the benchmark tenor of debt be raised to 10 years. CEG considered that there is an inconsistency between a five-year debt tenor and the asset beta estimate which is drawn from firms with an average debt tenor of 20 years, and that this inconsistency leads to a downward bias in WACC ('tenor anomaly').[116]

3.135.3 The Oxera report proposed that the trailing average debt premium be annually updated, to provide a better match to the costs incurred by the EDBs (for PQ regulation).[117]

3.136 We discuss each of the above issues in the following sections.

Reasons for our draft decisions

Our considerations of the averaging periods for the risk-free rate and debt premium

3.137 Oxera considered that:[118]

> [the Commission's] use of a prevailing RFR, which has a three-month averaging period, and the historical debt premium, which is calculated as a five-year average, leads to a mismatch in the method by which the two elements of the CoD are calculated.

3.138 Oxera recommended that:[119]

> the NZCC could adjust the tenors of the RFR and debt premium so that they match.

[114] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), p. 43.

[115] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), p. 43.

[116] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Networks Association, February 2023), Section 2.

[117] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), pp. 44-45.

[118] Ibid, p. 43.

[119] Ibid, p. 43.

3.139 We sought advice from Dr Lally on this issue. Lally (2023) points out that the purposes of these averaging periods are entirely different; three months for the risk-free rate component is to provide a sufficiently wide window for regulated businesses to undertake interest rate swap contracts, while the five-year averaging period for the debt premium is in order to replicate the debt premium costs incurred by regulated firms that borrow for five-year terms with staggered maturity dates. Thus, there is no need for these averaging periods to be matched.[120]

3.140 We agree with Dr Lally that Oxera's argument is misplaced and that the different purposes of the averaging periods for the risk-free rate and the debt premium justify the different terms.

Our considerations of the benchmark tenor of debt

3.141 Oxera considered that: [121]

> the NZCC could reduce the risks around recovering the costs of embedded debt by considering an extension of the averaging period for the debt premium and RFR.

3.142 Oxera submitted that:[122]

> Based on data provided to Oxera by the EDBs we worked with on this report, the mean tenor of the debt that EDBs raise is 8.5 years. Thus, if the interest payments on debt issued more than five years ago are materially different to the hybrid average that the NZCC calculates, the EDBs will be either over- or under-compensated.

3.143 Oxera raise an issue that we addressed in 2016: that given suppliers may have raised debt outside of the window in which we estimate the debt premium, there may be a mismatch between the debt premium at the time debt was raised and that used in calculating the debt premium for the purposes of regulation.

3.144 In 2016 we noted:[123]

3.144.1 The debt premium is relatively stable, which reduces the chance that any mismatches will have a material impact on supplier revenues.

3.144.2 Any potential mismatches can take place in both directions. Therefore, mismatches are likely to even out over time. We consider that regulated suppliers should be able to manage this risk.

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[120] Dr Lally "Review of submissions on the risk-free rate and the cost of debt" (report to the Commerce Commission, 17 March 2023), p. 13.

[121] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), p. 43.

[122] Ibid, p. 43.

[123] Commerce Commission "Input methodologies review decisions Topic paper 4: Cost of capital issues" (December 2016), p. 36.

3.144.3 Dr Lally has provided evidence that any mismatches in the debt premium are likely to be at least partially offset by mismatches between our estimate of the TAMRP and its true value.[124]

3.145 However, we recognised that if the determination window happened to coincide with a period of abnormal market conditions, then suppliers could be over- or under-compensated in comparison to their incurred debt as they could not hedge between their incurred debt premium and the allowance provided in the WACC.

3.146 We consider that significant one-off movements in the debt premium of this type could have a sufficiently large effect on revenues to suppliers and prices paid by consumers that estimating an 'average' debt premium over a longer period of time is a more appropriate solution. At that time, we considered a five-year average was an appropriate balance.

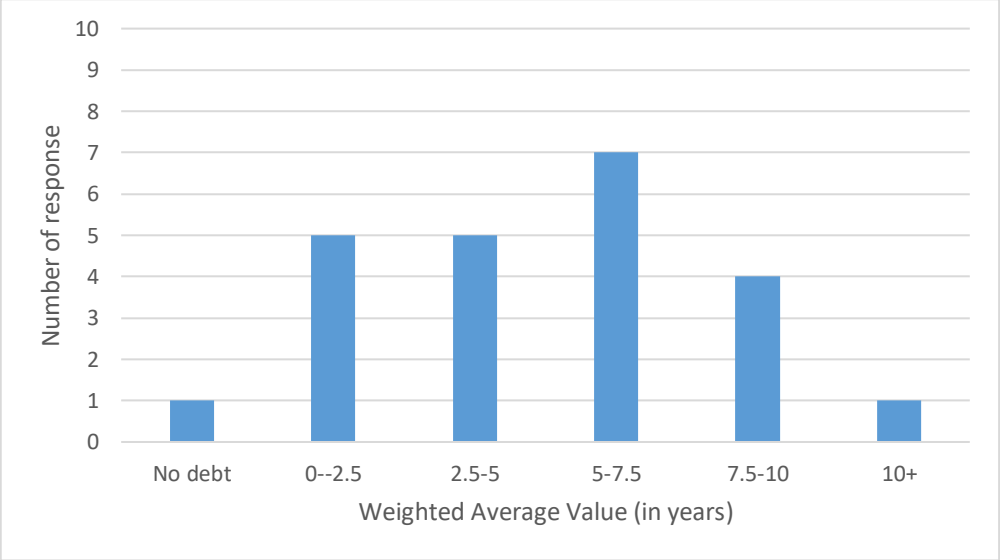
3.147 In particular, whilst this change resulted in a small negative impact on investment incentives for suppliers (compared to the prevailing rate), we considered the impact of this would be limited given the generally small movements of the debt premium in normal market conditions, and a five-year average would provide protection to consumers against one-off significant changes in debt premiums.

3.148 We have received additional evidence from the confidential debt survey we conducted in 2022, where we found that some suppliers do have an average original term above five-years, but half of the suppliers do not. Many of the smaller suppliers do not issue bonds and have shorter term debt. If we were to provide a longer term for all suppliers, we would over-compensate half of the suppliers with a term of five-years and less.

3.149 Our 2022 confidential debt survey found that the value-weighted average original term to maturity of the regulated suppliers that responded was 7.25 years. Twelve of 23 regulated suppliers that responded to our request advised that the actual weighted average original period to maturity of their debt was greater than five years, and only one was greater than 10 years. For half of regulated suppliers, the weighted average original period to maturity was five years or less. The distribution of their responses is shown in Figure 3.2.

[124] See Dr Lally's expert advice on the cost of debt, asset beta adjustments for GPBs, RAB indexation and inflation risk and TAMRP: Dr Lally "Review of further WACC issues" (report to the Commerce Commission, 22 May 2016), p. 9.

Figure 3.2 Regulated suppliers' debt portfolio: weighted average original term to maturity of interest bearing debt



3.150 We consider that a five-year term when estimating the debt premium is reasonable. Qualifying suppliers that have issued debt with an average term longer than the regulatory period (thereby incurring a greater debt premium) will not be under-compensated as they will qualify for the TCSD allowance which provides compensation for the efficient cost of longer-term debt incurred by an individual supplier. The TCSD is discussed under paras 3.209 and 3.280.

3.151 On balance we do not consider that lengthening the averaging period would better promote the purpose statement.

Our considerations of the 'tenor anomaly'

3.152 The CEG report commissioned by ENA considered that there is an inconsistency between our use of a five-year benchmark debt tenor and our EDB asset beta estimate which is drawn from firms with an average debt tenor of 20 years. CEG considered this inconsistency leads to a downward bias in WACC because the five-year benchmark debt tenor gives rise to a lower cost of debt and the 20-year average debt tenor of the energy comparator sample results in a lower equity beta.

3.153 A key concept in CEG's argument is the debt beta, which we briefly introduce here. A detailed explanation of debt beta can be found in the Commission's previous IMs Reasons Papers.[125] A debt beta measures the systematic risk associated with a firm's debt. Debt betas can affect cost of capital estimates in three ways: first, when converting estimated asset betas to equity betas; second, when converting estimated equity betas of comparators into asset betas; and third, when estimating the firm's cost of debt (in particular, the debt premium). The Commission has assumed a debt beta of zero in the previous IMs.

3.154 CEG linked the problem in para 3.157 to the 'leverage anomaly' identified by the Commission and argued that the leverage anomaly is a direct corollary of the 'tenor anomaly'.[126, 127]

> Choosing a different leverage to the sample average should not affect the WACC but, without accounting for debt beta it does. Similarly, choosing a different tenor to the sample average should not affect the WACC but, without accounting for debt beta it does. The NZCC has addressed the leverage anomaly but the same logic means it should also address the tenor anomaly.

3.155 CEG submitted that the only reason why the equity owners of a firm would choose to issue higher cost long term debt rather than short term debt is that doing so reduces the cost of equity. CEG further submitted that this must manifest through a lower equity beta because longer term debt absorbs some of equity-like risk which raises the debt beta for the debt instrument.[128]

3.156 CEG considered that we need to address the 'tenor anomaly' by adopting an average debt tenor consistent with the average debt tenor in the asset beta sample.[129]

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[125] Commerce Commission "Input Methodologies (electricity distribution and gas pipeline services) Reasons Paper" (December 2010), Section H.9.

[126] Commerce Commission "Input Methodologies (electricity distribution and gas pipeline services) Reasons Paper" (December 2010): "When the simplified Brennan-Lally CAPM is used to estimate the cost of equity (in conjunction with the simplified beta leveraging formula, ie debt beta is assumed to be zero), and the estimated cost of debt includes a positive debt premium, the resulting estimate of WACC increases as leverage increases. The higher the value for the debt premium incorporated in the estimated cost of debt, the greater the effect on the resulting estimate of WACC as leverage increases. This anomaly is being created by the analytical models used to estimate the WACC rather than simply reflecting unusual market conditions."

[127] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Networks Association, February 2023), p. 5.

[128] CEG use the formula $Equity\ beta = \frac{\text{Asset beta} - \text{Debt beta}}{1 - \text{Leverage}}$ to show that an increase in debt beta reduces equity beta. Ibid, p. 4.

[129] Ibid, pp. 1, 3-8.

3.157 We sought advice from Dr Lally on this issue. Lally (2023) noted that the issues on asset beta and debt tenor are quite distinct in regard to notional leverage, and the merits of the leverage/asset beta argument have no apparent relevance to the debt tenor/asset beta issue.[130]

3.158 We agreed with Dr Lally that CEG had not established the equivalence between the 'leverage anomaly' and the 'tenor anomaly'. There is a mathematical proof of the 'leverage anomaly' which is the basis of our use of notional leverage, whereas the relationship between the debt tenor and debt beta is an empirical question and CEG had not provided evidence to support their claim that issuing longer term debt reduces debt beta.

3.159 Without the link between the 'leverage anomaly' and 'tenor anomaly' claimed by CEG, the choice of comparator firms for the estimation of a benchmark asset beta for EDBs and the choice of a benchmark efficient debt tenor are distinct matters. We provided detailed reasoning for our draft decisions on these two matters in other sections.

Our considerations of an annual update of the debt premium allowance

3.160 Oxera observed that there is substantial volatility in the debt premium since the 2016 IM Review which implies a material difference between the debt premium allowance and actual costs incurred by the EDBs. Oxera proposed that we index the debt premium allowance (for PQ path WACC determinations) to help reduce the networks' exposure to the high level of movement in market rates.[131]

3.161 We sought advice from Dr Lally on this issue. Lally (2023) showed that his empirical analysis with regard to annually updating the trailing average debt premium supports Oxera's claim, but that the gain is very small and annual updating incurs additional administrative costs.[132]

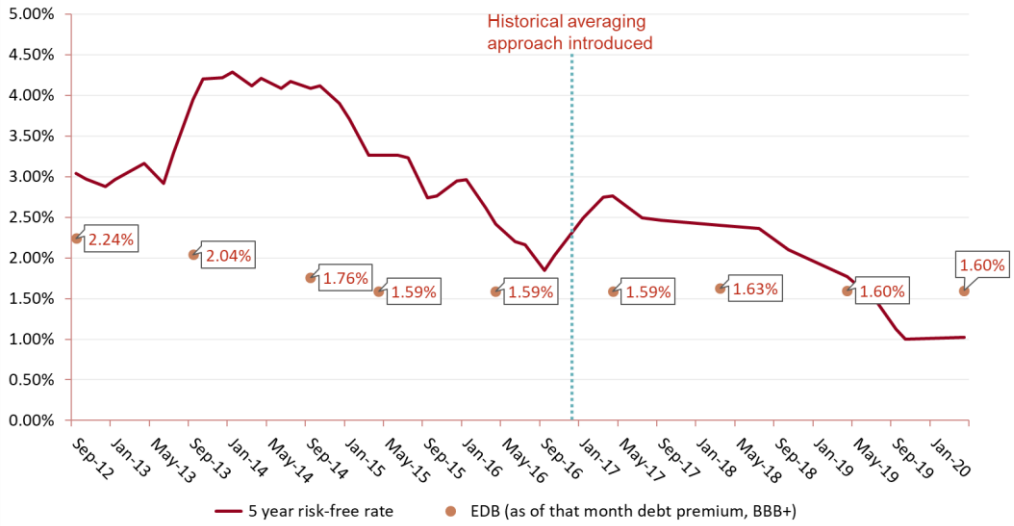
[130] Dr Martin Lally "Review of submissions on the risk-free rate and the cost of debt" (report to the Commerce Commission, 17 March 2023), pp. 19-20.

[131] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), pp. 44-45.

[132] Dr Martin Lally "Review of submissions on the risk-free rate and the cost of debt" (report to the Commerce Commission, 17 March 2023), pp. 13-19.

3.162 In the 2020 Fibre IMs, we also looked at how the debt premium has changed over time, and its potential impact.[133] Figure 3.3 below demonstrates that the debt premium (averaged over five years) has been relatively stable over time. We note that the five-year average debt premium would have less volatility compared with annual numbers (the latest EDBs' annual debt premiums are 1.55% (2021), 1.15% (2022), and 1.25% (2023) which when averaged are 1.59% (2021),[134] 1.51% (2022),[135] and 1.43% (2023), [136]) especially after the historical averaging approach was introduced during the 2016 IM Review.

Figure 3.3 EDB historical debt premium estimates



3.163 We consider that any change in the average debt premium from a given year to another will generally be relatively small given they are averaged over five annual estimates. The debt premium for investment grade bonds has generally been relatively stable, so changes in debt premium will likely not be biased up or down over a long time period and errors are therefore likely to cancel out, on average, over time. Therefore, we do not consider that over time our method will detract from the Part 4 purpose by compromising the NPV=0 principle.

[133] Commerce Commission " Fibre input methodologies: Main final decisions – reasons paper" (October 2020).

[134] Commerce Commission "Cost of capital determination for disclosure year 2022 for information disclosure regulation. Electricity distribution businesses and Wellington International Airport." (April 2021), p. 5.

[135] Commerce Commission "Cost of capital determination for disclosure year 2023 for information disclosure regulation. Electricity distribution businesses and Wellington International Airport." (May 2022), p. 5.

[136] Commerce Commission "Cost of capital determination for disclosure year 2024 for information disclosure regulation. Electricity distribution businesses and Wellington International Airport" (May 2023), p. 5.

3.164 We recognise that, in theory, annual updating of the debt premium would be more aligned with the opportunity cost of investment at a given point of time. However, we find that the impact on suppliers of updating the debt premium annually would be small and that the benefits do not justify the compliance costs and additional complexity.

3.164.1 Recalculating and reapplying the WACC annually during a regulatory period would involve intervening in the price-path and resetting allowed revenue for each year of the regulatory period.

3.164.2 We considered an alternative mechanism in the 2020 Fibre IMs – an NPV-neutral debt premium wash-up at the end of the regulatory period which would be less administratively burdensome and less complex than updating the price-path each year. However, we found the net effect of the wash-up on the supplier's revenue would be insignificant. For example, based on the annual variations in the debt premium from 2016 to 2020 (in Figure 3.3), if we were to implement the debt premium wash-up approach, the net change in the debt premium would be an increase from 1.59% (in 2016) to 1.60% (in 2020). The resulting net wash-up to the supplier would be 0.3 bps per annum.[137]

3.165 In summary, we consider that the gains from updating the debt premium throughout the period and implementing an NPV-neutral wash-up are marginal (and will in any event be reflected in the averaging period in the future), and do not justify the effort and additional complexity of introducing an adjustment.

Stakeholder views on our draft decision

3.166 The main changes proposed in submissions relating to the debt premium were:

3.166.1 increasing the tenor of the bonds to ten years and removing the 10-year cap on the TCSD;

3.166.2 updating the debt premium annually;

3.166.3 including an additional debt premium uplift for GPBs; and

3.166.4 the 'tenor anomaly': suggestions that the tenor of debt in the debt premium is inconsistent with the tenor of debt of firms in the asset beta sample which results in an underestimation of the WACC.

[137] For detail about this example, please see Commerce Commission " Fibre input methodologies: Main final decisions – reasons paper" (October 2020), pp. 378-379.

Term of debt premium and cap on TCSD

3.167 In its submission on our draft decision, Oxera (on behalf of First Gas, Powerco and Vector) argued that it does not find the ten-year cap on the TCSD to be justified.[138] Oxera states:[139]

> Specifically, we observe that the market data for the New Zealand energy networks supports a debt tenor assumption of longer than five years, with the weighted average debt tenor at issuance being 7.25 years across the industry, as per the NZCC's assessment.

3.168 Oxera suggests that there is no evidence that debt of ten years or longer would be inefficient, and that it may be reasonable to raise both the debt premium tenor as well as the TCSD cap to allow companies a wider choice of debt instruments.[140]

3.169 This is also related to the debt 'tenor anomaly' discussed in paragraphs 3.177 to 3.181 below.

Updating the debt premium annually

3.170 Oxera (on behalf of the 'Big Six' EDBs) suggests that our current approach to estimating a historical average debt premium can lead to a mismatch between the regulatory allowance and actual debt costs faced by EDBs. It recommends that we introduce annual indexation for the debt premium.[141]

3.171 Oxera notes debt premia are volatile, and networks are exposed to corporate debt interest rate uncertainty and volatility which cannot be hedged like the risk-free rate. Oxera suggests that bringing Dr Lally's modelling more in line with market conditions makes the case for annual indexation 'significantly stronger'.[142] It states that once these assumptions are corrected it would lead to an implied benefit that may outweigh the costs of additional administration costs from annual updates.[143]

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[138] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), p. 10.

[139] Oxera "Response to Commerce Commission's draft decision for IM Review 2023 on cost of capital" (report prepared for Vector, 9 August 2023), p. 20.

[140] Ibid. p. 20.

[141] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023).

[142] Oxera state that Lally's assumptions around mean-reversion of the debt premium does not align with academic literature; that the assumption around refinancing with ten-year bonds does not align with our 5-year bond assumption in setting the cost of capital in practice; the mean reversion assumption and lack of shocks results in an unrealistic path; and Lally assumes a 30-year estimation window and so companies may be underfunded for a significant period of time and still have sufficient funding on average by the end of the 30-year period.

[143] Oxera notes that the key assumptions in Lally's model are: a mean reversion of interest rates and debt premia; 10% annual refinancing instead of 20% assumed in the draft decision, a lack of shocks in the model; and a 30-year estimation window.

3.172 Wellington Electricity and Vector echo Oxera's arguments that the current debt premium approach exposes suppliers to uncertainty during a regulatory period.

3.173 Air New Zealand agrees that the current approach to calculating the debt premium is appropriate and effectively replicates costs associated with debt with staggered terms to maturity, while minimising complexity and administrative burden.[144]

Gas debt premium uplift

3.174 Oxera (on behalf of First Gas, PowerCo and Vector) argues that the decarbonisation agenda and associated uncertainty lead to greater credit risk for gas networks relative to electricity networks. Therefore, it suggests that GPBs require an uplift on the debt premium.[145]

3.175 Oxera assesses credit rating agencies' reports on New Zealand's EDBs and GPBs using the Environmental, Social and Governance (ESG) Credit Impact Score (CIS) measure. It attempts to link this measure to the potential impact on credit ratings, summarising that "we expect the risk to be priced into the debt instruments available to GPBs".

3.176 Oxera then analyses market data from the UK to assess whether bond pricing implies a 'gas premium'. Oxera selects comparable vanilla fixed-rate bond pairs, matched on credit rating and term to maturity, issued by electricity distribution and gas distribution companies. It then constructs long-term and short-term gas premia by looking at the difference in yields. It shows that, based on its analysis of the specific companies:

3.176.1 For bonds with a shorter time to maturity, there is generally a negative gas premium.

3.176.2 For term bonds with a longer time to maturity, there has been a positive gas premium since approximately 2021.

[144] Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.1.

[145] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023).

'Tenor anomaly'

3.177 Previously CEG raised the 'tenor anomaly' in a submission on the CEPA consultation.[146] Because CEG's only proposed change was to the benchmark tenor of debt, for the Draft Decision we considered their arguments as part of our work on the debt premium.

3.178 CEG develops its arguments further in a submission commissioned by the ENA on our Draft Decision.[147]

3.179 The new elements of CEG's arguments are:

3.179.1 A 'mathematical proof' that aims to show that the 'leverage anomaly' is identical in structure to the 'mathematical proof' of the 'tenor anomaly', with both anomalies inconsistent with the Modigliani Miller capital structure invariance proposition (**the MM Theorem**).

3.179.2 A theoretical argument based on Merton's (1974) model of the relationship between debt betas and time to maturity of bonds.

3.179.3 CEG's own modelling, which supports the argument that suppliers are being undercompensated by approximately 0.29% per annum in the WACC.

3.180 CEG recommends that we adopt one of three options to address the 'tenor anomaly', with the first option being their preferred choice:

3.180.1 adopt a longer benchmark tenor assumption (eg, 10 years) to reduce the magnitude of the WACC bias;

3.180.2 retain a five-year benchmark tenor but apply a separate adjustment to the de-levering and re-levering process in reaching the benchmark equity beta; or

3.180.3 make adjustments to the WACC standard error or WACC percentile to offset the WACC bias.

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[146] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Networks Association, February 2023), p. 5.

[147] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), p. 11. CEG also raised the "tenor anomaly" in a report for the NZAA.

3.181 The ENA references CEG's report in its submission.[148] The ENA argues that CEG's arguments support the use of longer tenor bonds to estimate the cost of debt and claim that there is strong regulatory precedent for using 10 years.

Reasons for our final decision

Term of debt premium

3.182 We use our base benchmark debt tenor in the estimation of debt premia. In our draft decision, we provided detailed information on the evidence that supports a benchmark tenor of five years. In particular, our 2022 confidential debt survey found that the value-weighted average original term to maturity of the regulated suppliers that responded was 7.25 years.

3.183 However, for half of the 23 regulated suppliers that we received data from, the weighted average original term to maturity was five years or less, and only one was greater than 10 years. Therefore, if we increased the debt premium tenor above five years, then half of the regulated suppliers would likely be overcompensated relative to their actual term (assuming an upward sloping yield curve).

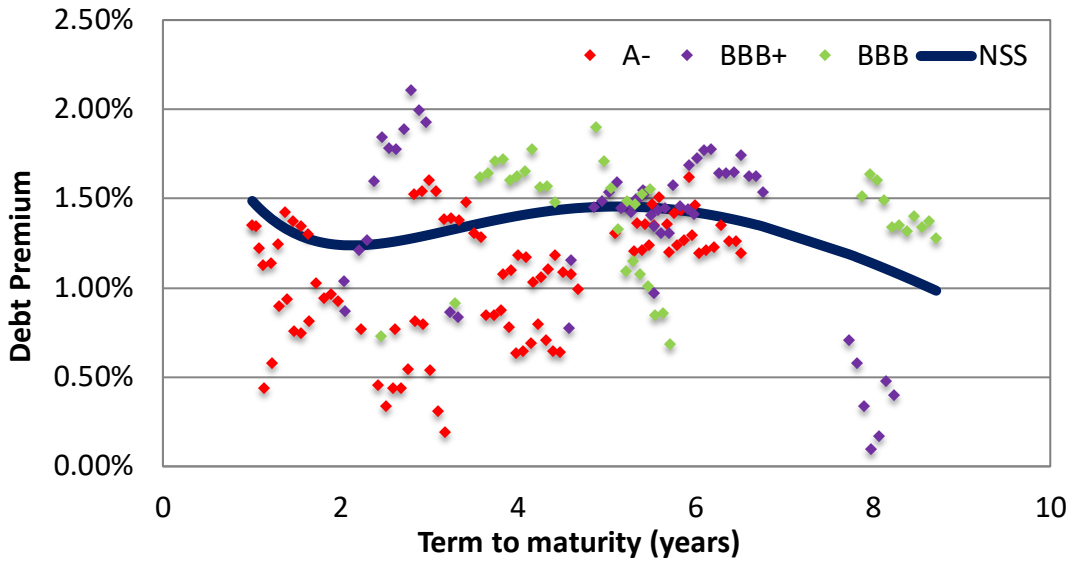
3.184 We provide the TCSD allowance to qualifying suppliers that have issued debt with an average debt term longer than the default debt premium term (five-years) so that these suppliers will not be undercompensated for the efficient cost of incurring longer-term debt.[149]

3.185 Based on publicly available qualifying bonds that we use to estimate our debt premium, there are currently not enough applicable bonds in the New Zealand market to reliably estimate a 10-year debt premium. This reflects that the practice in New Zealand has generally been to issue debt with a shorter term than 10 years, and therefore regulated suppliers, overall, would be overcompensated as the bond in our July 2023 WACC determination sample with the longest tenor has a remaining term to maturity of 8.7 years. For example, Figure 3.4 below demonstrates the relevant bonds used in the calculation of the debt premium for GPBs based on a target credit rating of S&P BBB+.

[148] Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), section 4.2, p. 8.

[149] Commerce Commission "Input methodologies review 2023 - Draft decision - Cost of capital topic paper" (14 June 2023), pp. 39-41.

Figure 3.4 July 2023 GPB NSS debt premium graph



3.186 On the term of the debt premium, we do not consider that submissions have provided sufficient evidence that increasing the term of the debt premium above five years would better promote the Part 4 purpose. Based on results from the confidential debt survey we consider that applying a tenor above five years would overcompensate suppliers on average. Firms that efficiently issue debt longer than five years can be compensated through the TCSD allowance.

3.187 The term of the debt premium is also related to the debt tenor anomaly which we discuss in paragraphs 3.206 to 3.208 below.

Updating the debt premium annually

3.188 Our draft decision was to retain our current approach of determining an 'average debt premium' based on the average of the most recent five annual debt premium estimates (historical average approach).[150] The average debt premium is set for the length of the regulatory period as we have previously noted that it has very low volatility over time, particularly when averaged over five years (see Figure 3.5 below).

3.189 Oxera (on behalf of the 'Big Six' EDBs) argues that we should change our draft decision and instead update the average debt premium annually during regulatory period. Air New Zealand considered that our current approach to estimating the debt premium is reasonable.

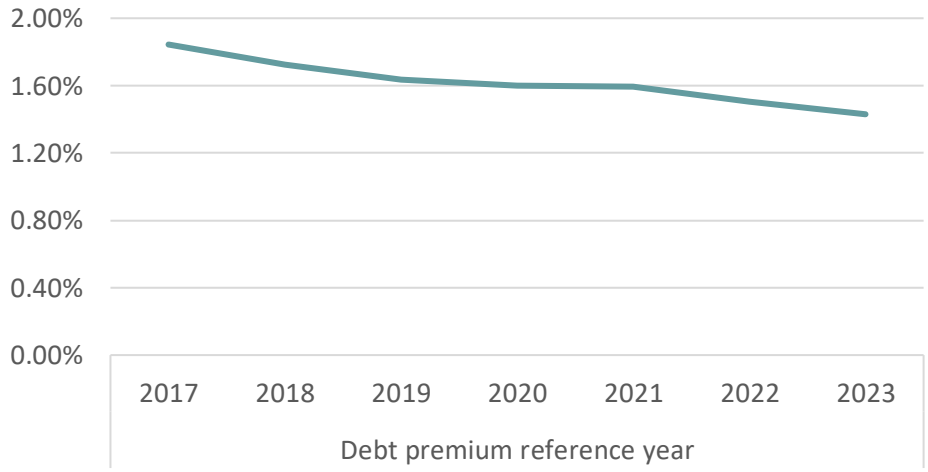
[150] We introduced this approach to the debt premium in 2016 because we recognised that while firms can hedge the risk-free rate of interest, they cannot hedge the risk premium in New Zealand.

3.190 Oxera states that "…the NZCC and Dr Lally agree that the debt premium has significant levels of volatility…".[151] This is not correct. In the draft decision we note that the debt premium, averaged over five annual periods, has been relatively stable over time.[152] The stability of the debt premium has been one of the main reasons that we do not consider that annual updates of the debt premium are justified.

3.191 Oxera also supports its claim that the debt premium is volatile by displaying the unaveraged debt premium over time.[153] The figure in Oxera's submission demonstrates that the daily debt premium can be volatile, and this is the reason that we apply an average of five annual debt premium periods. This averaging over five annual periods smooths the short-term variations and provides stability to the estimate.

3.192 We have updated the analysis that we presented in the draft decision (analysis done for the Fibre IMs). From this we can see what impact annual updates of the debt premium would have on cash flows. Figure 3.5 displays the historically averaged five-year debt premiums since we introduced the averaging approach following the 2016 IM Review.

Figure 3.5 EDB/Transpower BBB+ five-year historical debt premium



[151] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), para 3.15.

[152] Commerce Commission "Input methodologies review 2023 - Draft decision - Cost of capital topic paper" (14 June 2023), paras 3.103-3.104.

[153] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), Figure 3.1.

3.193 Table 3.1 shows the cumulative impact on Transpower's return on capital that would have resulted if we had updated the debt premium annually rather than at each reset, starting in 2017.[154] Table 3.1 shows the cumulative difference from 2019 to 2023 and from 2017 to 2023 (noting that this change occurred over more than one regulatory period).[155]

Table 3.1 Impact of annual debt premium updates

Debt premium	Vanilla WACC	Return on capital	Difference against baseline debt premium (1.43%)
1.43% (2023)	6.73%	$328,647,706	
1.63% (2019)	6.81%	$332,749,298	-$4,101,592
1.84% (2017)	6.90%	$337,055,970	-$8,408,264

3.194 We can see that, even with the largest change in average debt premium from 2017 to 2023, the impact on the return on capital would be an impact of just over $8 million less annually (assuming all else remains equal). The difference is negative (ie, the return on capital would reduce relative to 2017) demonstrating the impact of a lower debt premium on the return on capital. This shows that, even with a large change in the average debt premium over time, the impact on the return on capital is not very material. Therefore, we consider that updating the average debt premium annually will not have a significant benefit over updating the average debt premium at the beginning of every regulatory period.

3.195 Submissions noted the impact of annual updating would better match the actual debt premium faced by suppliers, and therefore would require that if the debt premium decreased over time, then a negative adjustment would be required.

3.196 Lally (2023) responds to the points raised in Oxera's submission which critique Lally's original modelling.[156] Lally agrees with one part of Oxera's submission (using five-year bonds for the debt premium rather than ten-year bonds), and so updates his modelling for a shorter bond term. Lally finds that the advantage from annual updating rather than five-yearly updating increases slightly.

[154] We use Transpower as an example to see the magnitude of cumulative difference as it is the regulated supplier with the largest RAB.

[155] For this analysis we have used a risk-free rate of 4.31% (ie, that used in the most recent ID WACC determination for Transpower), leverage of 42%, asset beta of 0.35, TAMRP of 7%, tax rates of 28% and debt issuance costs of 0.2%.

[156] Dr Martin Lally "Review of further submissions" (report prepared for Commerce Commission, 23 September 2023), pp. 10-12.

3.197 We note Oxera's submission, Lally's response, and our recognition in the draft decision that, in theory, annual updating of the debt premium would be more aligned with the opportunity cost of investment at a given point of time.[157]

3.198 However, we also considered whether a change in approach provides sufficient benefits above the additional complexity and administrative costs of annual updating. Even if we think there might be small benefits to annual updating, we do not consider that Oxera's suggested changes are materially better than our draft decision. We do not consider that the benefits of introducing annual updating would outweigh the additional administration costs.

Gas debt premium uplift

3.199 Oxera assesses whether the decarbonisation agenda and associated uncertainty lead to greater credit risk of gas networks, compared to electricity.

3.200 Oxera compares the ESG scores of electricity and gas companies to assess a potential impact on the creditworthiness of the companies. It suggests that the lower ESG ratings of gas companies are a risk which could put downward pressure on their credit rating, and therefore requires an uplift in debt premium.[158]

3.201 It is misleading to use the ESG rating to assess the creditworthiness because it is just one factor used by credit rating agencies. There has been some confusion around how the ESG ratings for companies impacts their creditworthiness and subsequently their credit ratings (S&P has recently dropped ESG scores from debt ratings).[159] ESG considerations may be one factors that credit rating agencies use in setting credit ratings for companies. However, just because the ESG score of a company may be lower than another does not mean that, overall, the creditworthiness is lower.

3.202 The outturn credit rating of the different sectors is what is important to the level of creditworthiness and, therefore, estimate of debt premium for suppliers. If credit ratings are actually adjusted due to this risk (or any other factor) then this can be taken into account in the credit rating that we set for the relevant sector. We do not consider that a perception of higher risk in one area (ESG) means that the gas sector should have a debt premium uplift above a sector with the same benchmark credit rating (electricity).

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[157] We note that either updating for annual changes in the debt premium or setting a fixed debt premium for the regulatory period is consistent with ex-ante financial capital maintenance (FCM) and we consider the resulting impact on the WACC is relatively immaterial compared with other adjustments such as the WACC uplift (and unbiased in either direction).

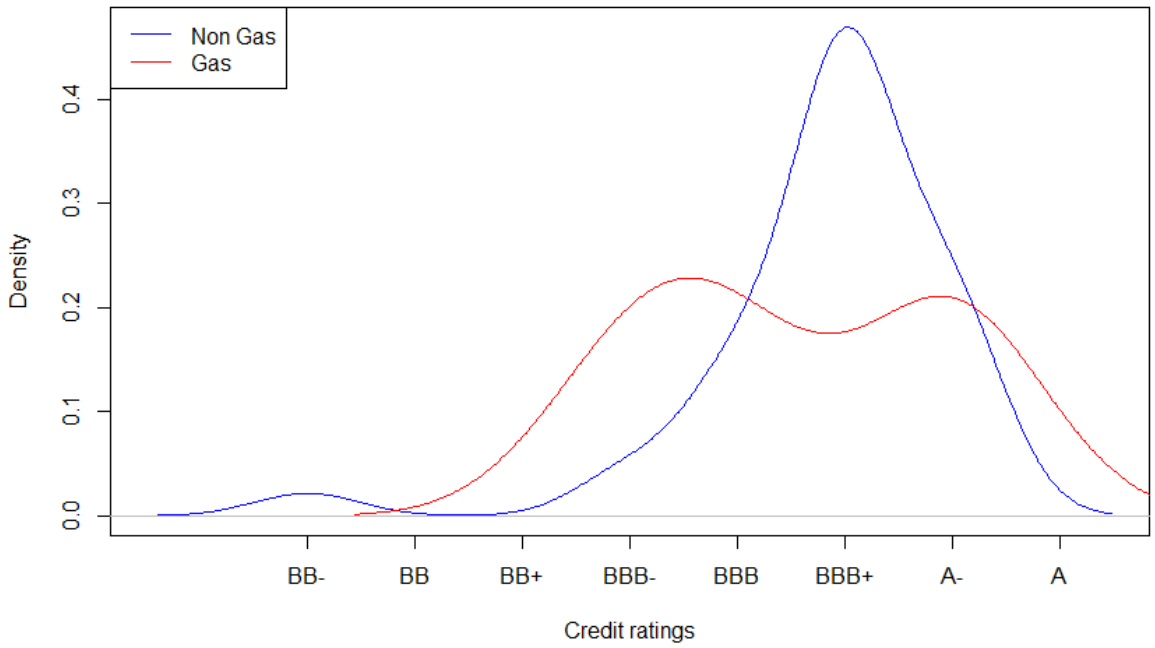
[158] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), Section 2C.

[159] See article from Bloomberg 'S&P Drops ESG Scores From Debt Ratings After Investor Confusion'. Link

3.203 In response to Oxera's analysis on the gas premia observed in the UK debt markets for specific companies, we consider that the comparators are not necessarily reflective of the gas or electricity sector as a whole or in New Zealand. Lally (2023) also states that the evidence provided by Oxera is not strong because it relates to three UK companies rather than New Zealand companies.[160]

3.204 Our credit ratings for electricity and gas are informed by the combined asset beta sample. We can observe in Figure 3.6 that the average credit ratings are similar between the gas and non-gas (electricity and integrated) comparators, although there is greater dispersion for gas.[161, 162]

Figure 3.6 Distribution of gas and non-gas credit ratings in our asset beta comparator sample[163]



3.205 Therefore, we do not consider that there is sufficient evidence of increased credit risk for gas suppliers compared with electricity or the need for an uplift for gas.

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[160] Dr Martin Lally "Review of further submissions" (report prepared for Commerce Commission, 23 September 2023), pp. 12-13.

[161] We note that gas only sample is based on relatively few (nine) observations from the overall energy sample.

[162] As we discuss in the asset beta section of this paper, we make an adjustment to the asset beta applying to GPBs based on the differences in risks between New Zealand gas suppliers and firms in the comparator sample and we also note that we have directly addressed decarbonisation risks as part of the recent GPB DPP. The debt premium is related to credit risk of the sector, and we do not have evidence that GPBs have significantly different credit risk than the wider energy comparator sample.

[163] We have excluded one of the comparators (Hawaiian Electric, ticker HE US Equity) from the non-gas sample due to it being a clear outlier following wildfires impacting its network and leading it being downgraded to

'Tenor anomaly'

3.206 Our decision is not to make any of the changes suggested by CEG. This is supported by the following reasoning, and detailed analysis is in Attachment A.

3.206.1 CEG's argument that the 'tenor anomaly' and the 'leverage anomaly' have the same mathematical structure is incorrect.

3.206.2 The theoretical basis for CEG's correction is based on the Merton model which has a number of problems.

3.206.3 We commissioned Dr Lally to analyse the estimates from CEG. Lally notes that, even if we were to accept the use of the Merton model despite the identified problems, CEG has made a number of errors and correcting for these errors would reduce the CEG estimate of the downward bias in the WACC from 0.29% to 0.08%.[164] We agree with Dr Lally's assessment.

3.207 We recognise that there are limitations and areas of uncertainty with the CAPM. However, it is the best model we have. Estimating debt betas is very difficult, which is one reason why we chose to set debt beta to zero and use the leverage of the comparator sample to solve the 'leverage anomaly'.

3.208 CEG's proposed adjustment estimates a debt beta and then estimates a relationship between the debt beta and debt tenor based on weak evidence both theoretically and empirically. We consider that trying to refine our WACC estimate in the manner proposed by CEG is a case of 'false precision' not appropriate for regulatory purposes.

a credit rating of B- by S&P and put on negative credit watch at the time of the analysis. We consider that these abnormal circumstances do not make a fair comparison with the rest of the sample.

[164] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of CEG's submission on the debt tenor anomaly" (report prepared for Commerce Commission, 6 September 2023), p. 12.

Term Credit Spread Differential

Final decisions

3.209 Our final decisions are to:

3.209.1 make no change to the methodology for calculating the TCSD;

3.209.2 maintain the 10-year cap on the TCSD allowance;

3.209.3 use a spread premium of 8.5 basis points for EDBs/Transpower and GPBs in calculating the TCSD allowance, which is a change from the draft decision of 7.5 basis points; and

3.209.4 maintain our draft decision of not specifying a TCSD for airport services and leave the decision for an Airport's price-setting event.

Background

3.210 The cost of capital IM includes a TCSD allowance to compensate suppliers for the additional debt premium incurred from issuing debt with an average original term greater than five-years (the term that we allow for in the debt premium).

3.211 Although the TCSD is conceptually a component of the cost of capital, it is treated as an adjustment to cash-flows and is only available to suppliers who have met the criteria and issued long-term debt. We recognise that issuing longer term debt can be consistent with prudent debt management.

3.212 The TCSD is calculated by way of a formula that combines:

3.212.1 the additional debt premium associated with debt that has an original term to maturity in excess of the five-year debt premium (the 'spread premium') up to a cap of ten years,[165] and

3.212.2 a negative adjustment to take account of the lower per-annum debt issuance costs that are associated with longer-term debt.[166] This is tied to the value of debt issuance and associated costs (discussed later in this chapter).

Issues raised in submissions that informed our draft decision

3.213 We received submissions from energy businesses and airports on the TCSD in the lead up to our draft decisions.

[165] This debt is called 'qualifying' debt.

[166] We assume that all debt issuance costs are fixed, irrespective of the original term of the debt.

3.214 The ENA recommended that, if we continued to adopt a five-year tenor for the debt premium, a spread premium of 9.1 bps should be used.[167]

3.215 New Zealand Airport Association (**NZAA**) and Wellington International Airport (**WIAL**) suggested a change to the IMs to allow for the benchmark tenor of debt to reflect an airport's actual tenor.

3.216 We considered these issues in our draft decisions on the TCSD for energy businesses and airports.

Reasons for our draft decisions - TCSD for EDBs/Transpower and GPBs

3.217 Our draft decision was to maintain a spread premium of 7.5 bps for energy businesses. The following section explains how we reached the draft decision, including how we determine the value for each element in the TCSD formula.

Spread premium

3.218 The spread premium is the additional debt premium that has an original term to maturity in excess of the five-year tenor we allow for in the debt premium.

3.219 We based our approach to estimating the spread premium on our 2016 approach.[168] Our detailed approach is described as follows.

Time period

3.220 We included the last seven years' worth of data (from 1 September 2015 to 31 August 2022) in our sample, broken into 14 semi-annual periods.

Samples

3.221 Our analysis was based on our proposed benchmark credit rating – BBB+ for energy businesses. However, we considered that including bonds for BBB and A- credit ratings in the analysis can allow for a larger, more robust sample. We included dummy variables for these additional credit ratings (BBB, A-) to take account of the average difference from the target credit rating (BBB+). We refer to the sample with BBB, BBB+, and A- bonds as a 'full sample' in the following paragraphs.

[167] Electricity Networks Aotearoa (ENA) - Rate of return issues -"Submission on IM Review CEPA report on cost of capital" (3 February 2023), p. 18-19.

[168] Commerce Commission "Input methodologies review decisions: Topic paper 4 – Cost of capital issues" (20 December 2016), attachment E.

3.222 We also split the sample based on whether we include or exclude bonds that are issued by entities that are 100% government or local authority owned. Bond yields of these entities are less likely to be consistent with privately owned companies (and that of a 'benchmark supplier'), given the existence of an implicit guarantee from the government in the event of financial distress.

3.223 We included four subsamples in our analysis:

3.223.1 BBB+ only sample including 100% government-owned bonds;

3.223.2 BBB+ only sample excluding 100% government-owned bonds;

3.223.3 Full sample including 100% government-owned bonds; and

3.223.4 Full sample excluding 100% government-owned bonds.

3.224 We noted that some issuers' credit ratings have changed over time. For simplicity, we used the credit rating as at the beginning of each semi-annual period.[169]

Method

3.225 We used the following three steps in estimating the spread premium using an econometric approach:

3.225.1 A key assumption required to estimate the spread premium is to obtain an estimate of the five-year debt premium, so that the 'spread premium' above the five-year term can be estimated. Therefore, the first step was to estimate the five-year debt premium for each individual month in the sample using the NSS curve.[170]

3.225.2 Next, we calculated the 'adjusted debt premium' by subtracting the five-year debt premium from the observed debt premium (which will have a tenor above five years). This gives the additional debt premium for each bond and a remaining term relative to the five-year baseline.

[169] For example, the credit rating for Wellington International Airport has changed over time (BBB+ from 2006 to 14th June 2020, and BBB from 15th June 2020). We have used the credit rating as at the beginning of each semi-annual period.

[170] The NSS framework allows for a flexible yield curve with the 'humped' shape often associated with bond-yield term structures. For a detailed explanation of NSS curve, see Commerce Commission "Input methodologies review decisions: Topic paper 4 – Cost of capital issues" (20 December 2016), attachment H.

3.225.3 Finally, we estimated a constant linear relationship between the remaining term above five years and the adjusted debt premium and set the intercept of the linear slope to zero. The resulting slope is the spread premium. This estimates the expected additional costs to regulated suppliers of each additional year of term to maturity associated with a bond with a term longer than five years.

3.226 We used the NSS method as a cross-check against the econometric approach described above. We undertook analysis based on semi-annual NSS curves using the same semi-annual periods as the econometric approach. We used a sample including bonds with the target credit rating (BBB+) and included bonds from one tier each side of the target rating (ie, BBB and A-) to increase the sample size and robustness of the analysis.[171]

3.227 Our draft decision spread premium results are summarised below in Table 3.2.

Table 3.2 Summary of spread premium estimates

	Spread premium of last 7 years (in bps)	Spread premium of last 7 years (excluding March – August 2020) (in bps)
BBB+ only including 100% govt owned bonds	11.6	8.7
BBB+ only excluding 100% govt owned bonds	11.0	8.1
Full sample including 100% govt owned bonds	10.2	8.0
Full sample excluding 100% govt owned bonds	3.8	6.8
NSS method	8.7	8.2

3.228 We considered that we should place the greatest weight on full samples both including and excluding 100% government owned bonds as they are based on the largest sample. We also considered that it is more appropriate to exclude the COVID-19-affected period (March 2020 – August 2020) due to the large outliers and abnormal observations.

3.229 Given the variation in the results, we considered an approximate judgement is more appropriate than a value from a specific dataset.

[171] As with the econometric approach outlined above, the NSS approach adjusts for the average difference between the credit ratings for each bond and the target credit rating.

3.230 The average spread premium result based on our preferred subsamples and time periods was 7.4 bps which is very close to the spread premium of 7.5 bps from the 2016 IM Review. Therefore, we proposed to maintain the spread premium of 7.5 bps.

Debt issuance cost adjustment

3.231 In addition to the spread premium incurred from issuing debt with longer maturity dates, the TCSD takes into account the reduced per annum issuance costs associated with longer-term debt.

3.232 Our estimate of the debt issuance and associated costs is fixed (based on the length of the regulatory period). Therefore, regardless of the debt term, the required adjustment can be calculated based on our allowance of 0.20% p.a. issuance costs for debt with a five-year original term.[172] Table 3.3 displays the lower debt issuance costs associated with debt that has a longer original tenor and also how this translates to a debt issuance cost adjustment as part of the TCSD calculation.

Table 3.3 Debt issuance costs adjustment

Tenor	5	6	7	8	9	10
Issuance costs (0.20%*5/tenor)	0.20%	0.17%	0.14%	0.13%	0.11%	0.10%
Debt issuance cost adjustment	0.00%	-0.03%	-0.06%	-0.07%	-0.09%	-0.10%

TCSD

3.233 For combining the spread premium and the debt issuance costs adjustment, a fixed relationship between the original tenor of issued debt and the TCSD can be determined.

Table 3.4 TCSD for different original tenor length (EDBs/Transpower and GPBs)

Tenor	5	6	7	8	9	10
Spread premium	0.000%	0.075%	0.150%	0.225%	0.300%	0.375%
Debt issuance cost adjustment	0.00%	-0.03%	-0.06%	-0.07%	-0.09%	-0.10%
TCSD	0.00%	0.05%	0.09%	0.16%	0.21%	0.28%

[172] See paragraphs 3.287 for detailed explanation on debt issuance and associated costs.

3.234 To incorporate the TCSD formula for energy businesses in the IMs, we proposed to maintain the current approach. That is to:

3.234.1 provide a formula in which the input would be the original tenor of the relevant debt issuance – this input would not need to be rounded;

3.234.2 use the formula to calculate the TCSD for each bond by determining the relevant spread premium and debt issuance costs adjustment; and

3.234.3 set the maximum tenor allowed in the calculation to be 10 years.

Our considerations of submissions on TCSD for energy

3.235 The CEG report commissioned by ENA suggests a spread premium of 9.1 bps rather than the TCSD spread premium in the current IMs of 7.5 bps.[173] In summarising the CEG report, the ENA stated that:[174]

> ENA's view is that CEG's analysis supports the Commission's decision to adopt a six-monthly estimation period in preference to a monthly estimation period. This approach result in a TCSD of 0.091%.
>
> ENA recommends that if the Commission continues to adopt a 5-year debt tenor, a TCSD of 0.091% be used.

3.236 CEG's estimates of the spread premium were consistently higher than ours. CEG provided us with their detailed calculations, however we could not reconcile their results with ours. Based solely on their report, we note that:

3.236.1 CEG has used a slightly different method to us for estimating the spread premium. For example: we have estimated the five-year debt premium for each individual month while CEG has estimated it only for each semi-annual period. This difference between the methods will lead to different estimates of the spread premium.

[173] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Networks Association, February 2023).

[174] Electricity Networks Aotearoa (ENA) - Rate of return issues -"Submission on IM Review CEPA report on cost of capital" (3 February 2023).

3.236.2 We noted that we were not sure which subsample CEG are using when estimating the spread premium. CEG appear to use the BBB+ only excluding 100% government-owned bonds sample. However, we noted that CEG also included the bonds issued by Christchurch Airport which is 100% owned by Christchurch City Council and the New Zealand government.[175, 176]

3.237 Our draft decision was to maintain the current TCSD allowances for EDBs, GPBs and Transpower. We published the spreadsheet of our calculations to clarify the reasons for the differences between our estimates of the spread premium and CEG's to inform our final decision.

Reasons for our draft decisions - TCSD for airports

3.238 Our draft decision was to maintain our 2016 decision of not specifying a TCSD value for airports in the IMs.

3.239 Airports are subject to ID regulation, and the impact of longer-term debt can be considered at the PSE depending on the Airport's specific circumstances.

Our considerations of submissions on TCSD for airports

3.240 NZAA supported the decision of not including a TCSD for airports:[177]

> Originally, the IMs included a TCSD to compensate airports that issue debt with an average initial tenor of more than five years (albeit it resulted in a cashflow adjustment rather than a change to WACC). It was removed in the 2016 IM Review due to is complexity and lack of effectiveness. NZ Airports does not advocate for a return of the TCSD.

but would have liked us to consider that:

> it should be possible for airports to use a debt premium in their pricing WACC that is different to the benchmark in the WACC IM, if that better reflects their actual debt tenor.

3.241 Wellington International Airport Limited (WIAL) also suggested a change to the IMs to allow for debt tenor to reflect an airport's actual tenor.[178]

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[175] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Networks Aotearoa, February 2023), para 74.

[176] CEG also note that our August 2022 WACC determination did not include some longer maturity bonds that would be relevant for the TCSD calculation. We agree that all of the bonds that meet our criteria are relevant, and we have used these in our updated estimation of the spread premium. The bonds used in the WACC determination (for the purposes of estimating the debt premium) are not necessarily relevant for estimating the spread premium.

[177] NZ Airports Association Inc. "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022).

[178] Wellington International Airport Limited "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022).

3.242 We considered that the compensation for long-term debt could be assessed during the PSE. For example, we assessed whether additional compensation would be appropriate for the additional debt premium that can be incurred from issuing debt with a longer original term than five years for Wellington Airport in our 2022 PSE review.[179]

Stakeholder views on our draft decisions

Submissions on the TCSD for EDBs/Transpower and GPBs

3.243 We received expert reports from CEG (commissioned by ENA) and Oxera (commissioned by EDBs and GPBs) on the TCSD for regulated energy suppliers.[180]

3.244 `The CEG report commissioned by ENA states that there are errors in the NSS model that we published with our draft decisions.[181] CEG's view is that the best estimate of the spread premium should be 8.9 bps if we follow our 2016 weighting approach or 8.4 bps if we follow the weighting approach in our 2023 draft decision, after correcting for the errors.

3.245 The Oxera report (for the 'Big Six' EDBs) suggests that a spread premium of 10.2 bps should be used (which is the result of using the full sample including 100% government-owned bonds and based on using the last seven years of data without any adjustment for the impact of the Covid-19 affected period).[182] Oxera also disagrees with capping the allowed maximum tenor for the TCSD at 10 years.[183]

3.246 The ENA cites the CEG report in recommending a spread premium of 8.9 bps for the TCSD for Energy businesses.[184]

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[179] Commerce Commission "Review of Wellington Airport's 2019-2024 Price setting event: Final report" (28 September 2022), pp. 86-90.

[180] CEG "Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Network Aotearoa, July 2023), section 3; Oxera 'Response to the New Zealand Commerce Commission's draft decision for Part 4 Input Methodologies Review 2023 on the cost of capital' (Prepared for the New Zealand electricity distribution businesses, July 2023), section 3B.

[181] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), pp. 22-34.

[182] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big Six' EDBs, 19 July 2023), section 3B.

[183] Ibid.

[184] Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp.9-10.

3.247 Vector, Wellington Electricity, Unison (in its cross-submission), and Orion (in its cross-submission) cite the Oxera report in supporting a spread premium of 10.2 bps for the TCSD for energy businesses.[185]

3.248 Vector (in its cross-submission) notes that although Oxera and CEG used different approaches to examining our approach, their analyses support a higher spread premium estimate than our draft decision.[186]

3.249 Transpower accepts the draft decision spread premium of 7.5 bps.[187]

Submissions on the TCSD for Airports

3.250 Airlines and their expert reports, including Air New Zealand and TDB Advisory (prepared for BARNZ), support our draft decision of setting the appropriate TCSD at an Airport's price-setting event.[188] For example, TDB Advisory submit:[189]

> We support the Commission's draft decision to maintain its 2016 approach of not specifying a term credit spread differential (TCSD) for airports. As above, individual airport's circumstances can be addressed if necessary, at each airport's Price Setting Event (PSE).

Reasons for our final decisions - TCSD for EDBs/Transpower and GPBs

Consideration of submissions

3.251 In response to our draft decisions reasons paper and model, submitters raised four substantive points relating to:

3.251.1 the choice of periods used to estimate the spread premium;

3.251.2 the samples that we focus on in choosing the spread premium;

3.251.3 the ten-year cap on the TCSD allowance; and

3.251.4 CEG's claims of errors in our model.

3.252 We discuss our response to each of these points below.

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[185] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.24; Wellington Electricity "Submission on IM Review 2023 Draft Decisions" (19 July 2023), section 4.1; Unison Networks "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p.2; Orion "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 10.

[186] Vector "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 70.

[187] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.36.

[188] Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.2; TDB Advisory "Report on IM Review 2023 Draft Decisions cost of capital paper" (report prepared for BARNZ, 19 July 2023), p.4.

[189] TDB Advisory "Report on IM Review 2023 Draft Decisions cost of capital paper" (report prepared for BARNZ, 19 July 2023), p.4.

Issue #1: the choice of periods used to estimate the spread premium

3.253 The analysis that underpinned our draft decision for the spread premium used seven years of semi-annual data from September 2015 to August 2022. We excluded one semi-annual Covid-affected period from March 2020 to August 2020 because it contained large outliers.

3.254 CEG submitted that if we followed our 2016 approach to identifying and removing outliers, the semi-annual period before Covid (September 2019 to February 2020) should also be excluded.

3.255 In 2016 we applied judgement and excluded sample periods that appeared to be outliers and would have a significant impact on the resulting forward-looking spread premium estimation used to calculate the TCSD.

3.256 In the present review, the period from September 2019 to February 2020 appears to be an outlier, as it includes a highly negative spread premium for the full sample excluding 100% government-owned bonds. We therefore agree with CEG that we should exclude the full year from September 2019 to August 2020 from our estimation of the spread premium.

3.257 Oxera suggests that we should include all 14 semi-annual periods including the Covid-affected period to "better compensate the EDBs for the actual financing costs that they face".[190]

3.258 As explained above, the two periods we have excluded are clearly outliers relative to other periods. The full sample excluding 100% government-owned bonds sample has a large negative spread premium in the period from September 2019 to February 2020. The spread premiums for March 2020 to August 2020 include outliers in both directions depending on the sample used.

3.259 We therefore do not agree with Oxera that the full period of data should be included. As with our response to CEG's submission, we believe that we should follow our 2016 approach and exercise judgement in choosing which periods to include in the analysis. Specifically, we should exclude periods that would have a significant impact on the forward-looking spread premium estimate.

[190] Oxera 'Response to the New Zealand Commerce Commission's draft decision for Part 4 Input Methodologies Review 2023 on the cost of capital' (Prepared for the New Zealand electricity distribution businesses, July 2023).

Issue #2: the samples that we focus on in choosing the spread premium

3.260 Oxera agrees that using full samples increases the number of observations and statistical robustness. However, Oxera argues that by taking the average of the two full-samples, non-government-owned bonds are double-counted in the final estimate. Hence, Oxera suggests that we should rely solely on the full sample including 100% government bonds and adopt a spread premium of 10.2 bps.

3.261 CEG suggests that we should take the average of the four samples (which it claimed is most consistent with our 2016 approach) and adopt a spread premium of 8.9 bps.[191]

3.262 First, we consider that the benchmark corporate bond that we use as our 'target notional supplier' is not a 100% government-owned bond. Given this, we do not consider that Oxera's approach of relying solely on the full sample including 100% government bonds is a more robust and transparent approach. More importantly, our 2016 approach stated that "we consider that an approximate judgement is more appropriate than a value from a specific dataset".[192]

3.263 Second, we do not agree with CEG's view that averaging across all sub-samples is most consistent with our 2016 approach. Our 2016 final decision of using a spread premium of 7.5 bps is 'an approximate judgement' based on the comparison of both CEG's and our estimates.

3.264 Therefore, we consider that the decision should not be based on a single sample, as suggested by Oxera, but instead based on judgement informed by the evidence from all samples, including the NSS results as a cross-check.

Issue #3: the ten-year cap on the TCSD allowance

3.265 Oxera suggests that the ten-year cap for the calculation of the TCSD allowance should be removed.[193]

[191] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), para 153.

[192] Commerce Commission "Input methodologies review decisions: Topic paper 4 - Cost of capital issues" (20 December 2016), para 909.

[193] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big Six' EDBs, 19 July 2023), section 3B.

3.266 Although we recognise that issuing longer term debt can be consistent with prudent debt management, we stated clear reasons for setting a ten-year cap on the TCSD allowance calculation in the 2020 Fibre Input Methodology:[194]

> When we make allowance for the spread premium, we estimate a straight-line relationship for simplicity given the additional complexity of curve fitting, data requirements and materiality, but we understand it is more akin to a curve. Beyond ten years we consider that the incremental premium becomes immaterial against the reduced debt issuance costs.

3.267 In Attachment B we provide further information on the credit spread above the risk-free rate for tenors greater than 10 years. We can see that allowing for a debt premium (through the TCSD) for terms above 10 years to maturity can lead to overcompensating suppliers, resulting in excessive profits for suppliers and prices for consumers.

3.268 Therefore, we consider that it is appropriate to set the maximum allowed tenor at ten years. Providing for a higher debt premium above ten years based on a fixed linear relationship (when in practice we would expect the yield curve to flatten as the term to maturity increases) could overcompensate suppliers that issue longer term debt.

Issue #4: CEG's claims of errors in our model

3.269 CEG submitted that there are errors in the model we published. For example:

3.269.1 CEG submitted that the model we published identified the wrong government bonds for some corporate bonds when calculating the risk-free rate which is due to the order of government bonds in the output list in the worksheet 'Govt bond inputs';[195]

3.269.2 CEG also submitted that the model does not correctly calculate the monthly debt premiums when the first day of the month is on a weekend which does not have data from Bloomberg.[196]

3.270 On the first issue CEG raised, we have been unable to reproduce the errors where the incorrect bonds are selected. All government bonds in the list are ranked in the order of increasing maturity in the worksheet.[197]

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[194] Commerce Commission "Fibre input methodologies: Main final decisions - reasons paper", (13 October 2020), para 6.326.

[195] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), Section 3.

[196] Ibid.

[197] This can be seen from the model we published worksheet 'RFR&DP' cell 'A257'.

3.271 On the second point, CEG is correct that the debt premiums cannot be calculated when the first day of the period falls on a weekend. However, this can be easily solved by matching the start date to the first date that has available data.

3.272 We have checked the model and our results, and we are satisfied that our results are correct.[198]

Analysis for the final TCSD for EDBs/Transpower and GPBs

3.273 After considering the points raised in submissions, we decided to:

3.273.1 include the last seven years of data but exclude the periods with spread premiums that appear to be outliers. That is, to exclude the Covid-affected period (as identified in draft decisions) as well as the semi-annual period prior to Covid (as suggested by CEG);

3.273.2 maintain our approach from the draft decision of giving the most weight to the two full samples as they are based on the largest sample of bonds;

3.273.3 maintain the maximum allowed tenor for the TCSD calculation at 10 years; and

3.273.4 rely on the regression method and use the NSS method as a cross-check.

3.274 The results of the updated spread premiums are presented in 0. We also compared our updated results with CEG's estimates which were prepared using our model.

[198] We also found that there is an issue in CEG's submission when they calculated the spread premiums. We noted that Figure 3-2 presents an outlier of -20.3 bps for the sample based on including 100% government-owned bonds, but the source appears to be a regression reported in Figure 3-3 to be based on excluding 100% government-owned bonds sample.

Table 3.5 Updated summary of spread premium estimates (in bps)

Estimation period	Draft Decision	CEG submission on Draft Decision	Analysis for Final Decision
	Last 7 years excluding Mar 2020 – Aug 2020	Last 7 years excluding Sep 2019 – Aug 2020	
BBB+ only including 100% govt owned bonds	8.7	8.9	9.0
BBB+ only excluding 100% govt owned bonds	8.1	9.7	8.4
Full sample including 100% govt owned bonds	8.0	8.7	8.9
Full sample excluding 100% govt owned bonds	6.8	8.2	8.3
Average across all four samples	7.9	8.9	8.7
Average across two full samples	7.4	8.4	8.6
NSS estimate	8.2		7.9

3.275 In our draft decision we considered that we should place the greatest weight on the full samples both including and excluding 100% government-owned bonds because they are based on the largest samples. The full samples have spread premiums of 8.3 bps and 8.9 bps based on the updated sample periods explained above. The full sample that is closest to our notional benchmark is the one that excludes 100% government bonds, which has a spread premium of 8.3 bps.

3.276 The results for the smaller BBB+ only samples are 8.4 bps and 9.0 bps. The BBB+ excluding 100% government owned bonds sample is the same as our notional benchmark firm and has a spread premium of 8.4 bps.

3.277 We therefore decided to use a spread premium of 8.5 bps for our final decision. It is within the range of each of the BBB+ and full samples and is close to the estimate for the sample that we consider best matches our target notional benchmark. Given the NSS result of 7.9 bps, we do not consider that a higher premium would be justified. Our final decision for the spread premium is based on judgement and is not a value from a specific sub-sample.

3.278 The following table presents the updated TCSD allowance based on our final decision of a spread premium of 8.5 bps.

Table 3.6 Final decision on TCSD for different original tenor length (EDBs/Transpower and GPBs)

Tenor	5	6	7	8	9	10
Spread premium	0.000%	0.085%	0.170%	0.255%	0.340%	0.425%
Debt issuance cost adjustment	0.00%	-0.03%	-0.06%	-0.07%	-0.09%	-0.10%
TCSD	0.00%	0.06%	0.11%	0.19%	0.25%	0.33%

Reasons for our final decisions - TCSD for Airports

3.279 Submitters agree with our draft decision of not specifying a TCSD value for airport services. Air New Zealand and TDB Advisory (on behalf of BARNZ) both support our draft decision.[199]

3.280 Based on the support we received on our draft decisions, our final decision is to confirm our draft decision of not specifying a TCSD for airports for the reasons set out in the draft decision.

Compensation for debt issuance and associated costs

Final decisions

3.281 Our final decision is to:

3.281.1 maintain a total allowance for debt issuance and associated cost of 20 bps p.a. for a five-year regulatory period; and

3.281.2 allow debt issuance and associated cost at 25 bps p.a. for a four-year regulatory period.

[199] Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.2; TDB Advisory "Report on IM Review 2023 Draft Decisions cost of capital paper" (report prepared for BARNZ, 19 July 2023), p.4.

3.282 The baseline 20 bps for a five-year regulatory period broadly represents:

3.282.1 direct debt issuance costs – 8-10 bps p.a.;

3.282.2 swap costs – 4 bps p.a.; and

3.282.3 compensation for potential additional costs, where efficiently incurred, associated with costs such as brokerage, new issue premium, committed facilities/cost of carry or forward starting swaps – 7-9 bps p.a.

Background

3.283 Firms incur costs when raising and managing their debt. These costs are not reflected in the debt premium but are an inherent cost of raising the debt finance needed to support an ongoing business. The IMs recognise that fees and costs associated with prudent debt issuance and refinancing costs are legitimate expenses that should be compensated for. The 2016 IMs provided a total allowance for debt issuance and associated costs of 20 bps p.a.

3.284 Our approach to estimating the debt issuance and associated cost allowance recognises that direct costs of issuing debt are spread over the term of the debt, and there are also annual costs for debt management and other potential costs. Direct issuance costs are calculated based on spreading the direct debt issuance costs (as a proportion of the book value of debt) over the term of the debt. In addition, we provide an annual allowance for the costs of interest rate swaps and other 'potential' debt costs for each year of the regulatory period. Together, this provides us with an annual estimate of the debt issuance and associated cost allowance.

Issues raised in submissions up to the draft decisions

3.285 We did not receive any submissions suggesting that our approach to determining the level of direct issuance costs, swap costs and potential other costs in the current IMs was not appropriate.

Amortisation of debt issuance costs

3.286 The CEG report commissioned by ENA suggested that we should include a NPV adjustment to the debt issuance cost allowance to address the amortisation of debt issuance costs for debt raised in previous years, which CEG considers may undercompensate suppliers.[200] In summarising the CEG report, the ENA writes that:[201]

> CEG has identified a potential error (Appendix B) in the Commission's collation of debt issuance cost in its final 2016 decision, which understated transaction costs by around 0.5bp (assuming a 5-year tenor and a 5% discount rate). This mathematical error should be simple to correct.
>
> …
>
> In the regulatory context, we can think of the entire debt RAB as the inventory of debt that is being used up (maturing) and replenished (refinanced) at a rate of 20% per year. The Commission's approach to compensate only for the costs of new debt as it is incurred amounts to, in effect, refusing to compensate for the costs of prior building and holding of that debt inventory.

Reasons for our draft decision

3.287 Our draft decision was to maintain a total allowance of 20 bps p.a. for a five-year regulatory period and allow an upward adjustment for a four-year regulatory period. We consider that debt issuance costs would be relatively higher for a four-year regulatory period as a proportion of total annual debt costs, as the fixed issuance costs would be spread over a shorter time period, and that the 20 bps should therefore be scaled up on a pro rata basis.[202]

3.288 Given the variability in individual costs, we were deliberately not precise in estimating the individual components of debt issuance costs, but the baseline 20 bps for a five-year regulatory period broadly represented:

3.288.1 direct debt issuance costs – 8-10 bps p.a.;

3.288.2 swap costs – 4 bps p.a.; and

3.288.3 compensation for potential additional costs, where efficiently incurred, associated with costs such as brokerage, new issue premium, committed facilities/cost of carry or forward starting swaps – 7-9 bps p.a.

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[200] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Authority Networks, February 2023).

[201] Electricity Networks Aotearoa (ENA) - Rate of return issues -"Submission on IM Review CEPA report on cost of capital" (3 February 2023).

[202] The allowance for a four-year regulatory period is 25 bps (estimated as 25bps = 20*(5/4)).

3.289 We considered that the 20 bps p.a. estimate for a five-year regulatory period is our best view of the average cost of a benchmark supplier that issues New Zealand domestic vanilla bonds on a regular basis consistent with our 'simple approach' to estimating the cost of debt. Further details on how we reached the conclusions on debt issuance and associated costs for the draft decision are provided in the following sections.

How we reached the estimated debt issuance and associated costs

Direct debt issuance cost

3.290 Direct issuance costs are the costs incurred to raise new debt. These can include one-off and ongoing costs required to issue debt in New Zealand in line with our simple approach to setting the cost of debt.

3.291 To help review the suitability of our current estimate of debt issuance costs, we considered the information provided in the confidential debt survey. From this survey we identified 38 vanilla New Zealand domestic bonds issued by seven regulated suppliers that are equivalent to the type of bond from which we estimate the debt premium. The average direct debt issuance cost provided in the debt survey of these bonds was 9.2 bps p.a. when averaged over the original tenor of the bond, with a median of 6.9 bps p.a.

3.292 For the 38 vanilla New Zealand domestic bonds, 58% had a direct issuance cost less than 8 bps p.a., while 71% had a direct issuance cost less than 10 bps p.a. Therefore, we considered a direct debt issuance cost of 8-10 bps p.a. weas a reasonable allowance.

Swap costs

3.293 Consistent with our assumed debt management strategy, we set our cost of debt based on the assumption that suppliers will use interest rate swaps to match the term of the regulatory period using fixed-to-floating interest rate swaps:

3.293.1 swapping fixed (with a term above five years) rate for a base floating rate at the time of issuance;

3.293.2 swapping the base floating rate at the time of the regulatory reset determination window for five-year fixed rate.

3.294 We defined the cost of executing a swap transaction as:[203]

> half of the New Zealand dollar wholesale bid and offer spread for a vanilla interest rate swap determined at the time of pricing the qualifying debt.

[203] Commerce Commission "Input methodologies review decisions: Topic paper 4 – Cost of capital issues" (20 December 2016).

3.295 We have relied on the confidential debt survey for the cost of executing an interest rate swap. The results from the debt survey on interest rate swap costs supports our proposed allowance of 2 bps per swap. Based on the incentivised debt management strategy, we allow suppliers the cost of two fixed-floating interest rate swaps per year.[204] Therefore, we considered that the allowance of 4 bps p.a. is reasonable.

Compensation for 'potential' additional cost

3.296 We recognised that not all costs are captured by the direct issuance and swap costs. There are other potential indirect and other costs associated with maintaining an efficient debt portfolio.

3.297 In 2016 we allowed for potential costs, where efficiently incurred, associated with brokerage, new issue premium, committed facilities/cost of carry, forward starting swaps of 7-9 bps p.a.

3.298 As we received no new information around other potential debt raising costs, we proposed to maintain the current allowance of 7-9 bps. We welcomed more evidence on these costs in submissions on the draft decisions.

Our considerations of submissions

3.299 We considered that the current level of debt issuance costs appropriately provide for the cost of maintaining the notional benchmark portfolio.

3.300 In response to the CEG report recommending an increase in allowed debt issuance costs for an NPV adjustment for the amortisation of issuance costs, we did not consider that this additional compensation was required because:

3.300.1 Our assumed debt management strategy is that a notional supplier raises debt consistently and on a staggered basis. Therefore, the supplier is compensated for this every year through the debt issuance costs that we allow in the WACC. The supplier is then able to use interest-rate swaps to fix the risk-free rate portion of existing debt but still issue new debt consistently to manage refinancing risk. Suppliers can respond to our assumed strategy to avoid mismatches with our allowed cost of debt.

3.300.2 We do not prescribe specific costs or timing of our debt issuance costs or the cost of debt allowance more generally, we simply provide an allowance based on our assumed debt management strategy and suppliers can respond to this how they like.

[204] We incentivise regulated suppliers to swap the fixed rate for a base floating rate at the time of issuance, and then swap the base floating rate for the five-year fixed rate at the time of the WACC determination window.

3.300.3 Even if a supplier was to raise a large amount of debt at one time (which is where this amortisation cost may arise), we provide an additional allowance for other 'potential' costs associated with raising debt, in addition to direct issuance and swap costs, which could cover a range of different costs that suppliers may or may not require. This overall allowance can compensate for a range of different debt management strategies and other costs that may be required.

3.301 On this basis, we did not consider that an increased allowance for an NPV adjustment to debt issuance and associated costs was necessary.

3.302 Given the uncertainty of the debt issuance costs, we did not consider we should be too precise in trying to replicate costs using a bottom-up approach. Instead, we considered that on the basis of the available evidence, the allowance for debt issuance costs should be no higher than 20 bps p.a. for debt with a five-year term.

3.303 We considered this was sufficient to cover the direct costs of issuing New Zealand domestic corporate bonds (8-10 bps) and costs of any required interest-rate swaps (4 bps). As noted above, given the uncertainty and variability of the various costs, we considered it was prudent to include an additional allowance to cover other issues related to debt issuance.

3.304 Therefore, we were satisfied that suppliers are adequately compensated for their debt issuance costs based on our draft decisions.

Stakeholder views on our draft decisions

3.305 Transpower, Orion and Air NZ all support our draft decision on the debt issuance and associated costs. [205]

3.306 Vector does not support our draft decision on the debt issuance and associated costs but does not provide any detailed explanations.[206]

[205] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.36; Orion "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.18; Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.2.

[206] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.9.

3.307 The only substantive submission we received on debt issuance and associated costs was from CEG (on behalf of the ENA). CEG argues that our draft decision undercompensates suppliers in two aspects:[207]

3.307.1 We provide debt issuance costs for an ongoing business, but not the initial costs of establishing a debt book in the first place.

3.307.2 Where the RABs are growing, the allowance is based on the current-year RAB, which is smaller than the RAB that suppliers are financing.

Reasons for our final decisions

3.308 Our approach to setting the debt issuance and associated costs is most easily understood by thinking about the costs of debt raised in the present year being reimbursed through an allowance that divides the costs equally over a number of years equal to the length of the regulatory period.[208] Taking this interpretation:

3.308.1 We do not agree with CEG that we do not provide compensation for establishing a debt portfolio. As described, debt issuance costs, including for the establishment of a debt portfolio, are reimbursed over a number of years equal to the length of the regulatory period. However, we agree with CEG's related point that we do not make an NPV adjustment when we divide the costs. In its submission on the CEPA consultation, CEG estimated the cost of not providing an NPV adjustment at 0.5 bp per annum.[209]

3.308.2 We do not undercompensate suppliers for their debt issuance costs where RABs are growing. Rather, if the firm raises more debt than it retires in a given year, then the higher costs are reimbursed on a forward-looking basis over a number of years equal to the length of the regulatory period.

3.309 CEG relies on an alternative interpretation of our approach to debt issuance and associated costs, that we compensate current costs in the current year. Expressed verbally, this argument creates the impression of under-compensation.

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[207] CEG "Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa, July 2023), section 4.

[208] For example, if we estimated a total cost of issuing a bond at 50 basis points, we would then provide an allowance of 50/5=10 bps per annum for a five-year regulatory period or 50/4=12.5 bps per annum for a four-year regulatory period.

[209] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Authority Networks, February 2023), p.35.

3.310 CEG provides an illustrative example to show the under-recovery under our approach.[210]

Figure 3.7 Actual debt raising vs NZCC modelled debt raising with RAB growing at 3% real (5.6% nominal)[211]

Year	Debt portion of ORAB	Actual debt raising	NZCC assumed debt raising	Shortfall in compensation	If debt raising costs are amortised
		Debt RAB growth + refinancing new debt	20% of RAB	1% ×actual debt raising less 0.2% of RAB	1% of actual debt raising less 1% of RAB amortised* over 5 years
1	100	26	20	0.06	0.01
2	106	27	21	0.06	0.01
3	111	27	22	0.05	0.00
4	118	28	24	0.04	-0.01
5	124	28	25	0.03	-0.02
6	131	33	26	0.07	0.01
7	138	35	28	0.07	0.01
8	146	35	29	0.06	0.00
9	154	36	31	0.05	-0.01
10	163	37	33	0.05	-0.03
Average				**0.06**	**0.00**

* Amortised at a 7.07% WACC

3.311 CEG shows the example of debt issuance costs for a supplier with a growing RAB. From Year 1 to Year 2 the RAB grows from $100m to $106m. CEG argues that because we compensate the supplier for raising $20m of debt, which is 20% of starting RAB of $100m, and not the $26m that the firm actually raises, that there is a shortfall in compensation of $\$26m \times 1\% - \$100m \times 0.2\%$, which is the same as $(\$26m - \$20m) \times 1\%$ (column 5 of CEG's table).

3.312 Under our approach to debt issuance costs, the costs of raising the additional $6m are compensated in the five years after debt is raised. That is, it is compensated in equal increments in years 2 to 6. As a result, there is no under-compensation. Similarly, the compensation for debt issuance costs allowed in year 1 is not compensation for money raised that year. Rather, it is compensation for costs that had been incurred in the past.

3.313 A complete accounting of the compensation for debt issuance costs for the debt raising shown in figure 3.7 would start from year 2 and continue to year 15, the first and last years in which the firm would be compensated for the debt raising shown in the table.

[210] CEG "Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa, July 2023), p. 38, Table 4-1.

[211] Ibid, table 4.1.

3.314 We already allow for other 'potential' costs of 7-9 bps per annum associated with raising and managing debt. So even if suppliers considered that they were undercompensated due to the timing of debt issuance compensation, they have this allowance (as part of the overall debt issuance and associated costs) that should provide adequate overall compensation.

3.315 We reiterate that we use a notional benchmark cost of debt rather than actual costs to provide an incentive for suppliers to be efficient and minimise costs. Suppliers can raise debt in whichever way they like, but we only compensate for the notional benchmark cost of debt.

3.316 Therefore, we have decided to maintain our draft decision of allowing a total debt issuance and associated costs of 20 bps for a five-year regulatory period, and a total debt issuance and associated costs of 25 bps for a four-year regulatory period.

Credit rating

Final decisions

3.317 Our final decision is to maintain the current S&P (or equivalent from other recognised agency) long-term credit ratings of:

3.317.1 BBB+ for EDBs/Transpower and GPBs; and

3.317.2 A- for airport services.

Background

3.318 Credit ratings are an indication of a borrower's creditworthiness. The higher the rating, the less the likelihood of default.

3.319 In the 2016 IM Review, we specified notional long-term credit ratings, which are used when estimating the debt premium. We consider that if suppliers' actual credit ratings were used there may be an incentive for them to increase leverage, leading to adverse implications for consumers.

3.320 We consider that an efficient operator would seek to maintain an appropriate investment grade credit rating to ensure satisfactory access to debt capital markets at reasonable costs. S&P minimum long-term credit rating considered to be investment grade is BBB-.

3.321 At the last IM Review, we decided upon S&P long-term credit ratings of BBB+ for EDBs, Transpower, and GPBs and A- for airports because this provides an adequate safety margin above the minimum investment grade.[212] This margin protects against the possibility that economic downturns or shocks can lead to financial distress, but also provides suppliers with flexibility over the level of leverage and the choice of debt instruments.

Issues raised in submissions up to the Draft Decisions

Stakeholder submissions on credit rating for energy businesses

3.322 Submissions from energy businesses such as ENA and Powerco supported our use of the notional credit rating of BBB+ for EDBs and GPBs in the CEPA consultation submissions.[213]

Stakeholder submissions on credit rating for specified airport services

3.323 TDB Advisory for the Board of Airline Representatives New Zealand Inc. (**BARNZ**) supported our use of notional credit ratings for airports remaining at A- in both the Process and issues paper[214] and CEPA consultation submissions:[215]

> We suggest that the notional long-term credit rating for airports remain at A-. This would provide continuity and consistency with the Commission's past approach to this issue. We note that there have been several adjustments up and down in actual credit ratings over recent years – including Christchurch Airport moving to and then from an A- rating – with recent downgrades probably reflecting the impact of the Covid pandemic.
>
> Overall, considering a largely post-pandemic outlook where prospects for airline and airport activities appear to be rapidly improving, we think that there is more upside than downside risk regarding credit-rating adjustments in the coming years.

3.324 WIAL submitted that we should examine whether the notional A- credit rating remains appropriate.[216]

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[212] Commerce Commission "Input methodologies review decisions: Topic paper 4 – Cost of capital issues" (20 December 2016), para 250.

[213] Electricity Networks Aotearoa (ENA) - Rate of return issues -"Submission on IM Review CEPA report on cost of capital" (3 February 2023); Powerco "Submission on IM Review CEPA report on cost of capital" (3 February 2023).

[214] Board of Airline Representatives New Zealand Inc. "Process and Issues and draft Framework papers" (11 July 2022).

[215] Board of Airline Representatives NZ (BARNZ) – Cover letter – "Submission on IM Review CEPA report on cost of capital" (3 February 2023).

[216] Wellington International Airport Limited "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022).

3.325 NZAA preferred the notional credit rating approach but would like us to give some weight to the actual credit ratings of the regulated airports:[217]

> The average movement in credit ratings for Wellington and Christchurch Airports has been downward, which suggests that any change to the benchmark rating would also be downward.
>
> We also note that, as part of 2016 IM Review, the Commission observed that Bloomberg only reported long-term credit ratings for three of the airports in the comparator sample, which suggests that the comparator sample approach is not feasible for airports.

Reasons for our draft decisions

3.326 We considered that our current S&P long-term credit ratings for energy businesses and airports remained appropriate, given that:

3.326.1 BBB+ is the most common long-term credit rating of the companies in our comparator sample for EDBs, Transpower, and GPBs; and

3.326.2 there are only three businesses in the airports comparator sample with credit ratings (ranged from A- to A+).

3.327 Therefore, we proposed to maintain the current S&P (or equivalent from other recognised agency) long-term credit ratings of:

3.327.1 BBB+ for EDBs/Transpower, and GPBs; and

3.327.2 A- for airports.

Credit rating for EDBs/Transpower and GPBs

3.328 Submissions from energy businesses such as ENA and Powerco supported our use of the notional credit rating of BBB+ for EDBs and GPBs in the CEPA consultation submissions.[218]

[217] NZ Airports Association Inc. "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022).

[218] Electricity Networks Aotearoa (ENA) - Rate of return issues -"Submission on IM Review CEPA report on cost of capital" (3 February 2023); Powerco "Submission on IM Review CEPA report on cost of capital" (3 February 2023).

Credit rating for Airports

3.329 We considered that the notional long-term credit rating should reflect a prudent long-term level of exposure to credit default risk. Specifically, we noted that the notional long-term credit rating should be, and remain, comfortably within an 'investment grade' credit rating as defined by the major credit rating agencies, and a S&P long-term credit rating of A- provides an adequate margin of safety with respect to airport services. We also noted that the average leverage of the airports' comparator sample, at 26%, was relatively low compared to other sectors, such as energy network businesses, at 41%.

3.330 We noted that two of the three regulated airports in New Zealand have credit ratings lower than the benchmark credit rating of A-. The specific circumstances of individual airports are something that can be taken into account when reviewing price setting events and alternative credit ratings can be used, where justified. We noted that we have accepted the use of a BBB+ credit rating in our 2022 price setting event review for Wellington Airport, partly as an allowance for their issuing long term debt.[219]

Stakeholder views on our draft decisions

Energy businesses

3.331 Transpower supported our draft decision that maintained the current credit rating of BBB+ for EDBs and Transpower.[220]

3.332 Vector also supported our draft decision that maintained the current credit rating of BBB+ for EDBs and GPBs, but neutral for Transpower.[221]

Aeronautical services

3.333 TDB Advisory (prepared for BARNZ) agreed with our draft decision of maintaining the A- notional credit rating for airports.[222]

3.334 Air New Zealand also supported our draft decision of maintaining a notional long-term credit rating of A- for airports.[223] They also agreed that specific circumstances of individual airports can be considered at price setting events.

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[219] Commerce Commission "Review of Wellington Airport's 2019-2024 Price setting event: Final report" (28 September 2022).

[220] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.36.

[221] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.9.

[222] TDB Advisory "Report on IM Review 2023 Draft Decisions cost of capital paper" (report prepared for BARNZ, 19 July 2023), p.4.

[223] Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.2.

Reasons for our final decisions

Credit rating for EDBs/Transpower and GPBs

3.335 As we received no substantive submissions on our proposed credit ratings for energy businesses, our final decision is to confirm our draft decision to maintain a long-term credit rating of BBB+ for energy businesses, for the reasons outlined above.

Credit rating for Airports

3.336 We note that we have updated the comparator sample for airports, however, we do not consider that this warrants a change from the credit ratings in our draft decision. There are four businesses in the airports' comparator sample with credit ratings (ranged from A- to A+). We therefore consider a long-term credit rating of A- for airports remains appropriate.

Chapter 4 Cost of equity

Purpose and structure of this chapter

Purpose of this chapter

4.1 The purpose of this chapter is to explain our final decisions on:

4.1.1 the main issues raised in relation to the cost of equity, including any changes we make as a result; and

4.1.2 our review of each of the parameters that make up the cost of equity, including any changes we make as a result.

Structure of this chapter

4.2 This chapter begins by explaining our final decision on the risk-free rate for the cost of equity.

4.3 We then explain our final decisions in respect of the equity beta, including:

4.3.1 how we estimated the equity beta for EDBs, GPBs, Transpower and airports using a similar approach to 2010 and updated data; and

4.3.2 whether we make any adjustments to the equity beta for regulatory differences or differences in exposure to systematic risks.

4.4 We then explain our final decision in respect of our review of TAMRP.

4.5 The discussion of risk-free rate and TAMRP applies to all regulated sectors. The asset beta section first discusses asset beta as it relates to airports, and then as it relates to EDBs, GPBs, and Transpower.

Risk-free rate for the cost of equity

Final Decisions

4.6 Our Final Decision on the risk-free rate for the cost of equity is to use the same risk-free rate for the cost of equity and the cost of debt. This is the same as the draft decision and the pre-review IMs. That is, to:

4.6.1 Maintain our Draft Decision to match the term of the risk-free rate for the cost of equity with the length of the regulatory period.

4.6.2 Maintain our Draft Decision to use New Zealand government bonds as a proxy for the risk-free rate.

Issues raised in submissions up to the draft decision

Term of the risk-free rate for equity

4.7 Oxera (for the 'Big Six' EDBs) submitted that we "consider a range of evidence on yields for government bonds with maturities between five and 20 years".[224]

4.8 Oxera made three points concerning the term of the risk-free rate for equity:[225]

4.8.1 Oxera interpreted a submission by Professor Schmalensee to the Australian Energy Regulator (**AER**)'s recent Rate of Return Instrument (**RORI**) process as meaning that Dr Lally's argument for recommending that the term of the risk-free rate be set equal to the regulatory period is invalid.

4.8.2 Oxera noted Ofgem uses a longer term for the risk-free rate because it more closely matches the term used by investment analysts.

4.8.3 Oxera also noted Ofgem uses a longer term for the risk-free rate because the volatility of returns on inflation-linked gilts is lower than the volatility of the returns on shorter dated bonds.

'Convenience yield'

4.9 Oxera (for the 'Big Six' EDBs) submitted that we assess "the feasibility of using both the government bonds and the highest-quality non-government bonds as inputs to its RFR estimation in order to take into account a possible convenience premium." [226]

4.10 Oxera argued that in contrast to the highest-quality non-government bonds, government bonds have special properties that create additional demand for these instruments, which pushes the government bond yield to fall below a 'true' risk free rate based on a zero beta asset.[227]

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[224] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big 6' EDBs, 3 February 2023), p. 11.

[225] In its report Oxera raises issues relating to the risk-free rate for debt and equity. Some of these issues were also discussed in chapter 3. The discussion here considers Oxera's arguments solely with respect to the risk-free rate for equity.

[226] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big 6' EDBs, 3 February 2023), p. 11.

[227] Ibid, p. 13.

4.11 Oxera cited academic support for the idea of a 'convenience yield' and the precedent of the Competition & Markets Authority (**CMA**) accepting arguments that "the government can borrow at rates significantly lower than would be accessible by even the highest-rated private investor."[228]

Reasons for our draft decision

Term of the risk-free rate for equity

4.12 We commissioned Dr Lally to comment on the points raised by Oxera. That advice was published alongside our Draft Decision.[229]

4.13 The AER advice from Professor Schmalensee did not address the substance of the advice from Dr Lally.[230] To the extent that the two experts disagree it is related to the authorship of the original idea.[231]

4.14 We considered the question of using a term for the risk-free rate that more closely matches investment valuation practises in our 2016 review of the IMs.

4.15 We reaffirmed the reasoning that we expressed at that review. Using a term for the risk-free rate for debt and equity that is matched to the length of the regulatory period ensures consistency in the way in which debt and equity are estimated and that the overall cost of capital is consistent with the regulatory period to which it is to be applied. We also noted that:

[228] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big 6' EDBs, 3 February 2023), p.12.

[229] Dr Lally "Review of submissions on the risk-free rate and the cost of debt" (report to the Commerce Commission, 17 March 2023).

[230] The issue of the term of the risk-free rate for the cost of equity was initially debated between Professor Schmalensee and Dr Lally during the AER's 2022 RORI Review. Oxera raised the same issue in its submission including the discrepancy between Professor Schmalensee and Dr Lally. Dr Lally reiterated his response to Professor Schmalensee in his report for the Commission.

[231] In the introduction to his statement to the AER, Professor Schmalensee sets out the two questions that he was asked to answer. Neither question was concerned with the substance an argument made by Dr Lally. Richard Schmalensee "Statement of Richard Schmalensee, Ph.D. To the Australian Energy Regulator" (29 July 2022), p.1.

4.15.1 Estimates of the risk-free rate used for expert valuations are used in a different context to WACC estimates, where prices are reset every five years. We have previously explained the reasons why the term of the risk-free rate should match the term of the regulatory period.[232] In the IMs merits appeals judgment, the High Court agreed with the principle that "…the term of the risk-free rate should be aligned to the regulatory term to avoid over and under compensation." [233]

4.15.2 A number of suppliers, with the power to set prices as they see fit and which set their own cost of capital when pricing their services, adopt a term of the risk-free rate that matches their pricing period. [234]

4.16 Having considered the arguments that Ofgem made for using bonds with longer time to maturity to estimate the risk-free rate, Oxera estimated the volatility of returns on New Zealand government bonds of different maturities. its results suggested that New Zealand government bonds with longer maturities are not less volatile than New Zealand government bonds with shorter maturities. The evidence Oxera presented does not support a change to our current approach.

'Convenience yield'

4.17 We disagreed with Oxera's proposal on the 'convenience yield':

4.17.1 We were not aware of any practitioners in New Zealand that use bonds other than government bonds to estimate the risk-free rate.

4.17.2 It would not always be possible to find sufficiently liquid corporate bonds with the required credit rating to use to estimate the risk-free rate.

4.17.3 Our concerns were also shared by Dr Lally, who has surveyed the academic articles cited by Oxera and concluded that they do not offer support for what Oxera is proposing.[235]

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[232] Commerce Commission "Input methodologies (electricity distribution and gas pipeline services) reasons paper" (22 December 2010), para H4.29-H4.59, and para H4.30.

[233] Wellington Airport & others v Commerce Commission [2013] NZHC 3289, para 1287.

[234] Commerce Commission "Input methodologies (electricity distribution and gas pipeline services) reasons paper" (22 December 2010), para H4.51; and Commerce Commission "Input methodologies (Airport Services) reasons paper" (22 December 2010), para E4.50.

[235] Dr Lally "Review of submissions on the risk-free rate and the cost of debt" (report to the Commerce Commission, 17 March 2023), pp. 6-11.

4.18 As a further practical point, the papers that Oxera cited disagree on how the 'true' risk-free rate should be identified. If the return on government bonds is below the true risk-free rate (because government bonds are held for reasons other than their yield) then we would need a basis for estimating the true risk-free rate in order to calculate a convenience yield. The AER acknowledged this problem, writing that: "(A)ny convenience yield is very difficult to estimate. The estimate of a convenience yield is only as accurate and robust as the proxy for the alternative and 'true' risk-free rate."

4.19 As Oxera acknowledged, the AER and Ofgem have both considered the use of bonds other than the government bonds as a proxy for the risk-free rate and have chosen to continue using only government bonds.

4.20 The AER pointed to the literature on convenience yields being far from settled, while Ofgem argued that the overwhelming weight of academic evidence favours the use of government bonds as the risk-free asset.

4.21 We agreed with Ofgem's conclusion that: "(H)aving considered the alternatives, we could not confirm a necessarily better estimation method. Relying on ILGs [government bonds] alone is simpler, more principled, and supported by greater precedent, than other methods or combinations of methods." [236]

Stakeholder views on our draft decisions

Term of the risk-free rate for equity

4.22 Oxera (for the 'Big Six' EDBs) continues to recommend using government bonds with remaining maturities longer than five years (for example, from five to 20 years) for setting the risk-free rate for the cost of equity.[237] Oxera provides three reasons:

4.22.1 Dr Lally, in his report for us, does not prove that the term has to match the length of the regulatory period to ensure NPV=0.[238]

4.22.2 It is appropriate to consider longer-term horizons for the analysis of cost of capital parameters for discounting the cash flows of a regulated utility.

4.22.3 In their RORI 2022 Final Decision the AER decided to use a 10-year term to estimate the risk-free rate for equity.

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[236] Ofgem "RIIO-2 Final Determinations – Finance Annex (REVISED)" (03 February 2021), para 3.23.

[237] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), pp. 2, 13-19.

[238] Dr Lally "Review of submissions on the risk-free rate and the cost of debt" (17 March 2023).

4.23 Vector, Wellington Electricity, Orion (cross-submission), and Unison (cross-submission) cite the Oxera report in supporting the use of longer-term bonds to estimate the risk-free rate.[239]

4.24 Oxera, for Vector (cross-submission), argues that there is no clear academic evidence supporting matching the tenor of the instruments used to estimate the risk-free rate to the length of regulatory period.[240]

4.25 Air NZ supports our draft decision and considers that "using a term longer than the regulatory period, where prices will be reset at the end of the period, would compensate suppliers for a risk they do not bear".[241]

'Convenience yield'

4.26 Oxera (for the 'Big Six' EDBs) submits that government bonds have a convenience yield premium which results in our estimated risk-free rate being lower than a 'true' risk-free rate based on a zero-beta asset.[242] Oxera recommends that we include the highest-quality non-government bonds as proxy for the risk-free rate.

4.27 Oxera provides three main reasons for disagreeing with our Draft Decision.

4.27.1 In the Draft Decision we said that "we are not aware of any practitioners in New Zealand that use bonds other than government bonds to estimate the RFR".[243] Oxera considers that methodologies adopted by practitioners are not always transparent and reliable, therefore we should not base our decision on the disclosed information from practitioners. As an example, Oxera cites Forsyth Barr's estimates of equity beta for Auckland International Airport and Vector in 2023 and considers them much higher than the Commission's estimates for airports and EDBs/GPBs.

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[239] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.22; Wellington Electricity "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.29; Orion "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 8; Unison Networks "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p.2.

[240] Oxera "Response to Commerce Commission's draft decision for IM Review 2023 on cost of capital" (report prepared for Vector, 9 August 2023), section 4.

[241] Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.2.

[242] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), p. 9.

[243] Commerce Commission "Part 4 Input Methodologies Review 2023 – Draft decision. Cost of capital topic paper" (June 2023), p. 61.

4.27.2 In the Draft Decision we said that "it will not always be possible to find sufficiently liquid corporate bonds". Oxera considers that we have not acknowledged that the pool of non-sovereign AAA bonds is large. Using its filters, Oxera identifies 104 NZD-denominated AAA bonds which it considers reflect the investors' perception of the required returns for the highest-quality non-sovereign bonds.

4.27.3 In the Draft Decision we said that "according to Dr Lally, the academic evidence presented by Oxera does not offer support for Oxera's recommendation, specifically the recommendation to use the highest-quality non-government bonds as inputs to the RFR estimation."[244] Oxera considers that Dr Lally's critiques focus only on implementation concerns and not the principle.

4.28 Vector and Wellington Electricity cite Oxera's report and agree that the theoretical case for the convenience yield remains strong and the convenience yield can be readily estimated.[245, 246]

4.29 TDB Advisory (prepared for BARNZ) supports our Draft Decision of using only government bonds to estimate the risk-free rate and agrees that there is insufficient academic and empirical evidence to support adding the convenience yield for setting a regulatory WACC.[247]

Reasons for our final decisions

Term of the risk-free rate for equity

4.30 We explained in the original 2010 IMs the reasons why the term of the risk-free rate should match the term of the regulatory period.[248] In particular, we noted that the period of focus for regulatory purposes is the regulatory period and not the life of the asset or business, and that setting the risk-free rate to a term longer or shorter than the regulatory period may provide gains or losses depending on the term structure of interest rates.

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[244] Commerce Commission "Part 4 Input Methodologies Review 2023 – Draft decision. Cost of capital topic paper" (June 2023), p. 61.

[245] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.22.

[246] Wellington Electricity "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.29.

[247] TDB Advisory "Report on IM Review 2023 Draft Decisions cost of capital paper" (report prepared for BARNZ, 19 July 2023), p.4.

[248] Commerce Commission "Input methodologies (electricity distribution and gas pipeline services) reasons paper" (22 December 2010), para H4.29-H4.59. We note that the discussion in the 2020 IMs applies to the term of the risk-free rate used in both the cost of debt and the cost of equity. Oxera's submission is related to the term of the risk-free rate for equity (Oxera refer to the debate in the AER's latest RORI review which is on the equity side).

On Lally's proof

4.31 Lally (2021)[249] [250] provides an illustrative example where the asset life is two years and the regulatory cycle is one year, and shows that the NPV=0 principle can be met if the term of the risk-free rate for equity with the length of the regulatory period.

4.32 Oxera previously claimed that Dr Lally misinterpreted another academic paper which was cited in Lally (2021).[251] Based on the comments provided by Professor Schmalensee and Dr Lally on the matter, we considered that the debate is between two academics on the authorship of the original idea and does not affect the rationale and analytics in Lally (2021).

4.33 Oxera submits a new argument that Lally (2021) has not proven that the term of the risk-free rate must match the length of the regulatory period. Oxera argues that if Dr Lally's model considered regulators who estimate allowed revenues on an annual basis within a five-year regulatory period, then Dr Lally's rationale would lead to the conclusion that the term of the risk-free rate should be one-year, which does not match the length of the regulatory period.[252]

4.34 We asked Dr Lally to respond to Oxera's argument.

4.34.1 In his counter-argument against Oxera, Dr Lally uses an example which assumes a two-year regulatory period and two-year residual asset life. To satisfy the NPV=0 principle *ex ante*, the asset's book value now must be equal to the present value of the revenue to be received in the first year plus the expectation now of the residual value of the assets in one year.

4.34.2 Dr Lally argues that Oxera presumably sets the WACC in year 1 equal to the current one-year risk-free rate, and the WACC in year 2 equal to the one-year risk-free rate prevailing at the end of the first year to solve the NPV=0 formula. But this would assume that at the beginning of year 1, the regulator would have knowledge of the one-year risk-free rate prevailing at the end of year 1 (which is one year later), and this is not realistic.[253]

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[249] Dr Lally "The appropriate term for the allowed cost of capital" (report prepared for the AER, April 2021).

[250] Oxera state that "The NZCC has concluded that this methodology is to be used based on advice by Dr Lally (Lally (2023), which in turn is based on Lally (2021))."

[251] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), pp. 11-12.

[252] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), p. 15.

[253] Dr Martin Lally "Review of further submissions" (report prepared for Commerce Commission, 23 September 2023), pp. 7-8.

4.35 We agree with Dr Lally's assessment about Oxera's assumption in its critique of Lally's (2021) model.

On “Longer-term horizons”

4.36 Oxera also argues that “it is appropriate to consider longer-term horizons for the analysis of cost of capital parameters, to discount the cash flows of a regulated utility.”[254]

4.37 Oxera presents precedents where the UK CMA uses long-term government bonds for the risk-free rate for equity for the reason that equities have long (indefinite) maturity.[255]

4.38 We noted in the 2010 IMs that the period of focus for regulatory purposes is the regulatory period and not the life of the asset or business. [256] The allowed cost of capital (and regulatory revenue allowances) will be reset at the start of each regulatory period. Therefore, the long (indefinite) maturity of equities does not matter in this regulatory context.

On the AER RORI

4.39 On Oxera’s reference to the AER, we note that the AER decided to adopt the 10-year term for a number of reasons including maintaining the stability and predictability of their regulatory framework, and after considering the modest WACC impact of the change from 10-year to 5-year term due to their approach of estimating the Market Risk Premium (MRP) based on ‘Historical Excess Returns’.[257,258] However, the AER also stated:[259]

> We maintain our view from the draft Instrument that there is a sound rationale for employing a term that matches the length of the regulatory period as was recognised and supported by our Independent Panel.

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[254] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), p. 15.

[255] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), p. 16.

[256] Commerce Commission "Input methodologies (electricity distribution and gas pipeline services) reasons paper" (22 December 2010), para H4.52.

[257] AER, *Rate of Return Instrument Explanatory Statement*, February 2023, pp. 15-16.

[258] Dr Lally calculates the impact on our WACC if the term is changed to ten years, and his results show that as at February 2023, the use of the ten-year rather than the five-year risk-free rate would raise the allowed cost of equity by only 0.04%, but over the period from August 2019, doing so would have raised the allowed cost of equity by as much as 0.23% and lowered it by as much as 0.39%, with the average being a reduction of 0.11%. Dr Lally notes that this is not an immaterial impact. See Commerce Commission "Input methodologies review 2023 Dr Martin Lally "Review of further submissions" (report prepared for Commerce Commission, 23 September 2023), p. 10.

[259] AER, *Rate of Return Instrument Explanatory Statement*, February 2023, p. 15.

4.40 Applying the AER's reasoning would strengthen our case for maintaining our draft decision to match the term of the risk-free rate with the length of the regulatory period, both because our decision is based on sound rationale, and because it maintains the regulatory stability in the New Zealand context.

4.41 We recognize that there is no academic precedent on this matter aside from advice from Dr Lally, and regulator practices also differ. As the AER noted:[260]

> After extensive consultation and consideration, our view is that the question of the term of return on equity must be settled through the exercise of regulatory judgement. We have seen cogent cases made for employing a term that matches the length of the regulatory period and a term of 10 years, consistent with our current practices. It is an issue where intelligent and reasonable people have reached different conclusions. Stakeholders, experts, regulators and review panels have reached different conclusions supported by detailed and thorough analysis.

4.42 The complications that the AER faced are also present in our current case. However, we consider that for regulatory purposes, our current approach offers the best solution as it does achieve NPV=0 and is the simplest way to achieve this. Businesses argue for a longer-term approach but have not provided details for implementation nor demonstrated that their approach would achieve NPV=0 without complicated adjustments.

4.43 The third limb of our overarching objectives is to significantly reduce compliance costs, other regulatory costs, or complexity (without detrimentally affecting the promotion of the s 52A purpose). We consider that Oxera's proposed changes would add complexity without improving promotion of the s 52A purpose.

'Convenience yield'

4.44 We do not consider that Oxera has established a sufficient case for adjusting the risk-free rate using yields on the highest quality non-government bonds. Our reasons are set out below, and detailed analysis is in Attachment C.

4.45 On the theoretical ground, we consider that the features of government bonds that Oxera point to are precisely the characteristics of the risk-free asset that satisfies the CAPM assumptions.

4.45.1 Oxera's key argument is that government bonds have some special features such as 'safety and liquidity' which creates additional demand for these bonds and consequently drive down their yields to below the 'true' risk-free rate.

[260] AER, "Rate of Return Instrument Explanatory Statement", February 2023, p. 107.

4.45.2 The 'safety and liquidity' features of government bonds are compatible with the risk-free asset in the CAPM, whereas corporate bonds (Oxera's preferred proxy) lack these features and hence are less suitable as the proxy for the risk-free asset.

4.45.3 Oxera cited academic papers to support the existence of the convenience yield. However, these academic papers all use different proxies which indicates a lack of consensus on the 'correct' proxy for the risk-free rate. Indeed, yields of government bonds/bills are still the mainstream proxy for the risk-free rate in standard finance texts.

4.46 The empirical evidence on the 'convenience yield' is mixed.

4.46.1 Oxera essentially defines the convenience yield as the difference between the yields on government bonds and AAA corporate bonds due to a demand-supply condition (the excess demand for government bonds). But demand-supply conditions vary over time and hence the size of the convenience yield also varies over time.

4.46.2 In particular, some research indicates that the convenience yield has switched in recent times to being an 'inconvenience yield', possibly due to the over-supply of government bonds.[261]

4.47 There are practical difficulties of implementing Oxera's proposal.

4.47.1 The contentious choice of the 'correct' proxy for the 'true' risk-free rate, in conjunction with the time varying nature of the convenience yield makes it difficult to obtain an accurate and robust estimate of the convenience yield for regulatory purposes.

4.47.2 Furthermore, Dr Lally notes serious data issues with implementing Oxera's proposal of using AAA corporate yields as a proxy for the risk-free rate, ie AAA bond yields are not available over the entire period for which the TAMRP has been estimated.[262] He also notes similar problems with other alternative proxies advocated in the academic papers cited by Oxera.

[261] AER "Term of the rate of return & Rate of return and cashflows in a low interest rate environment. Final working paper" (September 2021), pp. 174-178, and academic papers referenced by the AER.

[262] We note that of the 104 bonds quoted by Oxera, only 18 bonds are based in New Zealand and none are corporate bonds.

4.48 Regulatory precedents cited by Oxera do not provide a strong case to support the adjustment for the convenience yield. We note that the reasoning of these regulators to include a convenience yield is the same reasoning used by Oxera, which we do not agree with on the appropriate proxy.

The Equity beta

Equity beta

4.49 This section discusses our approach to reviewing our equity beta estimates for EDBs, Transpower, GPBs, and airports. Based on the analysis we have undertaken, our final decision is to apply the following equity betas:

4.50 0.61 for EDBs and Transpower, which compares to 0.60 in the current IMs;

4.51 0.69 for GPBs, which compares to 0.69 in the previous IMs; and

4.52 0.87 for airports, which compares to 0.74 in the previous IMs.

Background

4.53 The IMs specify the equity betas, which are based on values of leverage also specified in the IMs and asset betas, both of which are estimated as part of the IM Review. Leverage is calculated using the same sample of comparators as for asset beta.

4.54 In the 2016 IM Review we applied a six-step process to estimate the equity beta. We followed the same process when estimating the equity betas for the Fibre IMs in 2020. As this process has not been disputed in submissions, and we have not identified any reason to change, we have continued with the same process in this review. The steps are:

4.54.1 Step 1: Identify a sample of relevant comparator firms;

4.54.2 Step 2: Estimate the equity beta for each firm in the sample;

4.54.3 Step 3: De-lever each equity beta estimate to get an estimated asset beta for each firm in the sample;

4.54.4 Step 4: Calculate an average asset beta for the sample;

4.54.5 Step 5: Apply any adjustments for regulatory differences or differences in systematic risk across services to the average asset beta for the sample; and

4.54.6 Step 6: Re-lever the average asset beta for the sample to an equity beta estimate using the Commission's assumed notional leverage.

4.55 We have drawn on information obtained from:

4.55.1 Submissions in response to our Process and issues paper;

4.55.2 Our consultant, CEPA, which was asked to apply our 2016 method, including the six steps above, to calculate the asset betas using updated information (but not to provide advice on what the asset beta should be);

4.55.3 Comment on Auckland Airport's submission by Ben Marshall of Bela Enterprises', which included advice on how we could consider the implications of COVID-19 for estimating the asset beta for airports;[263]

4.55.4 Submissions in response to our publication of CEPA's report, as well as our publication of a cover letter which asked for feedback on a range of issues;

4.55.5 Submissions in response to our draft decision;

4.55.6 Submissions in response to our publication of CEG's cross-submission, which introduced material that stakeholders had not had the opportunity to comment on;

4.55.7 Other regulatory decisions published since the 2016 review, including:

4.55.7.1 Our 2020 Fibre IMs;[264]

4.55.7.2 The 2022 United Kingdom (**UK**) airport regulator review of the asset beta for Heathrow airport;[265]

4.55.7.3 The 2023 AER RORI review for energy businesses;[266]

4.55.7.4 The 2022 Economic Regulation Authority (**ERA**) RORI review for gas pipeline businesses;[267] and

4.55.8 Our own further analysis.

[263] Ben Marshall, Nhut H. Nguyen, and Nuttawat Visaltanachoti "Comment on the Auckland Airport Input Methodologies Submission" (31 January 2023).

[264] See Commerce Commission "Setting the 2020/21 fibre input methodologies" website.

[265] UK Civil Aviation Authority "Economic regulation of Heathrow Airport Limited: H7 Final Decision - Section 3: Financial issues and implementation" (March 2023)

[266] Australian Energy Regulator "Rate of Return Instrument 2022" website.

[267] Economic Regulation Authority "2022 Gas Rate of Return Instrument" (16 December 2022).

4.56 For the remainder of this section, we have focussed on steps 1, 4 and 5 as these are the steps where there is either contention in submissions, or where our analysis has indicated we need to make changes from the last review. We have used the CEPA findings as the starting point for our analysis.

4.57 The first part of this section covers airports and the second part covers energy networks.

Part 1. Airports

Draft decisions

4.58 Our draft decision was to provide an equity beta of 0.74 for airports, based on an asset beta of 0.55 and leverage of 26%.

Draft reasons

Current betas

4.59 The asset beta underlying the 2016 IMs for airports was 0.60, which included a downward adjustment of 0.05 from the average of the comparator sample.

4.60 The equity beta set in the 2016 IMs for airports was 0.74, based on a notional leverage of 19%.

New evidence for step 1: identifying a sample of comparator firms

4.61 In 2016 we used a sample of 26 firms from stock markets in Australia, Austria, China (including Hong Kong), Denmark, France, Germany, India, Italy, Japan, Malaysia, Malta, Mexico, New Zealand, Serbia, Spain, Switzerland, Thailand and Turkey.

4.62 We were advised of a potential problem with our existing method in the submission by TDB Advisory for the BARNZ in response to our Process and issues paper:

> While we agree that overseas operators need to be included in the sample of comparable firms, the Commission's selection raises questions about the trade-offs between using a larger sample that may include firms that differ markedly from domestic operators, and a smaller sample of more similar firms. The larger sample should enable some smoothing across the more and less comparable operators, but if there is a disproportionate number of the latter – as we would argue is the case – then this smoothing loses some of its validity.
>
> On balance, we would prefer that a smaller sample of more comparable firms be used. We suggest that, in the Commission's current sample, the smaller operators that have primary responsibility for just one airport are likely to be more similar to their NZ counterparts than the very large, and often regional or even national, operators that are also included in the sample.[268]

4.63 The materiality of any change to the comparator sample depends on the combined effect it has on the asset beta, leverage and equity beta.

4.63.1 The comparator sample used by CEPA results in an asset beta of 0.74, notional leverage of 15% and an equity beta of 0.88.[269]

4.63.2 The comparator sample we used for the draft decision resulted in an asset beta of 0.55, notional leverage of 26% and an equity beta of 0.74.

4.63.3 The WACC was materially lower under our draft decisions, compared to CEPA's results, because the effect of the lower equity beta more than offsets the effect of the higher leverage (the simplified Brennan-Lally Capital Asset Pricing Model (**SBL-CAPM**) causes the WACC to increase when leverage is increased).

4.64 When we released the CEPA report we sought submissions on whether we should exclude some airport companies because the markets in which they operate are substantively different to the New Zealand market.

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[268] TDB Advisory "Process and Issues and draft Framework papers" (report prepared for Board of Airline Representatives New Zealand Inc., 11 July 2022), p. 7.

[269] As CEPA was asked to apply the same method we applied in 2016, these are the averages of the last two five-year periods.

4.65 In response, CEG for NZAA indicated it prefers a large sample:

> the sample should be as large and diversified as possible, and if we do decide to shrink the sample then Auckland Airport should be given primary weight.
>
> we should not change the method just because the results point to a higher beta, because to do so would create an unpredictable regulatory environment and affect investor confidence.[270]
>
> And
>
> Focussing on one, or a limited, geography will increase the variance of the estimates because there will be a lack of diversity in the shocks being captured. These considerations point to the value of the NZCC sample having a diversified set of airports from many countries in order to maximise the effective diversity of economic shocks being analysed. Including airports from a large number of jurisdictions reduces the likelihood that our asset beta estimate is unduly influenced by specific shocks that were peculiar to a narrow set of economies during the estimation period.[271]

4.66 Qantas submitted that the sample should include firms that are comparable:

> Qantas believes that airport securities used in the comparator sample should be selected on a stringent principle-based approach, covering the following factors:
>
> 1. Business Environment: Comparator airports should operate in a similar economic operating environment to that of a New Zealand airport. For example, Australian (e.g., ERA, IPART, QCA) and overseas regulators (CARR, CAR) apply either an explicit country filter approach or exclude based on market classification system ie, exclude frontier and standalone markets.
>
> 2. Relative Risk: Comparator airports should display similar underlying business risk, including similar revenue stream drivers (aeronautical revenue supports a large share of total revenue), involvement of regulators and demand risk.
>
> 3. Robustness: Comparator airports need to have a reliable empirical beta estimate, whereby distortions driven by illiquidity and limited market index diversification should be considered in the filtering process. For example, as Auckland Airport contributes 6% to the local index, its beta estimate is overrepresented in systematic risk, introducing an upward bias.[272]

4.67 When Qantas applied these criteria the remaining firms in its sample are from share markets in Australia, Austria, France, Germany, Italy, Spain, China (Beijing Capital International Airport, trading in Hong Kong) and Switzerland. They excluded firms from China, Denmark, India, Japan, Malaysia, Malta, Mexico, Serbia, Thailand and Turkey.

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[270] CEG "NZ Commission comments on asset beta estimates for airports" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for NZ Airports Association, 3 February 2023), p. 6.

[271] Ibid, para 155.

[272] Qantas "Submission on IM Review CEPA report on cost of capital" (17 February 2023), p. 1.

4.68 Evidence from other regulators indicates a preference to have a sample of relatively close comparators:

4.68.1 the UK Civil Aviation Authority (**CAA**) uses a detailed analysis of markets to exclude companies; under their method Auckland Airport and Sydney Airport are excluded because the economies are not considered comparable to the UK. The only countries included for its decision on Heathrow Airport were from three countries: France, Germany and Spain.[273]

4.68.2 the AER excludes international energy companies from its sample even though it has only one firm in its sample that is currently trading on the Australian Stock Exchange (although it has decided to continue to use recently delisted firms as well). The AER states:

> international firms likely have different characteristics and operating and market environments to the regulated 'pure play' Australian energy network businesses and, as a result, may not be directly comparable to those we regulate.[274]

4.68.3 the ERA includes international energy companies in their comparator sample but only from Canada, New Zealand, United Kingdom and United States. The ERA states:

> With regard to regulatory characteristics, the ERA looks to countries where energy networks operate under similar regulatory, legal and other institutional arrangements to those in Australia.
>
> With regard to market factors, the ERA looks to countries with capital markets that are sufficiently deep, liquid, large and informationally efficient.
>
> On this basis the ERA considers that Commonwealth countries such as the United Kingdom, Canada and New Zealand are close matches to Australia. The ERA considers that the United States is also comparable.[275]

4.69 For the Fibre IMs, we used firms from Czech Republic, Japan, New Zealand, Poland, Singapore, South Korea, UK, the United States (**US**), and Western Europe. We decided to exclude companies from Turkey because of their high market risk premium compared to New Zealand.[276]

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[273] UK Civil Aviation Authority "Economic regulation of Heathrow Airport Limited: H7 Final Decision - Section 3: Financial issues and implementation" (March 2023), p. 3.

[274] AER "Rate of Return Instrument Explanatory Statement" (February 2023), p.19.

[275] Ibid.

[276] Commerce Commission "Fibre input methodologies: Main final decisions - reasons paper" (13 October 2020), p. 424.

4.70 For our energy comparator sample in the 2016 IM Review, we used firms from New Zealand, United States and United Kingdom.

4.71 We concluded from this survey of regulators that it is common practice among regulators to ensure companies in the sample are trading in markets that are comparable to the host country, that is have similar systematic risk. CEG's view that we should include a sample as large and diversified as possible is not standard practice and we do not support that approach.

4.72 As noted above, Qantas proposed we consider business environment (similar economic operating environment), relative risk (similar revenue stream drivers, involvement of regulators and demand risk) and robustness (reliable asset beta estimates) as criteria when selecting the comparator sample.

4.73 For the draft decision, we broadly agreed with Qantas' proposal and have used the following method to remove firms from the sample that we did not consider were comparable to a major airport trading in New Zealand.

4.73.1 Remove firms that operate in markets that are substantively different to New Zealand. We have used the Financial Times Stock Exchange (**FTSE**) Equity Country Classification and market risk premium as indicators.

4.73.1.1 CEG submitted that we should not consider the market risk premium of a country because equity beta estimates are standardised (the average risk firm in a market has an equity beta of 1).[277] However, we consider the market risk premium is useful as an indicator of countries that may have a materially different risk profile, and therefore trading environment, to New Zealand. There is a strong correlation between the classification of countries in the FTSE Equity Country Classification and market risk premium (**MRP**).

4.73.2 Remove firms that have unusually variable asset beta estimates. We have used bid-ask spreads, percentage of shares traded (free float %), and variability in asset beta across estimation method (daily, weekly and four-weekly) as indicators.

4.73.3 Remove firms that have unusual business financing structures that create anomalies when converting the observed equity betas to asset betas. We have used leverage as an indicator where an issue is highlighted if leverage is negative.

[277] Big Six' EDBs – Cover letter – "Submission on IM Review CEPA report on cost of capital" – (3 February 2023) section 4.3.

4.73.4 Remove firms that have business characteristics that are not comparable to a major airport operating in New Zealand. Our standard practice, which CEPA has applied, is to exclude firms that have delisted, are not involved in regulated airport operations, have a low percentage of aeronautical revenues, or had a low percentage of days traded.[278]

4.74 For the draft decision, we did not use a mechanistic method (precise thresholds) when applying these indicators, but rather applied judgement based on the information across the indicators when considering whether to exclude a firm from our comparator sample. We provided a table in Appendix A of the draft decision to show how we applied our judgment for each firm. We were balancing the risk of having a small sample with the risk of including firms that are poor comparators, while acknowledging that there is inherent error in measuring correlations across erratic share-market data.

4.75 Our draft decision was to include eight comparator firms: Aeroports de Paris (France), AENA (Spain), Beijing Capital International Airport (China), Flughafen Wien (Austria), Flughafen Zurich (Switzerland), Fraport (Germany), Sydney Airport (Australia) as well as Auckland Airport.

4.76 Compared to the sample proposed by Qantas, our sample in the draft decision was the same but excluded the firm from Italy (major airport is Bologna) because of its unreliable asset beta estimates. Qantas also had concerns about including this firm in the post-Covid sample because of its wide trading margin.

4.77 We agreed with Qantas that Sydney airport should be included because it was only delisted in March 2022 and it is from a market that has proximity and comparability to the New Zealand market.

4.78 When calculated using our existing method in step 4, the unadjusted asset beta was 0.63. In comparison, the CEPA update of our existing method resulted in an asset beta of 0.79 (before the negative adjustment of 0.05) and the Qantas proposal resulted in an asset beta of 0.63.

[278] At the 2016 IM review, we included two firms from Japan that were not airport owners but provided services to airports and we indicated we would review their inclusion at this review. CEPA has excluded these firms from the comparator sample on the basis that they were either not involved in regulated airport activities or had a low percentage of aeronautical revenue.

New evidence for step 4: calculating the average asset beta for our comparator sample

4.79 Our current method for step 4 involves placing the most weight on the combined average of the asset beta for the last two five-year periods.

4.80 COVID-19, however, caused us to question whether the current method is appropriate for estimating the asset beta for airports. Airports were impacted substantially by COVID-19 and the associated restrictions on passenger travel, including lockdowns. Auckland Airport was affected to the extent that it raised additional equity to support its balance sheet and extended maturity dates on bank loans.[279]

4.81 We sought advice from Bela Enterprises on how we should consider the asset beta in the context of COVID-19.[280] Their advice was that we need to make the best estimate of asset beta for the next regulatory period, which involves identifying the extent that COVID-19 had a systematic effect on the asset beta, and also the likelihood that a similar event could happen in the near future.

4.82 There was evidence the asset beta for airports increased in the 2020-2022 period. Using our proposed sample, the asset beta varied from 0.48 for 2012-2017, to 0.57 for 2018-2020, to 0.81 for 2020-2022 (the 2020 date is 28 February to coincide with COVID-19).

4.83 The use of the revised sample was important for the purpose of analysing the effects of COVID-19 because it removed unnecessary noise in the comparator sample.

4.84 A clearer picture emerged when we split the data from the revised sample into separate periods:

4.84.1 The average weekly and four-weekly asset beta for the pre-COVID-19 periods of 2007-2012, 2012-2017 and 2018-Feb 2020 combined was 0.53;[281]

4.84.2 The average weekly asset beta for the first 10 weeks of COVID-19 (which we have represented by the New Zealand lockdown period of 28 Feb 2020 to 13 May 2020) was 0.93;[282]

[279] Auckland Airport "Respond Recover Accelerate Annual Report 2020" (2020), p. 9.

[280] Ben Marshall, Nhut H. Nguyen, and Nuttawat Visaltanachoti "Comment on the Auckland Airport Input Methodologies Submission" (31 January 2023).

[281] The average weekly asset beta over this period was 0.53.

[282] The daily asset beta for this period was 0.73.

4.84.3 The average weekly asset beta for 14 May 2020 to 30 September 2022 was 0.70; [283] and

4.84.4 The average weekly asset beta for 1 October 2021 to 30 September 2022 was 0.56.[284]

4.85 This data indicated that the more intense period of COVID-19 uncertainty may have added approximately 0.4 to the previous long term airport asset beta of 0.53.

4.86 For the draft decision, we considered there were different ways of interpreting the data. As the asset beta for 1 October 2021 to 30 September 2022 (0.56) was similar to the pre-COVID-19 beta (0.57 for the two years prior or 0.53 for the 13 years prior), it was possible COVID-19 was not a systematic event and that the market had treated the COVID-19 period as having an anomalous effect on airports that was subsequently discounted. The weakness of this interpretation was that it relied on evidence from a short timeframe (12 months) and less confidence could be placed on asset betas calculated over short periods.

4.87 An alternative interpretation was that COVID-19 was, at least in part, a systematic event and the pandemic provided new information about the relative risk of investing in airports that can be affected by government responses and consumer behaviour associated with a pandemic. This was the interpretation the UK CAA came to and was the reason they made an upward adjustment to the pre-COVID-19 asset beta in their recent consideration of the asset beta for Heathrow airport.

4.88 The adjustment to the pre-COVID-19 asset beta by the UK CAA was based on a calculation of the effect pandemics could be expected to have on the asset beta if they occurred once in a set number of years (the UK CAA's consultant Flint Global assumed a range of 20 – 50 years and a duration of 17 – 30 months).[285]

4.89 Our draft decision estimate of a pre-COVID-19 asset beta of 0.53 was similar to the CAA's pre-COVID-19 asset beta of 0.5.[286]

4.90 The UK CAA analysis, conducted by their consultant Flint Global, based on regression analysis, suggested the amount added to the pre-COVID-19 beta was in the range of 0.04 to 0.14.[287]

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[283] The daily asset beta was 0.62.

[284] The daily asset beta was 0.50.

[285] Flint "Support to the Civil Aviation Authority: Estimating Heathrow's beta post-Covid-19" (August 2021), p. 17.

[286] Ibid, p. 3.

[287] Ibid, p.3.

4.91 TDB Advisory for BARNZ replicated the Flint analysis using the Auckland Airport data, and it calculated a pandemic adjustment range of 0 to 0.08:

> Overall we find that an event similar in nature and impact to COVID-19, occurring between once every 20 and once every 50 years, would increase the beta estimate for AIAL by between zero and 8 basis points, compared to recent pre-COVID observed values.[288]

4.92 The Flint and TDB Advisory method involved assigning weights to the pre-COVID-19 and COVID-19 betas to simulate the effects of a pandemic occurring at different intervals and with different intensity. We checked the intuition behind the TDB Advisory analysis by undertaking a simplified calculation, using the pre-COVID-19 asset beta for Auckland Airport and the asset beta during the 10-week lockdown period from the end of February 2020 to mid-May 2020:

4.92.1 Our estimate of the weekly asset beta for Auckland Airport for the period between 1 October 2007 and 28 February 2020 is 0.82, which is similar to the TDB Advisory estimate of 0.83;[289]

4.92.2 The weekly asset beta for Auckland Airport for the 10-week lockdown period was 1.24 and for the period May 2020 to September 2022 was 0.95. This indicates COVID-19 added between 0.12 and 0.41 to the asset beta;

4.92.3 To calculate an upper bound adjustment, we assumed a COVID-19-like event occurs once every 20 years, and lasts 18 months, which is the equivalent of 7.5% of the time. For any regulatory period, the asset beta was calculated as the pre-Covid-19 beta with a weight of 92.5% and the COVID-19 beta with a weight of 7.5%. For a pre-COVID-19 beta of 0.82, and a COVID-19 beta of 1.24, the asset beta would be 0.85. This is the same result obtained by TDB Advisory using weekly asset betas;[290]

4.92.4 To calculate a lower bound adjustment, we assumed a COVID-19-like event occurs every 50 years, and lasts for three months, which is the equivalent of 0.5% of the time. For a pre-COVID-19 beta of 0.82 and a COVID-19 beta of 1.24, the asset beta would be only slightly higher than 0.82; and

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[288] TDB Advisory "Auckland International Airport asset beta Covid-19 adjustment using Flint study" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for Board of Airline Representatives NZ (BARNZ), 3 February 2023), p. 8.

[289] Our pre-COVID-19 estimate is a weighted weekly average of the 2 years to 28 February 2020, which was 0.78; the five-year period 2012-17, which was 0.97; and the five-year period 2007-12, which was 0.69. TDB Advisory used the period August 2017 to February 2020 and July 2021 to August 2022.

[290] See table 2 TDB Advisory "Auckland international airport asset beta Covid-19 adjustment using flint study" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for Board of Airline Representatives NZ (BARNZ), 3 February 2023), p. 7.

4.92.5 Note that we considered this analysis as indicative as it uses asset betas calculated over short periods, which are not as reliable as asset betas calculated over longer periods.

4.93 We noted that TDB Advisory's calculation of the upper bound of 0.08 is based on monthly data and appears to be an outlier compared to the daily and weekly results that TDB Advisory reported for the upper bound. The range excluding the monthly data for the upper bound scenario was 0.01 - 0.04.

4.94 We also applied our check using our comparator sample rather than Auckland Airport. For a pre-COVID-19 asset beta of 0.53, with a weight of 92.5% and a COVID-19 asset beta of 0.93 with a weight of 7.5%, the weighted average is 0.56. This increase of 0.03 was considered an upper value. However, again we noted that this analysis was indicative only as it was based on asset betas calculated over short periods.

4.95 An alternative approach has been proposed by CEG for NZAA. CEG submits that COVID-19 has provided reasons to estimate asset betas at the start of a regulatory period (or on a periodic basis for firms not subject to price-quality regulation) rather than set asset betas in the IMs with the IMs instead specifying that the estimation period should be 10 years (or multiples of the regulatory period).[291] CEG submitted:

> There is no bias in the proposed methodology because the methodology will, on average and over time, accurately reflect and compensate for the scale and frequency of all shocks.[292]

4.96 For the draft decision, we considered the options for setting the asset beta were:

4.96.1 Option 1: Use the long-term pre-COVID-19 average of 0.53. This assumed the post-pandemic data was unreliable and that the pandemic was not a systematic event;

4.96.2 Option 2: Exclude the asset beta data for the period from February 2020 to September 2021 and apply an asset beta within the range of 0.53 to 0.56. This assumed the pandemic was not a systematic event but placed some weight on the post-pandemic data;

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[291] TDB Advisory "Auckland international airport asset beta Covid-19 adjustment using flint study" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for Board of Airline Representatives NZ (BARNZ), 3 February 2023), section 3.2.

[292] CEG "NZ Commission comments on asset beta estimates for airports" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for NZ Airports Association, 3 February 2023), para 63.

4.96.3 Option 3: Use the long-term pre-COVID-19 average of 0.53 and add a premium of 0 to 0.04, which gave a range of 0.53 to 0.57; we considered we could apply the midpoint of 0.55. This assumed the pandemic was a systematic event. The result was similar to the asset beta calculated for the 12 months to September 2022 (0.56) which was consistent with the market assigning a small premium to the airports asset beta;

4.96.4 Option 4: Use 0.63, which is the result from continuing to use the average of the last two five-years. This method gave the higher asset beta during the pandemic a weighting of about 15% because the asset beta was elevated for a period of about 18 months. This also assumed the pandemic was a systematic event; and

4.96.5 Option 5: Change the approach so that the asset beta was determined immediately prior to a regulatory period, using a 10-year period, as proposed by CEG for NZAA. This rolling-average approach assumed firms would be adequately compensated over time, without the need for any adjustment, for pandemics or other events that affected the asset beta.

4.97 Our view for the draft decision was that it is likely that COVID-19 provided new information that had not been included in the market's assessment of the airport asset beta, that the spike in the asset beta during the early stages of COVID-19 would be repeated in future pandemics, and that investors have repriced and reweighted airports in their efficient portfolio of investments. Therefore, we placed less weight on option 1. We considered the most appropriate way of setting the asset beta in the circumstances was to apply a premium to the pre-COVID-19 long term average asset beta. This premium was uncertain; however, we considered it likely falls within the range of 0 to 0.04.

4.98 We did not consider it appropriate to use option 4 because in our view this would place too much likelihood of a COVID-19-type event occurring during the term of the IMs.

4.99 We did not support the CEG proposal for the equity beta to be removed from the IMs and determined at the time of price reviews (option 5). We considered that specifying the equity beta in the IMs provides certainty for suppliers and that, on balance, this should be given more weight than determining an estimate of the equity beta that on average compensates suppliers for systematic risk over a long period of time.

4.100 In the circumstances, we considered the asset beta was a matter of judgement, and for the draft decision we proposed an asset beta of 0.55. This value was within the narrow range of estimates of 0.53 to 0.56 calculated using options 2 and 3. We could not be certain about the extent that we should add a premium to the pre-COVID-19 average and there was a possibility that COVID-19 was a non-systematic event. The value of 0.55 used in the draft decision was consistent with adding a premium of 0.02 to the asset beta to account for COVID-19-type events occurring in the future. Given estimation error, it was also not inconsistent with the asset beta calculated over the 12 months to 30 September 2022 of 0.56 and our estimate of the pre-COVID-19 asset beta of 0.53.

4.101 We provided a table showing the asset beta calculations for the proposed comparator sample for various periods and estimation frequencies in Appendix B of the draft decision.

New evidence for step 5: applying any adjustments

4.102 In 2016 we reduced the asset beta from the sample by 0.05 (from 0.65 to 0.6). We considered 0.65 to be the upper bound because it included firms with non-aeronautical services.

4.103 We were concerned that using a beta of 0.65 would overstate the beta for Auckland Airport's specified airport services (which are generally aeronautical services) because it was overly affected by non-aeronautical services, such as retail leasing.

4.104 Our previous decision was based on information that Auckland Airport, Deutsche Bank and PwC had either stated or used a higher asset beta for non-aeronautical services, and that the UK CAA at the time applied a lower asset beta for Heathrow and Gatwick than the 0.65 we calculated from the sample.

4.105 In response to our Process and issues Paper, Auckland Airport and its consultant LJK Consulting submitted there was no evidence that aeronautical services were lower risk. Their regression analysis indicated airports with higher non-aeronautical shares of revenue had lower asset betas. They also analysed revenue by segment at Auckland Airport and did not find non-aeronautical revenue was higher risk.

4.106 Auckland Airport's consultant LJK Consulting provided information on the proportion of non-aeronautical revenue for the following companies in the revised sample (for financial year 2019). When we compared the LJK Consulting data to the pre-COVID-19 betas from step 1, the correlation coefficient between non-aeronautical share and asset beta was 0.08, which indicates no correlation.

4.107 The submission by CEG for NZAA included analysis of aeronautical and non-aeronautical revenues from 2018 to 2021, which concluded that the relationship between asset beta and non-aeronautical revenues was negative. CEG concluded that the 0.05 downward adjustment for airports was not justified on conceptual grounds, and the evidence supported an upwards adjustment.[293]

4.108 Our analysis supported the findings by LJK Consulting and CEG of no statistical evidence of a positive relationship between asset beta and proportion of revenue that was non-aeronautical (based on the LJK data).

4.109 We received advice from Bela Enterprises on how we could undertake a more comprehensive analysis of whether the adjustment is required.[294] We decided not to undertake this analysis, as we were sufficiently persuaded that an adjustment was not necessary. However, we welcomed submissions on this matter.

4.110 Our draft decision was that a downward adjustment to the asset beta was not justified.

New evidence for step 6: calculating the equity beta

4.111 The IMs specify the equity betas, not the asset betas. The equity betas are calculated in step 6, by using the average leverage of our comparator sample.

4.112 For airports, our draft decision was to set leverage at 26%, compared to 19% in 2016. Leverage was higher largely because we excluded firms from China with very low or negative leverage. If we had continued to use the same method for selecting the comparator sample as in 2016 the leverage would have been 15% (as calculated by CEPA).

4.113 With an asset beta of 0.55 and leverage of 26%, the equity beta for the draft decision was 0.74 (compared to 0.74 in 2016 and compared to CEPA's calculation of 0.88).

Stakeholder views on the draft decision and on the further consultation on specific matters relating to the cost of capital

4.114 We received submissions on the draft decision and then on a further round of consultation we undertook on specific matters relating to the beta that were raised in a cross-submission that other parties had not had the opportunity to comment on.

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[293] CEG "NZ Commission comments on asset beta estimates for airports" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for NZ Airports Association, 3 February 2023), section 2.

[294] Commerce Commission "Input methodologies review 2023 - Bela Enterprises "Report on Auckland International Airport Ltd Asset beta submission" (report prepared for the Commerce Commission, 31 January 2023)

4.115 In general, our method of choosing firms and applying judgment as presented in the draft decision was supported by the airlines and their consultants and not supported by the airports and their consultants.

4.116 We have grouped the points made in submissions in relation to the relevant step in the equity beta calculation process. The submissions were focussed on step 1, which is the step that selects the comparator sample, step 4, which is the step that calculates the average asset beta for the comparator sample, and step 5, which is the step that applies any adjustments to the average asset beta for the comparator sample.

4.117 In relation to step 1, which is the step that selects the comparator sample, we received submissions relating to:[295]

4.117.1 Our use of liquidity indicators in selecting the comparator sample (CEG for NZ Airports Association, Houston Kemp for Wellington Airport).

4.117.2 Whether we should account for statistical analysis showing a negative relationship between number of routes to and from an airport and the asset beta of the airport (CEG for NZ Airports Association, TDB Advisory for BARNZ, Qantas).

4.117.3 Our use of negative leverage in selecting the comparator sample (CEG for NZ Airports Association, Incenta for Christchurch Airport).

4.117.4 Our use of market comparability indicators in selecting the comparator sample (Castalia for Air New Zealand, CEG for NZ Airports Association, Incenta for Christchurch Airport, TDB Advisory for BARNZ).

4.117.5 Our use of indicators of reliability of beta estimates when selecting the comparator sample (Castalia for Air New Zealand, CEG for NZ Airports Association).

[295] In the following list of submissions, where we refer to a consultant report we note that we also generally received a separate submission from the firm or organisation that engaged the consultant.

4.117.6 Whether, after taking into account the matters above, our comparator sample is suitable for determining the benchmark equity beta for airports (Airlines for Australia & New Zealand, CEG for NZ Airports Association, Chatham Islands Airport Limited, Christchurch Airport, Hamilton Airport and Hamilton District Councils, Houston Kemp for Wellington Airport, International Air Travel Association, Marlborough Airport, Marlborough District Council, Morrison & Co, Nelson City Council, New Plymouth District Council, NZ Airports Association, Rotorua Airport, Tasman District Council, TDB Advisory for BARNZ, Qantas, Queenstown Airport, Whakatane District Council).

4.118 In relation to step 4, which is the step that calculates the average asset beta for the comparator sample, we received submissions about how we accounted for the Covid-19 period in the draft decision (Castalia for Air New Zealand, CEG for NZ Airports Association, HoustonKemp for Wellington Airport, International Air Travel Association, TDB Advisory for BARNZ).

4.119 In relation to step 5, which is the step that applies any adjustments to the average asset beta for the comparator sample, the submissions were mainly about our draft decision to not make a downward adjustment (CEG for NZ Airports Association, International Air Travel Association, TDB Advisory for BARNZ, Qantas).

Analysis and final decision

4.120 In this section, we respond to the substantive issues raised in submissions on the draft decision and on the further consultation on specific matters relating to the cost of capital. We have responded to the points made in submissions in relation to the relevant step in the equity beta calculation process, as grouped in the preceding section.

Regarding step 1, have we biased our comparator sample by excluding airports with fewer routes?

4.121 CEG for NZ Airports Association provided statistical analysis showing a negative relationship between the number of routes to and from an airport and the asset beta of the airport.[296] CEG considers that, given NZ Airports have very few routes compared to the airports in the comparator sample, the method of selecting a comparator sample is inappropriate for the purpose of setting the asset beta for airports in NZ.

4.122 This issue was included in our further consultation as the information was provided for the first time as part of a cross-submission.

[296] CEG "Review of submissions on asset beta estimates for airports" (report prepared for NZ Airports Association, 9 August 2023) , section 6.

4.123 The theoretical underpinning of CEG's finding is unclear, as it is likely that the number of routes an airport has is not a systematic risk - it is not a risk that affects the whole market as an investor can address this risk through portfolio diversification. In this regard, we note Qantas' submission:

> The number of routes flown at an airport is driven by a long list of non-systematic factors, including but not limited to the availability of airport business development programmes, airline pricing and economic conditions in specific regions. These are clearly non-systematic factors, and it is incorrect to asset otherwise.[297]

4.124 A similar concern was submitted by TDB Advisory for BARNZ:

> We think that the specific airport characteristics that CEG would like the Commission to use in its asset beta estimates fall much more clearly in the category of unsystematic or idiosyncratic risks than the category of systematic risks. Well-diversified investors can largely remove these idiosyncratic risks by holding assets that are not influenced by such things as route numbers, passenger volatility etc.[298]

4.125 Qantas has concerns with the CEG analysis, including that CEG's route data is based on the firm's largest airport rather than the average number of routes across all airports, and that Qantas considers a better predictor would be the number of passengers per route. Qantas submitted that there is a low correlation between the number of passengers per route and the asset beta (an R squared of 0.02).[299] Qantas further submitted that:

> We note that higher volume routes can be more resilient to economic shocks than small or thin routes and are therefore lower risk.[300]

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[297] Qantas "Cross-submission on specific matters for the IM Review 2023 Cost of capital" (7 September 2023), p. 6.

[298] TDB Advisory "Cross-submission on specific matters for the IM Review 2023 Cost of capital" (report prepared for BARNZ, 7 September 2023), p. 6.

[299] Qantas "Cross-submission on specific matters for the IM Review 2023 Cost of capital" (7 September 2023), p. 7.

[300] Ibid, p. 7.

4.126 We have also reviewed the CEG analysis. Table 4.1 shows the level of significance of the regression of asset beta on the number of routes. There were 16 observations, which is a relatively small number of observations from which to draw statistically robust conclusions. Notwithstanding the small sample, the relationship is not as clear when different periods are considered. The relationship appears to have been influenced by the pandemic, although there appears to have been a stronger relationship emerging for the three years prior to the pandemic. Prior to 2017, there does not appear to be a significant relationship. We also note that when a market comparability indicator is added to the regression, the results are still significant.[301] The relatively low R-squared values indicate a potential problem from not accounting for other variables that influence asset beta apart from the number of routes.

Table 4.1 Regression results for the relationship between asset beta and number of routes[302]

Sample	p-value of number of routes	Indicator of statistical significance of regression (adjusted R-squared)
CEG preference of the last two five-year periods (2012 – 2022)	0.005**	0.40
Last five-year period (2017 – 2022)	0.007**	0.33
Previous two five-year periods (2007 – 2017)	0.114	0.11
Pre-Covid period (2007 – 2020)	0.042*	0.21
Last five-year period and dummy for market comparability concern	0.011*	0.30

[301] For 'market comparability' we have included a dummy variable for the impact of "developing" countries from the comparators with data in the sample.

[302] This analysis uses weekly and four-weekly frequencies.

4.127 Given our concern highlighted below (in the section on negative leverage) that some firms appear to have an artificially high asset beta due to their negative leverage, we have also examined the relationship between equity beta and the number of routes. This was to test whether this additional analysis using equity beta, which is estimated directly from market data, was more reliable than the analysis using asset beta, which is calculated using the equity beta and leverage and is affected by negative leverage values. The results, provided in Table 4.2, indicate less confidence in the finding of a relationship between equity beta and the number of routes argued by CEG (the p-values are less significant than the results using asset beta, and only the period 2012-2022 is statistically significant at the 5% level).

Table 4.2 Regression results for the relationship between equity beta and number of routes

Sample	p-value of number of routes	Indicator of statistical significance of regression (adjusted R-squared)
CEG preference of the last two five-year periods (2012 – 2022)	0.039*	0.22
Last five-year period (2017 – 2022)	0.339	0.00
Previous two five-year periods (2007 – 2017)	0.322	0.00
Pre-Covid period (2007 – 2020)	0.064	0.17
Last five-year period and dummy for market comparability concern	0.171	0.21

4.128 Overall, we consider that there may be a statistically significant relationship between the number of routes and the asset beta of an airport. However, our confidence of this relationship, particularly given the small sample used and the issues with the presence of negative leverage in the data, is weak. We also share the concern raised by Qantas that this relationship does not indicate a systematic risk. Overall, we consider that the indication of a statistically significant relationship between number of routes and asset beta is something that could be taken into account when considering the effect of pandemics rather than as a more general ongoing systematic risk.

Regarding step 1, should we modify how we have used our liquidity indicators when choosing the comparator sample?

4.129 In the draft decision, one factor we considered when choosing the comparator sample was the liquidity of the stock based on bid-ask spreads and free-float.

4.130 Houston Kemp for Wellington Airport submitted that we need to exclude Flughaven Wien based on liquidity concerns.[303] CEG for NZ Airports Association also considers that Flughaven Wien should be excluded on liquidity concerns, on the basis that it is acceptable to restrict the sample to firms that have a bid-ask spread of less than 0.5%.[304]

4.131 We have reviewed the data and consider that Flughaven Wien is an outlier compared to the other firms in the sample we used in the draft decision.[305] We have decided to continue to exclude firms with liquidity concerns, and to remove Flughaven Wien from the revised sample of comparators.

Regarding step 1, should we consider whether a firm has negative leverage when choosing the comparator sample?

4.132 In the draft decision one factor we considered when deciding to exclude firms from the comparator sample was whether they had negative leverage. The firms with negative leverage include Shenzhen Airport, Guangzhou Baiyun, Shanghai, Xiamen, Hainan, Grupo Aeroportuario del Surest, Grupo Aeroportuario del Pacifi and Malta International Airport.

4.133 CEG for NZ Airports Association and Incenta for Christchurch Airport submitted that we should not have used negative leverage as a reason to exclude these firms.[306] They say that economic theory does not support exclusion, and that negative leverage is a rational business strategy in the context of managing pandemic risk.[307]

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[303] HoustonKemp - Comment on asset beta methodology" (report prepared for Wellington International Airport (WIAL), 9 August 2023), page 8.

[304] CEG "Critique of 2023 IM Draft Decision on Asset Beta for NZ Airports" (report prepared for NZ Airports Association, 19 July 2023), section 6.2.

[305] Flughaven Wien has a bid-ask spread of 0.77% and a free float of 10%.

[306] CEG "Critique of 2023 IM Draft Decision on Asset Beta for NZ Airports" (report prepared for NZ Airports Association, 19 July 2023), section 6.1.4.; Incenta Economic Consulting "Airport Comparator Sample Selection" (report prepared for Christchurch International Airport Ltd (CIAL), 19 July 2023), section 2.6.

[307] We note that for the set of firms in our comparator sample, there is evidence of an increase in leverage on average between the pre-pandemic period and the year to 30 September 2022 (from 22% to 24%). We also note that for the set of firms we have excluded from our comparator sample leverage on average has also increased (from 8% to 10%).

4.134 Under normal economic conditions, financial risk (the risk associated with funding the firm through debt) adds to business risk (the risk assuming the business is funded entirely by equity, represented by asset beta) and both financial and business risk determine the systematic risk of the firm. Total systematic risk is represented by equity beta. If leverage is negative, the firm's systematic risk becomes less than its business risk (the equity beta becomes lower than the asset beta).

4.135 When we analyse the airports with negative leverage, we see that they have slightly higher systematic risk, as measured by equity beta, than the airports with positive leverage. When estimated over the pre-Covid period, the average equity beta for airports with negative leverage is 0.83 while the average equity beta for airports with positive leverage is 0.77. However, the firms with negative leverage over the pre-Covid period have an average asset beta of 0.87 compared to 0.57 for the airports with positive leverage.[308] It is possible that the market dynamic in countries where the business risk of operating an airport is relatively high results in these firms having negative leverage to reduce the risk investors face when they add these firms to their portfolio.

4.136 Our task is to estimate the systematic risk for airports in New Zealand. If some firms overseas are faced with high business risk and are using negative leverage to partially offset this risk (particularly where this occurs outside of the pandemic period), then those firms are unlikely to be reasonable comparators for New Zealand airports.

4.137 In the past we have included firms with negative leverage, but set their leverage to zero when determining the average leverage of the sample. The problem with doing that is it creates an inconsistency between the observed equity betas and calculated asset betas of the sample (that is, the asset beta is less than would otherwise be calculated using a negative leverage value). This problem would be avoided if they are excluded.

4.138 We have decided that when we consider whether to exclude firms from our comparator sample, we will consider whether they have negative leverage.

[308] More generally, a regression of asset beta on leverage indicates a negative relationship with a p-value of 0.002** and an adjusted R-squared of 0.33 (based on data from the last two five-year periods).

Regarding step 1, should we consider market comparability when choosing the comparator sample?

4.139 The criticism in submissions included that there is no reason why airports from less-developed countries should be excluded (CEG for NZ Airports Association and Incenta for Christchurch Airport[309]), and that we have been inconsistent because we have included companies that operate many airports including in non-developed countries (Houston Kemp for Wellington Airport).[310]

4.140 Christchurch Airport also submitted that the CEG analysis on the correlation between asset beta and number of routes indicates we should not consider whether the firm operates in a developing country when we form the comparator sample:

> We observe that a key implication of the additional empirical evidence that CEG introduces in paragraphs 131 to 166 is that the number of routes served by an airport has substantial explanatory power in terms of the airport's asset beta. Moreover, once this factor has been accounted for, whether the airport resides in a developed or developing country is much less important, and potentially unimportant (whilst CEG finds that the developed/developing status has weak statistical significance in one model, CEG suggests that this arises from the effects of an outlier, which we think appears likely).[311]

4.141 We indicated our concerns in paragraph 4.128 above about the analysis undertaken by CEG of the statistical relationship between asset beta and number of routes, and consider these concerns also relate to the analysis inclusive of an indicator of developed status.

4.142 We also note the submission from TDB Advisory for BARNZ supporting the use of a developed-country filter:

> We strongly agree that the Commission's use of a developed-country filter provides a key element of the comparability that is essential within the sample.[312]

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309 CEG "Critique of 2023 IM Draft Decision on Asset Beta for NZ Airports" (report prepared for NZ Airports Association, 19 July 2023), section 6.1.1; and Incenta Economic Consulting "Airport Comparator Sample Selection" (report prepared for Christchurch International Airport Ltd (CIAL), 19 July 2023), section 2.5.

310 HoustonKemp Economists "Comments on Commission's Asset Beta Methodology" (report prepared for Wellington International Airport Ltd (WIAL), 19 July 2023), section 3.

311 Incenta Economic Consulting "Cross-submission on specific matters for the IM Review 2023 Cost of capital" (report prepared for Christchurch International Airport Ltd (CIAL), 7 September 2023), para. 2.

312 TDB Advisory "Cross-submission on specific matters for the IM Review 2023 Cost of capital" (report prepared for BARNZ, 7 September 2023), p. 3.

4.143 There was also criticism by Incenta for Christchurch Airport[313] of our use of market comparability data, based on the FTSE Equity Country Classification and a proposal to consider other sources, such as the Damodaran data set (which Incenta[314] argues provides no basis for dismissing firms from China, for example). Incenta submitted that the FTSE Equity Country Classification is unrelated to systematic risk:

> In our earlier report, we observed that the difference between the FTSE Country Classifications of "developed" and "emerging" largely reflected the breadth of the derivative financial instruments available in the various markets. We observed that these additional instruments are not required for assets to be fairly-valued and for reliable estimates of betas to be obtained, and so whether firms were classified listed in "developed" or "emerging" markets is not justified as a filer of whether firms should be included in the sample of comparable entities. Our reading of the MSCI criteria to which Castalia refer is that they appear quite similar, and so the same observation would hold. [315]

4.144 Incenta also submitted that the firms in markets classified as not developed include firms with high liquidity and are extensively covered by research analysts.

4.145 Our review of the FTSE Equity Country Classification indicates it is a useful indicator of the riskiness of investing in a country's equity market, is compiled by an independent body using objective criteria, has a quality assurance process involving the use of an external advisory committee, and is targeted towards portfolio managers and asset allocators.[316]

4.146 Castalia for Air New Zealand support removing firms from the sample on the basis of market comparability and proposed the use of the MSCI Market Classification Framework. Castalia indicates that a firm that is classified as "developed" using this framework have openness to foreign ownership, ease of capital inflows/outflows, efficiency of the operational framework and stability of institutional framework.[317]

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[313] Incenta Economic Consulting "Airport Comparator Sample Selection" (report prepared for Christchurch International Airport Ltd (CIAL), 19 July 2023) , section 2.5. The Damodaran country risk data is from https://aswathdamodaran.substack.com/p/country-risk-a-july-2023-update

[314] Incenta Economic Consulting "Airport Comparator Sample Selection" (report prepared for Christchurch International Airport Ltd (CIAL), 19 July 2023) , section 1.4.

[315] Incenta Economic Consulting "Airport Comparator Sample Selection" (report prepared for Christchurch International Airport Ltd (CIAL), 19 July 2023) , section 1.5.

[316] For more information about the compilation process, see the FTSE Equity Country Classification Process.

[317] Castalia "Comments on Cost of Capital" (report prepared for Air New Zealand, 19 July 2023), p. 6.

4.147 TDB Advisory for BARNZ submitted that there was a discontinuity between the asset betas of firms listed in countries with higher GDP per capita and firms in countries with lower GDP per capita.[318] NZ Airports Association provided a 2010 report by Europe Economics to the Commerce Commission that indicated a reason for the relationship between GDP per capita and asset beta:

> … the elasticity of demand for air travel tends to decline with GDP per capita, so at higher GDP per capita the responsiveness of air travel to downturns in GDP will be less. [319]

4.148 Our view is that there is precedent from many other regulators for excluding firms from developing countries from comparator samples based on concerns of market comparability.[320]

4.149 We have decided that when we consider whether to exclude firms from our comparator sample, we place some weight on whether there is a market comparability issue. When we consider market comparability, we can take into account information from multiple sources, including Damodaran, the FTSE Equity Country Classification and the MSCI Market Classification Framework.

Regarding step 1, should we consider the reliability of beta estimates when choosing the comparator sample?

4.150 In the draft decision, one factor we considered when choosing firms for the comparator sample was whether they had a reliable beta estimate. We considered that an unreliable beta estimate is one that varies significantly for a particular period depending on whether it was calculated using daily, weekly or four-weekly data. In our view, a large variation indicates that less confidence can be placed on the asset beta for any period of time as unusual market characteristics may be affecting the beta.

4.151 In general, the airports and their consultants rejected excluding firms on this basis as they considered there was no theoretical basis for doing so. In addition, Castalia for Air New Zealand disagreed with the use of an asset beta variability indicator for the same reason.[321]

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[318] TDB Advisory "Cross-submission on IM Review 2023 Draft Decisions" (report prepared for BARNZ, 9 August 2023), para. 4.

[319] NZ Airports Association "Europe Economics for Air NZ: Critique of Commerce Commission's asset beta analysis (2010)" (9 August 2023) , para. 5.2.

[320] For example, the Australian Energy Regulator, Economic Regulation Authority and UK Civil Aviation Authority.

[321] Castalia "Comments on Cost of Capital" (report prepared for Air New Zealand, 19 July 2023), section 3.1.

4.152 CEG for NZ Airports Association proposed that if we do consider unreliability of beta estimates as an indicator, we should exclude daily betas from this analysis.[322] The view was that daily betas were generally lower than weekly or four-weekly betas. However, we do not think this is necessarily a valid concern because, while daily betas for airports are generally lower than other frequency betas, this is not necessarily the case in other industries. For example, our energy sample often has daily betas that are higher than weekly or four-weekly betas.

4.153 Nevertheless, for this final decision, we have not used daily betas when calculating the unreliability measure, as our standard practice when estimating asset betas is to use weekly and four-weekly frequencies.

4.154 While we are not aware of other regulators having used an unreliability measure, we are attracted to it because we need to understand the effects of Covid and that analysis is more difficult if it includes firms with unreliable/noisy betas.

4.155 We have decided to continue to place some weight on the reliability of beta estimates when choosing the comparator sample.

Regarding step 1, overall, should we change the comparator sample we used in the draft decision?

4.156 For the draft decision, we started with the sample of 24 firms that were identified by CEPA from applying our 2016 method and then considered whether there were additional reasons for excluding some of these firms. In what follows, we step through the process we used for the draft decision to check, having considered the matters raised in submissions, whether we should revise the sample.

4.157 Given our concerns about some of the firms using negative leverage to offset risks specific to their particular market (even outside of the Covid period), we have decided to restrict the sample to firms with positive leverage over the pre-Covid period. We also consider it appropriate to remove firms that are relatively illiquid. This removes 11 firms to leave a sample of 13.

[322] CEG "Critique of 2023 IM Draft Decision on Asset Beta for NZ Airports" (report prepared for NZ Airports Association, 19 July 2023), para. 305.

4.157.1 The firms with negative leverage are from China (4)[323], Mexico (2), Vietnam (1) and Italy (1);[324]

4.157.2 The firms with illiquidity are from Austria (1), Denmark (1) and Italy (1).[325]

4.157.3 This resulting sample of 13 has a pre-Covid asset beta of 0.64 and leverage of 0.24.

4.158 When we consider the remaining 13 firms, we note that 11 of the firms are from either developed or advanced emerging markets, 1 is from a secondary emerging market with a relatively high country-risk premium (GMRI from India) and one is from a frontier market with a relatively low country risk premium (Malta International Airport from Malta). GMRI from India has low asset market variability while Malta International Airport has relatively high asset beta variability (a maximum difference between weekly and four-weekly asset betas of 0.52).

4.159 We note that the FTSE Equity Country Classification classifies countries on a scale of decreasing risk from developed to advanced emerging to secondary emerging to frontier to unclassified. We have compared the FTSE Equity Country Classification to the MSCI Country Classification[326] and note that the classifications are similar but the FTSE classification provides a greater level of distinction in its overall classification; for example it distinguishes between advanced emerging and secondary emerging whereas the MSCI Country Classification does not.

4.160 We consider it reasonable to exclude GMRI from India and Malta International Airport on the following grounds:

4.160.1 GMRI on the basis of its high country-risk premium and country classification as secondary emerging.

[323] Note that this process does not exclude the firm controlling Hainan airport (ticker: 357 HK Equity), which is different to our draft decision to exclude that firm. The reason is that for the pre-Covid airport the firm controlling Hainan airport had positive leverage on average. Its negative leverage situation was prior to 2012.

[324] These firms are Shenzen Airport (00089 CH Equity), Guangzhou Baiyun International (600004 CH Equity), Shanghai International (600009 CH Equity), Xiamen International (600897 CH Equity), Grupo Aeroportuario del Sureste (ASURB MM Equity), Grupo Aeroportuario del Pacifico (GAPB MM Equity), Airports Corporation of Vietnam (ACV VN Equity) and Aeroporto Gulielmo Marconi de Bologna (ADB IM Equity).

[325] These firms are Flughafen Wien (FLU AV Equity), Kobenhavns Lufthavne (KBHL DC Equity) and Toscana Aeroporti (TYA IM Equity).

[326] The MSCI country classifications for 2023 are available here.

4.160.2 Malta International Airport on the basis of its country classification and asset beta reliability.

4.161 This leaves a sample of 11 firms, all from either developed or advanced emerging countries.[327] The average pre-Covid asset beta is 0.67 and leverage is 0.20 for these firms.

4.162 The next issue in terms of identifying the revised sample is whether we remove any of the remaining firms on market comparability grounds. There are four candidates for removal:

4.162.1 Malaysia Airports (Advanced emerging, country risk premium of 2%, maximum beta variability of 0.27)

4.162.2 Grupo Aeroportuario del Centro from Mexico (Advanced Emerging, country risk premium of 3%, maximum beta variability of 0.26)

4.162.3 AENA from Spain (Developed, country risk premium of 3%, maximum beta variability of 0.05)

4.162.4 Airports of Thailand (Advanced Emerging, country risk premium of 3%, maximum beta variability of 0.10)

4.163 There was criticism in submissions that we should not use country risk premium as an indicator because a firm's asset beta is relative to the market it is traded on, and all markets have an average equity beta of 1.0. This is a reasonable point. However, we are also endeavouring to establish a sample that can be used to understand the effects of the pandemic, and firms in countries that are not classified as developed or advanced emerging tend to have greater volatility in their asset beta estimates.[328] Instead of using country risk premium, it may be more appropriate to remove firms with relatively high beta variability. On this basis, there are grounds for excluding the firms from Malaysia and Mexico, and we have decided to do so.

[327] Note that as Beijing airport is traded on the Hong Kong exchange their classification is developed.

[328] The average maximum difference in asset betas (across weekly and four-weekly frequencies) for firms classified as either developed or advanced emerging was 0.10, whereas the average maximum difference in asset betas for firms classified as either secondary emerging or frontier was 0.21. This calculation is based on the last two five-year periods.

4.164 This leaves a sample of 9 firms. The difference between this revised sample and the draft decision sample is that we have removed one firm from Austria on liquidity grounds and added one firm from Thailand and one from China. The firm we added from China (Hainan) trades on the Hong Kong stock exchange, which is classified by the FTSE Country Classification as a developed market. The firm we added from Thailand is classified as advanced emerging and we consider we do not have strong grounds for excluding this firm, particularly because we have included firms that have a significant share of their operations in developing countries.[329]

4.165 Table 4.3 shows a comparison of our revised comparator sample with the full sample as proposed by the airports and their consultants as well as the data for the draft decision sample and Auckland airport, using estimates of pre-Covid parameters.

Table 4.3 Pre-Covid asset beta, leverage and equity beta for various samples[330]

Variable (pre-Covid)	Draft decision sample	Revised sample	Full sample	Auckland Airport
Sample size	8	9	24	1
Asset beta	0.53	0.63	0.66	0.82
Leverage	0.26	0.22	0.13	0.23
Equity beta	0.72	0.81	0.76	1.07
Indicative BL WACC (nominal)	6.9%	7.6%	7.7%	8.9%

4.166 A comparison of the revised sample and the full sample indicates that the vanilla nominal WACC is similar under both options (7.6% for the revised sample and 7.7% for the full sample, under plausible assumptions for other variables). In comparison, the draft decision sample would have been lower (6.9%).[331]

[329] For example, CEG observed that ADP and Fraport have more than half of their operations in countries other than France and Germany respectively. CEG "Critique of 2023 IM Draft Decision on Asset Beta for NZ Airports" (report prepared for NZ Airports Association, 19 July 2023), para. 37 and section 6.3.2.

[330] In this example we use an assumed risk-free rate of 4.0%, TAMRP of 7.0%, debt premium of 1.4%, debt issuance costs of 0.2% for all scenarios.

[331] The WACC calculations in this table assume a nominal risk-free rate of 4.0%, debt risk premium of 1.4%, debt issuance costs of 0.2% and TAMRP of 7%.

4.167 We consider that the revised sample is more robust than the sample we used in the draft decision. We have removed one firm from Austria on liquidity grounds and added one firm from Thailand and one from China. The pre-Covid asset beta increases from 0.53 to 0.63 by revising the sample.

4.168 Alternatively, we have considered the asset beta estimates from the narrower samples proposed by CEG for New Zealand Airports Association, on the basis that CEG considers these samples most closely represent the New Zealand airports.[332]

4.168.1 If we were to limit the sample to Auckland Airport and Zurich, the pre-Covid asset beta estimate would be 0.70.

4.168.2 If we were to limit the sample to Auckland, Zurich, AENA and Sydney, the pre-Covid asset beta estimate would be 0.59.

4.169 As our asset beta estimate for our revised sample of 0.63 falls within the range of the estimates from these narrower samples (0.59 to 0.70), we consider it is not inconsistent with the results from these narrower samples.

4.170 We had submissions from CEG for NZ Airports Association and Houston Kemp for Wellington Airport proposing the inclusion of Japan Airport Terminal Company because the Western Australian Supreme Court included this firm in the comparator sample for its judgment on Qantas versus Perth Airport.[333]

4.171 We note that CEPA excluded Japan Airport Terminal Company because of its low percentage of aeronautical revenue.[334] We consider CEPA's reasoning to be sound.

[332] CEG "Critique of 2023 IM Draft Decision on Asset Beta for NZ Airports" (report prepared for NZ Airports Association, 19 July 2023, section 8.4.

[333] CEG "Critique of 2023 IM Draft Decision on Asset Beta for NZ Airports" (report prepared for NZ Airports Association, 19 July 2023), paragraph 37 and HoustonKemp Economists "Comments on Commission's Asset Beta Methodology" (report prepared for Wellington International Airport Ltd (WIAL), 19 July 2023) , section 3.1.2.

[334] CEPA stated that it is a firm primarily involved in real estate leasing in airports and other related airport infrastructure such as air conditioning and water. According to CEPA 79% of its net sales are attributed to its real estate business. CEPA "Report on Cost of Capital 2022/ 2023" (report to the Commerce Commission 'IM Review 2023', 29 November 2022), p.7.

4.172 We received a submission from International Air Travel Association asking us to reconsider the inclusion of Beijing Capital Airport due to its regulatory framework compared to other firms in the sample.[335] We note that when CEPA formed the initial sample of firms it did not consider Beijing Capital Airport should be excluded and we also note that Beijing Capital Airport does not appear to be an outlier in terms of its asset beta. We therefore do not consider we have reason to exclude Beijing Capital Airport from the comparator sample.

4.173 On the basis of the considerations above, we have decided to change the comparator sample used in the draft decision to the revised sample of nine firms (with the major airports indicated in brackets):

4.173.1 357 (Hainan), 694 (Beijing), ADP (Paris), AIAL (Auckland), Flughafen Zuerich (Zurich), Fraport (Frankfurt), Sydney, AENA (Madrid), Thailand (Bangkok).

4.174 The asset betas and leverage for our recommended sample, as well as the excluded firms, are provided in Attachment D.

[335] International Air Travel Association "IATA Submission on IM Review 2023" (19 July 2023), page 1.

Regarding step 1, are we confident that our proposed comparator sample is suitable for determining the benchmark equity beta for airports?

4.175 While the airlines and their consultants generally supported our method of selecting a comparator sample, airports and their consultants did not. NZ Airports Association submits that our sample reflects the lowest systematic risk of listed airports in the world.[336] Christchurch Airport considers our filtering method has resulted in a sample that differs materially to the NZ airports.[337] It refers to the CEG report citing different regulatory frameworks, the greater capacity constraints of NZ airports, operations in markets outside of the market where they are listed, and much lower volatility in demand. CEG for NZ Airports Association also submitted that the sample should produce the same average asset beta over time as for Auckland Airport, and as our sample does not achieve this it must be wrong.[338] Morrison & Co submitted that the sample selection method proposed by Qantas, which is similar to ours, was scrutinised and rejected in the recent case of Perth Airport versus Qantas.[339]

4.176 We also received submissions from smaller airports and councils in New Zealand concerned that the sample, which generally reflects large international airports, was not representative of the risks faced by small regional airports in New Zealand.

4.177 Our view is that the spike in airport asset betas caused by Covid was an important reason for reconsidering how we establish the comparator sample. When we reviewed our 2016 sampling method, we concluded that we should apply a more rigorous consideration of comparability before accepting firms in the sample. As a result, we reconsidered our approach and applied a stronger liquidity filter, removed firms that appear to be using negative leverage to offset their high business risk, and removed firms that have market comparability concerns and statistical noise in their beta estimates. Including these firms would have made it more difficult to understand the effects of the pandemic on beta and more challenging to determine the most likely value of beta to apply for the term of the IMs.

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[336] NZ Airports Association "Submission on IM Review 2023 Draft Decisions" (19 July 2023), paragraph 11.

[337] Christchurch International Airport Ltd (CIAL) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 2.

[338] CEG "Critique of 2023 IM Draft Decision on Asset Beta for NZ Airports" (report prepared for NZ Airports Association, 19 July 2023), section 4.1.

[339] Morrison & Co "Submission on IM Review 2023 Draft Decisions" (19 July 2023), paragraph 16. However, the extent we have taken into account that case has been limited to the specific information that has been put to us as part of our review. For example, we have considered the issue of whether to include Japan Airport Terminal in our comparator sample as this issue was specifically put to us (see paragraph 4.171).

4.178 We also note that the revised sample produces a slightly higher indicative WACC to what would have been achieved if we had used the full sample; however, we do not consider the full sample provides an appropriate leverage for the benchmark assumption.

4.179 As we do not consider there is a reliable relationship between the number of routes and asset beta, or that this is necessarily a relevant consideration for systematic risk, we have no reason on this basis for ensuring the comparator sample comprises only airports with fewer routes.

4.180 We do not consider the level of asset beta for Auckland Airport needs to be matched over time by the asset beta of the comparator sample. There are likely to be many reasons for why the Auckland Airport asset beta is higher than the average of the comparator sample, including as noted by TDB Advisory for BARNZ, Auckland Airport's relative size on the New Zealand exchange.

4.181 Qantas also submitted that Auckland Airport's relative size on the NZ exchange was a reason why the UK Civil Aviation Authority did not include Auckland Airport in its comparator sample. The UK Civil Aviation Authority was concerned that Auckland Airport's asset beta was unreliable due to the circularity that can be created in the asset beta calculation, given its size relative to the market, which may bias the estimate.[340] Qantas also noted analysis by Dr Lally indicating that a stock's high and varying market capitalisation relative to the market can influence asset betas over time.[341] We also note that another reason why the UK Civil Aviation Authority did not include Auckland Airport in its comparator sample was because of the lack of diversity in the NZ exchange.[342]

4.182 In addition, we note that TDB Advisory for BARNZ considers that the extent of competition facing NZ airports is a factor that affects Auckland Airport's relative asset beta:

> We also question the merits and force of CEG's assertion that "(t)he most accurate sample has a long run average asset beta close to AIAL's long run average." (CEG p. 35). The purpose of the IMs is to simulate the opportunities and constraints that AIAL (and other regulated entities) would face in a workably competitive environment. These conditions are all the more important because, as argued above, Auckland Airport probably faces less inherent competition in its routine operations than most, and possibly all, of the overseas comparators.

[340] Qantas "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 8.

[341] Qantas "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 8.

[342] UK Civil Aviation Authority "Economic regulation of Heathrow Airport Limited: H7 Final Decision, Section 3: Financial issues and implementation" (June 2022), para. 9.71.

> If regulation were "perfect," in the sense that Auckland Airport's investment, pricing and other behaviours were perfectly aligned with those in a competitive setting, there may be a case for saying that AIAL's asset beta would also be better aligned with what would prevail under such competition. But, in addition to the fact that many other things besides the extent of competition are likely to influence the beta (such as the characteristics of local capital markets and, we would argue, the mix of aeronautical and non-aeronautical activities), the regulatory framework is unlikely to be perfect from the get-go: rather, it will evolve and hopefully improve over time.[343]

4.183 HoustonKemp for Wellington Airport considered that the sample was small and may result in variability due to idiosyncratic shocks to the firms in the sample, and also to firms entering/leaving the sample.[344] We acknowledge that it is preferable to have a larger sample of comparators than a smaller sample, as long as the comparators are appropriate. In the circumstances, we are concerned that expanding the sample beyond the 9 firms would produce less reliable results. We also note that the AER had 9 firms in its sample of energy comparators (none of which were trading at the time on the ASX)[345], while the UK Civil Aviation Authority had three firms in its sample of airport comparators.[346]

4.184 Houston Kemp for Wellington Airport submitted that we have been inconsistent with the UK Civil Aviation Authority as they exclude Sydney and Auckland airports, while we are using companies the UK Civil Aviation Authority use in their sample, alongside Sydney and Auckland airports.[347] However, we consider that it a different exercise to find comparators for a large international hub like Heathrow than it is for the relatively isolated airports of New Zealand. We also note the UK Civil Aviation Authority's view that there is a lack of close comparators for Heathrow Airport.[348]

4.185 Overall, we consider our sampling method is the best available to us and suitable for determining the benchmark equity beta and leverage for airports.

4.186 We next consider how the information from the comparator sample should be used to make the equity beta and leverage determinations.

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[343] TDB Advisory "Cross-submission on IM Review 2023 Draft Decisions" (report prepared for BARNZ, 9 August 2023), paras 11 and 12.

[344] HoustonKemp Economists "Comments on Commission's Asset Beta Methodology" (report prepared for Wellington International Airport Ltd (WIAL), 19 July 2023) , p. ii.

[345] Australian Energy Regulatory "Rate of Return Instrument Explanatory Statement" (February 2023), p. 178.

[346] These three firms are AENA (Madrid and Barcelona), ADP (Paris) and Fraport (Frankfurt). They are used for the purpose of calculating the baseline (pre-Covid) estimate of asset beta. UK Civil Aviation Authority "Economic regulation of Heathrow Airport Limited: H7 Final Decision, Section 3: Financial issues and implementation" (June 2022), para 9.69.

[347] HoustonKemp Economists "Comments on Commission's Asset Beta Methodology" (report prepared for Wellington International Airport Ltd (WIAL), 19 July 2023) , p. iii.

[348] UK Civil Aviation Authority "Economic regulation of Heathrow Airport Limited: H7 Final Decision, Section 3: Financial issues and implementation" (March 2023), para. 9.69.

Regarding step 4, was there an error in information we relied on in the draft decision to make the Covid adjustment?

4.187 CEG for NZ Airports Association submitted that there is likely to be an error in the TDB Advisory analysis (which applied the Flint Global method) that we relied on for making the adjustment to the asset beta for the likelihood of a pandemic occurring over the course of the IMs.[349]

4.188 This issue was included in our further consultation as TDB Advisory had not had the opportunity to respond. TDB Advisory considers there is no error.[350] We have reviewed TDB Advisory's calculations. We have found that TDB's estimates of asset beta using various durations and frequencies of a pandemic are largely consistent with their stated method using daily and weekly data. However:

4.188.1 We could not verify that the monthly results in its submission were consistent with the calculations in the spreadsheet model.

4.188.2 We have found that TDB's reported 'baseline' estimates of asset beta for the assumed non-Covid periods are not consistent with their stated method. We note that the non-Covid asset betas reported in Tables 2 and 3 of its submission are the same for both the 17-month and 30-month Covid assumption results, even though the non-Covid periods differ in each of these scenarios. Our understanding is that the base non-Covid period is based on the period of the five years in which the impact of Covid was not assumed to be present, so having identical baseline betas for both assumed Covid lengths does not appear correct.

4.188.3 We have also noted that TDB Advisory used the NZX50 Index whereas we have used the NZX All Index for our beta estimation. The use of different indices produces different results.

4.189 Whereas TDB Advisory reported a range of 0.01 to 0.04 for the Covid adjustment for Auckland Airport using weekly data,[351] we have calculated a range of 0.02 to 0.08 using the same method but with the NZX All Index and correcting the calculations of the baseline non-Covid betas.

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[349] CEG "Review of submissions on asset beta estimates for airports" (report prepared for NZ Airports Association, 9 August 2023), paragraph 67.

[350] TDB Advisory "Cross-submission on specific matters for the IM Review 2023 Cost of capital" (report prepared for BARNZ, 7 September 2023), section 1.

[351] TDB Advisory "Auckland international airport asset beta Covid-19 adjustment using flint study" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for Board of Airline Representatives NZ (BARNZ), 3 February 2023), Tables 4 and 5.

4.190 For the purpose of this analysis, we accept that it is reasonable to consider a pandemic-like event could occur once in either 20 or 50 years and could have a duration of 17 months as a lower bound scenario and 30 months as an upper bound scenario (these were the assumptions used by Flint Global and accepted by the UK Civil Aviation Authority).

4.191 We have noticed that the Covid adjustment calculated is nearly always the highest for four-weekly data and the lowest for daily data. We also note that the results with four-weekly data are more volatile, given the relatively few observations, particularly for the 17-month window. In addition, we have observed that the baseline data calculated using four-weekly data (which we refer to as the "non-Covid base", calculated using the observations in the five-year period excluding the 17- or 30-month Covid windows), was inconsistent with the longer term pre-Covid values of asset beta (calculated using the average of weekly and four-weekly asset betas). This issue with the four-weekly data is likely the result of having fewer observations when four-weekly data is used. For these reasons, we consider it appropriate to use weekly data when applying the Flint Global method, rather than our standard approach of using the average of weekly and four-weekly estimates.

4.192 Our application of the Flint Global method to Auckland Airport indicates the adjustment for a Covid-type event occurring over the course of the IMs is larger than we assumed in the draft decision. At the draft decision, we assumed the upward adjustment was in the range of 0 to 0.04, based on the analysis by TDB Advisory. Our further analysis indicates a range of 0.02 to 0.08.

4.193 We note that this range is similar, although somewhat lower, than the range calculated for the CAA by Flint Global, which was 0.02 to 0.11.[352]

4.194 A potential issue with the Flint Global method is that it assumes the non-Covid period within the sample is representative of the pre-Covid beta. Our application of the TDB Advisory/Flint method as applied to Auckland Airport produces a non-Covid asset beta of 0.83 for the lower bound estimate and 0.82 for the upper bound estimate. Our estimate of the pre-Covid asset beta based on Auckland Airport is 0.82. We also note the asset beta based only on Auckland Airport for the year to 30 September 2022 was 0.84. While the closeness of these numbers provides some confidence in the method, if we were to use 0.82 as the base, the adjustment would be 0.03 to 0.08, rather than 0.02 to 0.08.

[352] This calculation is under appeal by Heathrow Airport. See paragraphs 161 to 172 of the appeal document.

4.195 A further cross-check using the comparator sample shows that the average asset beta in the year to 30 September 2022, at 0.61 (after making an adjustment for a firm from China which appears to be an outlier),[353] is lower than our pre-Covid asset beta of 0.63. This indicates that the application of the Flint Global method may overstate the effect of a pandemic.

4.196 CEG submits that the post-Covid beta is not relevant because we should not try to estimate the effects of Covid by considering a post-Covid period. CEG bases this view on its interpretation of what asset betas measure:

> In short, they [asset beta observations] measure how the stock market reacted to the actual shocks that hit the economy in the relevant estimation window – and do not measure the exposure to risks that did not actually eventuate. [354]

4.197 TDB Advisory has a different view about what asset betas measure:

> The stock price of any entity – along with its measured beta in any period – will respond not just to actual events affecting the entity concerned, but also to changing perceptions of risk that could affect the company's performance and prospects – whether or not such risks actually materialise. For example, defence, transport and other stocks will reflect changing perceptions of the probability of a war over Taiwan, even though no war has occurred to date. Heightened uncertainty and perceptions of risk surrounding a particular stock that cause it to fluctuate more widely – including in relation to the market benchmark – are likely to be reflected in an increase in its beta, again whether or not the actual shocks or other sources of concern eventuate. [355]

4.198 We agree with TDB Advisory's view and consider that a stock's ongoing variation relative to the market will have incorporated the new information about the effects of a pandemic and prospects of another pandemic occurring. We consider it is relevant to take into account the evidence that the asset beta of the comparator sample for the year to 30 September 2022 was slightly lower than our estimate of the pre-Covid asset beta, even though we note that asset beta information estimated over a short period should be used cautiously.

4.199 We note the International Air Travel Association's view that, while they consider the pandemic was not a systematic event, they consider it acceptable to use a method that applies an adjustment to the pre-Covid asset beta.[356]

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[353] We remove Hainan Meilan International Airport (357 HK Equity) as it has a significantly higher asset beta compared with the rest of the comparator sample, and is the only company in the sample with negative leverage over the 12 months to 30 September 2022.

[354] CEG "Review of submissions on asset beta estimates for airports" (report prepared for NZ Airports Association, 9 August 2023), para. 92.

[355] TDB Advisory "Cross-submission on specific matters for the IM Review 2023 Cost of capital" (report prepared for BARNZ, 7 September 2023), p. 5.

[356] International Air Travel Association "IATA Submission on IM Review 2023" (19 July 2023), p. 1.

4.200 Castalia for Air New Zealand proposed we update the post-Covid cross check using data that is more recent than for the year to 30 September 2022.[357] We have not done so because we had to draw a line somewhere and there will always be new data available. A further benefit of using data up to 30 September 2022 is that all parties have had the opportunity to contribute to the decision on the basis of a consistent data set that was available at the time of the draft decision.

4.201 We have further considered how robust the Flint Global method is by applying it to the firms in the comparator sample. The method produces negative adjustments for 4 of the 9 firms. The range of the adjustments across the 17 month and 30 month windows is -0.06 to 0.16.[358] This large range is a concern and causes us to question the reliability of the Flint Global method. On average for the 9 firms in the sample, the mean lower bound (17 month) adjustment was 0.01 and the mean upper bound adjustment was 0.03. However, we consider that it is more relevant to this review to consider the application of the Flint method to Auckland Airport as it reflects the actual New Zealand experience of responding to a pandemic, notwithstanding that it is for a sample of one firm rather than a broader sample of NZ firms.

4.202 It is relevant to understand the argument against the Flint method, as presented by Heathrow Airport in its appeal of the recent UK Civil Aviation Authority decision.[359] The argument by Heathrow Airport is that:

4.202.1 The assumed length of the Covid period (either 17 or 30 months) does not account for ongoing effects after that assumed period;

4.202.2 The 20-50 year assumptions of a recurrence of a pandemic is arbitrary;

4.202.3 The method assumes all of the increase in asset beta over the Covid period was due to Covid rather than any other causes; and

4.202.4 The baseline (non-Covid) asset beta was based on pre-2014 data, which is out of date.

4.203 The TDB Advisory application of the Flint Global method (and our adjustments to that method) can be subjected to the same criticisms. However, we note that the Competition & Markets Authority's decision in relation to the appeal by Heathrow Airport was to not find error in the UK Civil Aviation Authority's decision in relation to the Covid adjustment.

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[357] Castalia "Comments on Cost of Capital" (report prepared for Air New Zealand, 19 July 2023), page 3.

[358] The 0.16 increase was for Hainan, which is likely to be due to the Covid-related restrictions in place in China.

[359] See paragraphs 168 to 171 of the Heathrow Airport appeal document.

> Accordingly, we determine that the CAA's Final Decision was not wrong either because it was based on errors of fact, was wrong in law, or an error was made in the exercise of a discretion in setting the pre-pandemic asset beta. Further, we determine that the CAA's Final Decision was not wrong because it was based on errors of fact, was wrong in law, or an error was made in the exercise of a discretion, in calculating the impact of the pandemic on HAL's asset beta.[360]

4.204 We have decided to use the Flint Global method as one piece of information in determining the asset beta but consider that this information should be used cautiously. For the purpose of informing the judgement that needs to be made about the asset beta, we consider that a pandemic adjustment to the non-Covid/pre-Covid asset beta could be in the range of 0.02 to 0.08, which is higher than the 0 to 0.04 range we assumed for the draft decision.

Regarding step 4, our final view on calculating the average asset beta for the comparator sample

4.205 In the draft decision, we applied judgement in determining the airport asset beta by placing most weight on (a) the pre-Covid beta with an added premium and (b) the asset beta for the 12 months to September 2022. Table 4.4 presents this data, updated for our recommended revision to the comparator sample, in comparison to the values used in the draft decision and in the current IMs.

[360] Competition & Markets Authority, H7 Heathrow Airport Licence Modification Appeals Final Determinations (17 October 2023), paragraph 6.53.

Table 4.4 Data to inform the determination of the airport equity beta and leverage

Indicator	Current IMs	draft decision	Inputs for final decision
Pre-Covid asset beta (long term average, weekly and four-weekly)		0.53	0.63
Pandemic premium based on our adjustment of TDB Advisory's calculation applied to Auckland Airport		0 – 0.04	0.02 – 0.08
Pandemic-adjusted asset beta		0.53 – 0.57	0.65 – 0.71
Asset beta for year to 30 September 2022 (weekly and four-weekly, including Hainan)		0.50	0.72
Asset beta for year to 30 September 2022 (weekly and four-weekly, excluding Hainan)		0.50	0.61
Asset beta for last two five-year periods (weekly and four-weekly)	0.65	0.63	0.74
Adjustment to asset beta	-0.05	0	0
Final asset beta	0.60	0.55	0.67

4.206 We consider that the starting point is the pre-Covid asset beta of 0.63 and that an adjustment to this value should account for the estimate of the pandemic premium of 0.02 to 0.08, which indicates a range of 0.65 to 0.71.

4.207 We note that the asset beta for the comparator sample for the year to 30 September 2022, at 0.74, is higher than this range. This value of 0.74 is affected by the large increase in asset beta for the firm controlling Hainan airport and has probably been influenced by the particular restrictions in place in China over the Covid period. Excluding the firm controlling Hainan airport results in an asset beta of 0.61 for the year to 30 September 2022, which is below the pre-Covid average of 0.63.

4.208 We also note that Auckland Airport had an asset beta for the year to 30 September 2022 which was 0.02 above its pre-pandemic asset beta.

4.209 We consider that the asset beta has fallen below 0.74, which is the average of the last two five-year periods and that it is not appropriate to continue to use the method we applied in the 2016 IM review.[361] While Auckland Airport considered that the continuing application of the average of the last two five-year periods is important for regulatory certainty, we do not agree.[362] We consider that determining our best estimate of the asset beta would better promote the Part 4 purpose while still providing sufficient regulatory certainty. We consider that if we were to use the average of the last two five-year periods, we would give too much weight to the pandemic on an ongoing basis.

4.210 We also consider that the asset beta has fallen below 0.73, which is the average of the last three five-year periods, which was the period that Wellington Airport proposed could be used to determine the asset beta.[363]

4.211 Overall, we consider a value of 0.67 is a reasonable estimate of the asset beta for the period of the IMs, which is consistent with a 0.04 adjustment to the pre-Covid asset beta calculated using our comparator sample.

Regarding step 5, should we maintain our position in the draft decision of not making a downward adjustment?

4.212 This issue hinges on the data used in the regression of aeronautical revenue share versus asset beta. CEG argues that Qantas and TDB Advisory used inaccurate data.[364] We sought submissions on this point in a separate consultation after the cross-submission stage.

4.213 CEG argued that there were errors made in Qantas and TDB advisory's analysis when examining the relationship between asset beta and proportion of aeronautical revenue. CEG suggested the first error they made was to incorrectly use weekly asset betas instead of the average of weekly and four-weekly asset beta. The second alleged error was that Qantas and TDB Advisory had incorrectly calculated the proportion of aeronautical revenue. CEG's analysis indicated either no or a positive relationship between asset beta and the proportion of the aeronautical revenue; and concluded the downward adjustment is not justified.

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[361] If we had continued to apply the 2016 method, we would have included in our final comparator set the 24 firms identified by CEPA, as CEPA was asked to replicate our 2016 method.

[362] Auckland International Airport Limited (AIAL) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 2.

[363] Wellington International Airport (WIAL) "Cross submission on IM Review 2023 Draft Decisions" (9 August 2023), para. 64.

[364] CEG "Review of submissions on asset beta estimates for airports" (report prepared for NZ Airports Association, 9 August 2023), para. 36.

4.214 Qantas updated its analysis to adopt the average of weekly and four-weekly asset beta, but they found there was still a negative relationship after this change.[365] Qantas disagreed with CEG's data of the proportion of the aeronautical revenue. Qantas argued that the unregulated revenue that directly relates to aeronautical activities can be a relevant and low risk revenue stream for an airport.

4.215 We have checked the regression analysis undertaken by CEG and Qantas. We note that there is discrepancy about the revenue that should be counted as aeronautical revenue. The difficulty in estimating the aeronautical services revenue is particularly important for the four airports that have the largest impact on the regression results. We understand that there are practical difficulties in identifying the correct portion of aeronautical revenue, especially for airports in other countries.[366]

4.216 Of particular importance are the limited data points included in the regression, which means the inferences are not statistically reliable. We consider that a downward adjustment would ideally be informed by reliable statistical evidence.

4.217 However, in the 2016 decision we made a downward adjustment without statistical evidence of a relationship between aeronautical shares and beta (Dr Lally found no reliable statistical relationship). The reasons underpinning that decision were qualitative rather than quantitative. The qualitative reasons for the downward adjustment included estimates of asset betas for aeronautical business segments that were lower than for non-aeronautical segments (by PwC and Deutsche Bank), statements by Auckland Airport indicating a lower asset beta for aeronautical segments and estimates by the UK Civil Aviation Authority for Heathrow Airport that were lower than our estimate from the comparator sample.[367]

[365] Qantas "Cross-submission on specific matters for the IM Review 2023 Cost of capital" (7 September 2023), Appendix A.

[366] In this regard, we also note the submission from International Air Travel Association which indicated that this analysis is affected by including airports with operations in developing countries (AENA, Fraport, Zurich; and ADP) in the sample and also Fraport that has a large ground handling business. International Air Travel Association "IATA Submission on IM Review 2023" (19 July 2023), page 2.

[367] Commerce Commission "Input methodologies review decisions - Topic paper 4: Cost of capital issues (20 December 2016), para 483.

4.218 For this review, we have not been presented with any qualitative evidence through the submission process which indicates the use of lower asset betas for aeronautical business segments. However, we note that TDB Advisory submitted that the economic entities that are largely focused on core economic infrastructure tend to have lower asset betas, which they suggest indicates the core aeronautical service components would come closer in risk profile to the lower-beta utility and infrastructure providers.[368]

4.219 We note that our estimate of the pre-Covid asset beta, at 0.63, is higher than the 0.53 mid-point asset beta (from a range of 0.44 to 0.62) the UK Civila Aviation Authority determined in its final decision for Heathrow Airport.[369] However, 0.53 is not a reasonable comparison because the CAA made a downward adjustment for the Traffic Risk Sharing mechanism, which reduces the risk associated with passenger numbers deviating from expectations. The post-pandemic range from the comparator sample of three firms was estimated by CAA to be 0.52 – 0.71, and our post-Covid range based on our refinement to the TDB Advisory analysis is 0.65 to 0.71.

4.220 Overall, we do not consider we have the grounds for maintaining our 2016 downward adjustment and we have decided to not make a downward adjustment.

Regarding step 6, our overall calculation of equity beta for airports

4.221 There is an indication from our final comparator sample that leverage is slightly lower than pre-pandemic levels. The pre-pandemic level was 0.25 and the average of the last two five-year periods was 0.23. We have decided on a value of leverage of 0.23 (see paragraph 5.30 for further information on our leverage decision).[370]

4.222 The final equity beta is calculated as 0.87 based on an asset beta of 0.67 and leverage of 0.23. In comparison, our draft decision was an equity beta of 0.74. based on an asset beta of 0.55 and leverage of 0.26.

Reasonableness of our asset beta for airports of 0.67

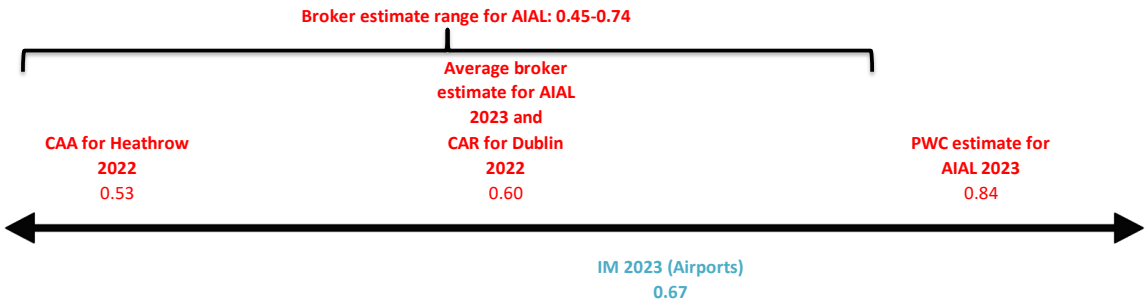
4.223 We have assessed the reasonableness of our asset beta estimate of 0.67 for airports based on available comparable information, as shown in Figure 4.1.

[368] TDB Advisory "Report on IM Review 2023 Draft Decisions cost of capital paper" (report prepared for BARNZ, 19 July 2023), p.6.

[369] UK Civil Aviation Authority "Economic regulation of Heathrow Airport Limited: H7 Final Decision, Section 3: Financial issues and implementation" (June 2022), Table 9.2 at para. 9.145.

[370] We note that 0.23 is also the average of the last two five-year periods.

Figure 4.1 Reasonableness checks on our asset beta estimate for airports



4.224 The above figure shows that our asset beta estimate for airports of 0.67 falls within the range of comparable information. We consider that this supports the reasonableness of our estimate.

Part 2: Energy

Draft decisions

4.225 Our draft decision for EDBs and Transpower was an equity beta of 0.59, based on an asset beta of 0.35 and notional leverage of 41%.

4.226 Our draft decision for GPBs was an equity beta of 0.68, based on an asset beta of 0.40 and notional leverage of 41%.

Draft reasons

Current betas

4.227 The energy asset betas underlying the 2016 IMs are:

4.227.1 0.35 for EDBs and Transpower; and

4.227.2 0.40 for GPBs, which included an uplift of 0.05 compared to the EDBs and Transpower.

4.228 The equity betas set in the 2016 IMs are:

4.228.1 0.60 for EDBs and Transpower, based on a notional leverage of 42%; and

4.228.2 0.69 for GPBs, based on a notional leverage of 42%.

New evidence for step 1: identifying a sample of comparator firms

4.229 In 2016, the energy comparator sample included companies from New Zealand, Australia, United States, and United Kingdom. Since 2016, Australian companies Ausnet and Spark Infrastructure have been delisted and APA has been excluded by CEPA because it has low regulatory revenue. Now only four companies in the sample of 54 are not from the US; three are from the UK and one (Vector) is from New Zealand.

4.230 Oxera for the 'Big Six' EDBs proposed we refine the sample to remove companies from the United States that are less comparable.

> In practice, the NZCC could refine its sample of comparators by reviewing the characteristics and comparability of US-based utilities in more detail. These companies account for over 60 of the comparators in the NZCC's sample, and not all of them will be subject to the same type of regulatory regime as in New Zealand. Specifically, as was also noted by Dr Lally, some US-based utilities are subject to rate-of-return regulation rather than price cap regulation as in New Zealand. Removing some of the less comparable companies from the sample would reduce the NZCC's sample to a size more comparable to that of Ofgem and the AER.[371]

4.231 For the draft decision, we did not consider it practical to restrict the sample to only those companies that are regulated in a similar way as in New Zealand because this would exclude many of the US companies, and in our view the most important characteristic of an energy comparator was whether it is an energy utility rather than an energy utility regulated in a comparable manner. However, we noted Oxera's reference to Dr Lally's view that the regulatory settings in New Zealand create greater risk for firms than do the regulatory settings in the US.[372]

4.232 ENA did not support CEPA's decision to exclude two firms that have a low percentage of regulated revenues from the comparator sample.[373] One of the firms, UGI Corp was excluded because its utilities activities account for 14% of total revenue. We agreed with CEPA's assessment that this firm should be excluded. However, we agreed with the ENA that APA Group, as one of the major gas pipeline businesses in Australia, is a relevant comparator that should be included in the sample, even though it has a low percentage of regulated revenues.

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[371] Commerce Commission "IM Review 2023: Forecasting and incentivising efficient expenditure for EDBs - 'Full slide deck'" (7 November 2022), p. 35.

[372] Ibid, p. 35.

[373] The firms are UGI Corp from the United States and APA Group from Australia. Ibid, p. 12. See Horizon Energy Group "Submission on Expenditure incentives EDB workshop" (8 December 2022)

4.233 Oxera submitted that we should remove illiquid companies from the comparator sample.

> We also consider that the comparator sample used by the NZCC includes illiquid companies, which can result in a mis-statement of the equity beta. Filtering out illiquid companies reduces the impact that illiquid stocks can have in driving the results, which is particularly important if the NZCC chooses to align with international regulatory precedent in selecting a smaller sample.[374]

4.234 We reviewed the sample prepared by CEPA by considering the reliability of the asset beta estimates. We used bid-ask spreads, percentage of shares available for trading and variability in asset beta across estimation method (daily, weekly and four-weekly) as indicators. As with the airport sample, we did not use a mechanistic method in the draft decision when applying these indicators, but rather used our judgement based on the information across the indicators when we considered whether to exclude a firm from the comparator sample.

4.235 This review highlighted the following six firms that were not included in the sample:

4.235.1 RGCO from the US, which had a bid-ask spread of 2.5% (the median bid-ask spread is 0.06%). RGCO was an outlier compared to other firms in the sample, with weekly and four-weekly asset betas near zero for the last two five-year periods;

4.235.2 Avangrid Inc from the US, which had a negative four-weekly asset beta for 2012-17 and a free float percentage of 18% (compared to a median of 99.4%);

4.235.3 Unitil Group from the US, which had a bid-ask spread of 0.78% and a variability in asset beta of 0.22 in 2017-2022;

4.235.4 Chesapeake Utilities Corp from the US, which had a bid-ask spread of 0.50% and a variability in their asset beta of 0.19;

4.235.5 MGE Energy Inc from the US, which had a bid-ask spread of 0.39% and a variability in asset beta of 0.24 in 2017-2022 and 0.28 in 2012-2017; and

4.235.6 Northwest Natural Gas Co from the US, which had a bid-ask spread of 0.21% and a variability in asset beta of 0.21 in 2017-2022.

[374] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big 3 February 2023), p. 35.

4.236 A firm that had indicators of concern was Vector. It had a bid-ask spread of 0.45% and a free float percentage of 24.9%. However, we left Vector in the sample for the draft decision because it had an asset beta variability of 0.03, which was relatively low compared to the firms noted above. We also considered Vector an important comparator because it was the only New Zealand firm in the sample.

4.237 There were other firms with high asset beta variability (for example, ONEOK Inc has a variability of 0.33 in 2017-2022). However, we left these firms in the sample because their bid-ask spreads and free float percentages were not also a concern.

4.238 Of the 51 remaining firms in the CEPA sample, the bid-ask spreads (excluding Vector) ranged from 0.02% to 0.16% with a median of 0.05%, the free float percentages (excluding Vector) ranged from 87.39% to 99.99%, with a median of 99.4%, and the variability in asset betas ranged from 0 to 0.33, with a median of 0.08.

4.239 Excluding the firms from the sample did not have a material effect on the asset beta. The average asset beta for the last two five-year periods in the draft decision sample was 0.36, which compared to 0.35 before these firms were removed. However, removing the firms did affect the standard errors of the asset beta, which were used in the broader WACC calculation.

4.240 In the draft decision, we noted recent decisions from Australia that indicated a concern that relying too much on international companies may not produce a reasonable set of comparators.

4.240.1 The AER used only Australian companies, including delisted companies[375]; and

4.240.2 The ERA in Western Australia used delisted Australian and international companies.[376]

[375] PowerCo "Submission on IM Review Options to maintain investment incentives in the context of declining demand paper" (10 February 2023), p. 10 -11 and 19.

[376] The Lines Company "Submission on IM Review Options to maintain investment incentives in the context of declining demand paper" (10 February 2023), p. 6 and 179.

4.241 We considered the comparator sample could be improved by including the Australian companies that were recently delisted, as a way of reducing the over-reliance on firms from the United States. We added Ausnet Services and Duet but did not add Spark Infrastructure as it used hybrid securities which gave it an artificially low leverage.[377]

4.242 In conclusion, for the draft decision we decided to modify the CEPA sample as indicated in this section. We provided a table in Attachment B of the draft decision that provided the relevant indicators for each firm and summarised the reasons for including or excluding firms from the sample. The table included leverage as an indicator; however, we did not find any indicators of concern (as we did with airports where some firms had negative leverage).

New evidence for step 4: calculating the average asset beta for our sample

4.243 For the draft decision, there were

4.244 three issues related to step 4. The first was whether to give more weight to daily betas. The second was whether to weight the sample by country. The third was how to deal with the effects of COVID-19.

Issue 1: should we give more weight to daily betas?

4.245 Our practice for the 2016 IM review was to calculate daily, weekly and four-weekly asset betas but to give primary weight to the weekly and four-weekly values.

4.246 At the 2016 IM Review, we said:

> We note there is a trade-off between problems of weekly/monthly betas and daily betas:
>
> Daily asset beta estimates can be distorted by low liquidity stocks. It is important to measure contemporaneous changes in the individual firm's share price and the relevant market index. The shorter the estimation interval used, the more difficult it is to capture a contemporaneous link.
>
> Weekly and monthly asset beta estimates, on the other hand, lead to fewer observations being available when undertaking the regression analysis. This can affect the statistical significance of the results.
>
> In reaching our decision to give primary weight to weekly and four-weekly betas, we note that:
>
> Our approach of averaging weekly and four-weekly betas across all possible reference days significantly reduces any concerns about a lack of observations for weekly and monthly estimates.

[377] Hybrid securities have both debt and equity characteristics, which make it difficult to estimate a firm's leverage.

> Although international evidence based on regulatory precedent and academic papers is ambiguous, a recent study of evidence implies that low frequency beta estimates should always be preferred to high frequency beta estimates.[378]

4.247 Oxera for the 'Big Six' EDBs proposed we give more weight to daily betas:

> We recommend that, when the stocks included in the sample are liquid, a daily observation frequency is used and when illiquid stocks cannot be excluded from the sample, a weekly observation frequency is used.[379]

4.248 As noted above we reviewed the sample for liquidity and removed an additional firm from CEPA's sample.

4.249 We also checked the practice by Australian regulators and noted the AER, Queensland Competition Authority (**QCA**) and ERA used weekly data. QCA's reasoning was that weekly data:

> strikes a balance between having a large number of observations and also being unlikely to capture statistical noise that might possibly be accompanied by higher-frequency (e.g. daily) return intervals.[380]

4.250 QCA also indicated that it prefers weekly to four-weekly estimates because the weekly estimates had lower standard errors.[381]

4.251 We noted that the Water Services Regulation Authority (**Ofwat**) used daily data on the basis that it maximised the number of data points and allowed for more precise and less volatile estimates.[382]

4.252 The issue of which method to put weight on was material for the draft decision, because as Table 4.5 shows for our comparator sample, the weekly estimates were greater than the four-weekly estimates and the daily estimates were greater than the weekly estimates.

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[378] Commerce Commission "Input methodologies review decisions - Topic paper 4: Cost of capital issues (20 December 2016) paras 306-307. The research referenced was Alan Gregory, Shan Hua and Rajesh Tharyan "In search of beta" (April 2015).

[379] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big 6' EDBs, 3 February 2023), p. 35.

[380] Queensland Competition Authority "Final report: Rate of return review" (November 2021), p. 77.

[381] Ibid, p. 77.

[382] Ofwat "Creating tomorrow, together: consulting on our methodology for PR24" "Appendix 11 - Allowed return on capital" (July 2022), p. 15.

Table 4.5 Asset betas for the draft decision energy comparator sample, by period and frequency

	2007-12	2012-17	2017-22
Daily	0.38	0.38	0.41
Weekly	0.35	0.35	0.40
Four-weekly	0.33	0.31	0.37

4.253 Our method of giving primary weight to weekly and four-weekly estimates resulted in an asset beta of 0.36, whereas weekly estimates gave a value of 0.37 and daily estimates gave a value of 0.40 (all based on the last two five-year periods for illustrative purposes).

4.254 The standard errors for the draft decision for the different estimation methods were shown in Table 4.6. The standard errors of the four-weekly estimates were higher than the standard errors of the daily and weekly estimates for 2017-2022 but not for the other periods. This table was inconsistent with QCA's view that weekly estimates had lower standard errors than four-weekly estimates.

Table 4.6 Standard errors for the draft decision energy comparator sample, by period and frequency

	2007-12	2012-17	2017-22
Daily	0.11	0.12	0.11
Weekly	0.11	0.14	0.14
Four-weekly	0.11	0.11	0.16

4.255 We considered the proposal by Oxera to use daily estimates for liquid stocks and weekly estimates for the less liquid stocks. However, we considered that there is an issue with using daily estimates due to statistical noise associated with daily movements. We were also not aware of any research evidence that invalidated the findings by Gregory et.al (2015) that low frequency estimates should be preferred over high frequency estimates. Further, our preference was to exclude firms that had unreliable beta estimates rather than to include these firms using a lesser frequency estimation method.

4.256 Overall, for the draft decision we proposed continuing to place primary weight on the average of weekly and four-weekly estimates to calculate the asset beta.

Issue 2: Should we weight the sample by country?

4.257 In 2016 we calculated the asset beta as the average of the sample. With the change to the sample, there was a risk that this averaging method placed too much weight on the US market.

4.258 We noted there was a regulatory precedent for weighting by country. The ERA weighted equally the estimates from each country in its international sample (it refers to this as 'country pooling'):

> The ERA applies country pooling for the 2022 final gas instrument. The ERA considers that this approach allows for the examination of country specific effects that may not be apparent under a full pooling approach, along with visibility over any variability of estimates within each country. This may reveal differences between countries that would otherwise be difficult to quantify, allowing for adjustment via regulatory discretion.[383]

4.259 Weighting equally the US, UK, New Zealand and Australia countries resulted in an asset beta of 0.35 which was slightly lower than the value of 0.36 without the weighting.

4.260 As the weighting did not have a material effect on the asset beta results, we proposed, based on simplicity and consistency with prior practice, that we continue with the existing method.

Issue 3: How should we deal with the effects of Covid-19?

4.261 For the draft decision, we calculated the average asset betas for different periods:

4.261.1 the asset beta varied from 0.34 for 2007-2012, 0.33 for 2012-2017, 0.20 for 2018-2020 and 0.44 for 2020-2022.[384]

4.262 It was not clear why the asset beta was lower for the two years prior to COVID-19. However, even if this was an anomalous period there was evidence the asset beta for energy increased in the 2020-2022 period.

[383] The Lines Company "Submission on IM Review Options to maintain investment incentives in the context of declining demand paper" (10 February 2023), para 1089.

[384] These asset betas are the averages of weekly and four-weekly values. Note the 2018-2020 estimate finishes at 28 February 2022, which approximates the start of COVID-19, and the 2020-22 estimate is for two years commences just after that date.

4.263 A clearer picture emerged when we split the data into separate periods:[385]

4.263.1 The average asset beta for the pre-COVID-19 periods of 2007-2012, 2012-2017 and 2018-Feb 2020 combined was 0.31;[386]

4.263.2 The average weekly asset beta for the first 10 weeks of COVID-19 (which we have represented by the NZ lockdown period of 28 Feb 2020 to 13 May 2020) was 0.60;[387]

4.263.3 The average weekly asset beta for 14 May 2020 to 30 September 2022 was 0.34;[388] and

4.263.4 The average weekly asset beta for 1 October 2021 to 30 September 2022 was 0.36.[389]

4.264 This data indicated that the more intense period of COVID-19 uncertainty may have added approximately 0.29 to the previous long term asset beta of 0.31.

4.265 We noted that the percentage increase in the long-term asset beta during the intense period of COVID-19, at 94%, was higher than the percentage increase for airports, at 75%. This was somewhat surprising given lockdowns and border closures were expected to have a greater effect on airports than on energy networks. However, we noted asset betas calculated over shorter periods may be unreliable compared to asset betas calculated over longer periods.

4.266 We calculated an adjustment to the long-term pre-COVID 19 asset beta to account for the likelihood that COVID-19 increased the asset beta, in the manner adopted for airports.

4.266.1 For a pre-COVID-19 asset beta of 0.31, with a weight of 92.5% and a COVID-19 asset beta of 0.60 with a weight of 7.5%, the weighted average was 0.33.[390] This increase of 0.02 was considered an upper value. A mid-point adjustment was 0.01.

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[385] We have used weekly and four-weekly values for the pre-Covid-19 estimates, but weekly values for the post-Covid-19 estimates, as we are wanting to make the best estimates possible and for the more recent estimates we are limited to weekly data.

[386] This uses averages of four-weekly and weekly asset betas. The average weekly asset beta over this period was 0.32.

[387] The daily asset beta for this period was 0.58.

[388] The daily asset beta was 0.31; the four-weekly asset beta was 0.30.

[389] The daily asset beta was 0.27; the four-weekly asset beta was 0.37.

[390] See paragraph 4.92.3 for an explanation of why we are using these percentages.

4.267 The Australian energy network regulators considered whether to change the method due to COVID-19:

4.267.1 The AER concluded that the longest estimates available, which were 14 years, are the most stable and therefore the most statistically robust estimates of beta for energy companies; they considered that five-year estimates were also useful (for "limited consideration") although subject to more statistical noise and estimation error; and

4.267.2 The ERA added the 10-year beta estimates to the information they considered, which had previously been the five-year estimate and a non-ordinary least squares estimation method that reduces the effect of outliers.

4.268 Our options for the draft decision were the same as for the airports' asset beta decision. We noted the calculation of the adjusted energy asset beta, of 0.31 + 0.01 = 0.32 was less than the average asset beta of the last two five-year periods (0.36). However, the average for the last two five-year periods was the same as the value for 1 October 2021 to 30 September 2022 (0.36).

4.269 As for the airports decision, the choice of asset beta for energy in the circumstances was a matter of judgement. We concluded in the draft decision that the asset beta was likely to fall in the range of 0.32 to 0.36 and our draft decision was to use a value of 0.35. Given estimation error, we considered this value was not inconsistent with the various interpretations of the effect COVID-19 might have had on the asset beta, and particularly given the uncertainty associated with the extent that COVID-19 was a systematic event.

Conclusion regarding step 4: calculating the average asset beta for our sample

4.270 For the draft decision, we proposed a value of 0.35 as the value of asset beta that best represented the information in our comparator sample.

New evidence for step 5: applying any adjustments

4.271 In 2016, we used a combined electricity and gas sample but provided a 0.05 uplift to the gas pipeline businesses (we had provided a 0.1 adjustment in 2010).

4.272 Our justification in 2016 was:

4.272.1 gas had a higher income elasticity of demand than electricity, based on modelling by HoustonKemp;

4.272.2 the risk of economic network stranding of the gas pipeline assets due to a drop in economic activity was higher in New Zealand relative to the companies in the comparator sample because a relatively low proportion of New Zealand households were connected to gas and this may have implied greater growth options; and

4.272.3 we preferred using an uplift to estimating asset betas using separate samples for gas and electricity. The reasons included the gas sample is entirely US companies (and evidence by CEG and TDB Advisory indicated little difference in systematic risk between electricity and gas businesses in the US), and the estimates of gas asset beta varied significantly based on different approaches suggested by consultants.[391]

4.273 We also noted, however, that a chart of asset betas from 1996 -2006 did not indicate a persistently higher asset beta for the gas sub-sample.

4.274 For the draft decision, we considered separately the matters of (a) whether we should separate the sample into gas and electricity; and (b) whether we should continue to apply an uplift for gas, and if so by how much?

4.275 We did not consider making an adjustment to the asset beta for energy networks because this matter had not been raised in submissions and we were not aware of any reason for doing so.

Creating separate gas and electricity samples

4.276 This section considered whether the systematic risk of gas firms and electricity firms in our comparator set was sufficiently different to separate out a gas and electricity asset beta.

4.277 When CEPA considered this issue with the updated sample, they found while the average asset beta for gas is higher than for electricity, the difference between the two estimates was not statistically significant given the large variance of the gas estimates.

4.278 Oxera for Vector, First Gas and Powerco found the difference in asset beta between gas and electricity sub-samples using updated data was 0.07 but the results were not statistically significant.[392]

[391] Commerce Commission "Input methodologies review decisions - Topic paper 4: Cost of capital issues (20 December 2016), paras 367.1 and 367.2.

[392] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), p. 23.

4.279 The asset betas for our gas subsample were shown in Table 4.7.

Table 4.7 Asset betas for the gas subsample, by period and frequency (for the draft decision)

	2007-2012	2012-2017	2017-2022
Daily	0.44	0.49	0.50
Weekly	0.40	0.48	0.50
Four-weekly	0.38	0.43	0.48

4.280 We updated the statistical analysis for our proposed comparator set. We tested the null hypothesis that the mean of the gas sample was not significantly different to the mean of the non-gas sample for different periods. The results were as shown in Table 4.8.

Table 4.8 Results of draft decision test of whether there was a statistically significant difference between the means of the gas and non-gas samples (p-values, debt beta = 0)[393]

	2007-12	2012-17	2017-22	2018-20	2020-22	2021-22
Daily	0.219	0.019*	0.040*	0.002**	0.182	0.260
Weekly	0.329	0.024*	0.120	0.002**	0.387	0.324
Four-weekly	0.342	0.029*	0.164	0.012*	0.223	0.999

[393] The values reported in this table are p-values. A p-value is a measure of evidence against the null hypothesis. In this case, the null hypothesis is that there is no significant difference between the means of the gas and non-gas samples. A single asterisk indicates there is evidence against the null hypothesis at the 0.05 level of significance; two asterisks indicate evidence at the 0.01 level of significance; three asterisks indicate evidence at the 0.001 level of significance. The more asterisks there are, the more confidence can be placed on a conclusion that the gas sample can be separated from the non-gas sample. It is common practice to use at least one asterisk as the level of evidence required to be confident that the means of two samples are statistically different. These results are generated using the t.test function in the package R.

4.281 At the 2016 IM Review we noted that a non-zero debt beta assumption made comparisons of asset betas across individual firms more valid because it accounted for different levels of gearing.[394] However, our analysis at the time indicated that the addition of a non-zero debt assumption largely changed the level of the asset beta for each subsample considered, and not the relativity of the asset betas across the different subsamples.[395] We repeated our statistical testing using an illustrative debt beta of 0.1. The results, shown in Table 4.9, indicated that including a debt beta assumption in the analysis did not change the results.

4.282 For the statistical testing in this review, we assumed a zero debt beta when calculating the asset beta for individual firms.

Table 4.9 Results of draft decision test of whether there was a statistically significant difference between the means of the gas and non-gas samples (p-values, debt beta = 0.1)

	2007-12	2012-17	2017-22	2018-20	2020-22	2021-22
Daily	0.216	0.018*	0.041*	0.002**	0.186	0.253
Weekly	0.324	0.023*	0.120	0.002**	0.390	0.322
Four -weekly	0.337	0.029*	0.164	0.012*	0.224	0.932

4.283 We could reject the null hypothesis for the pre-COVID-19 periods of 2012-2017 and 2018-2020 but not for the period 2007-2012. That is, there was evidence of a statistically significant difference in the means for the pre-COVID-19 period from 2012 to 2020.

4.284 We could not reject the null hypothesis for the 2017-2022 period which included the COVID-19 period (although the daily data was significant for this period), but neither could we reject the null hypothesis for the 1 October 2021 to 30 September 2022 period.

[394] Commerce Commission "Input methodologies review decisions – Topic paper 4: Cost of capital issues (20 December 2016), para 383.

[395] A comparison of Figure 7, which shows the asset betas of the subsamples assuming a zero debt beta, and Figure 8, which is the same chart assuming a non-zero debt beta, indicates the figures are very similar with the difference is mainly due to a shift in the levels of the asset betas. See Commerce Commission "Input methodologies review decisions - Topic paper 4: Cost of capital issues (20 December 2016), pp. 95 and 99.

4.285 We noticed the results were sensitive to the inclusion of a gas firm (ONEOK Inc) which had a relatively high asset beta variability. If that firm was excluded from the analysis, as shown in Table 4.10, the conclusion of a statistically significant difference in the means for the pre-COVID-19 period was weaker, with the weekly and four-weekly results insignificant at the 0.05 level of significance for the periods other than 2018-20.

Table 4.10 Results of test of whether there is a statistically significant difference between the means of the gas and non-gas samples (p-values) excluding ONEOK

	2007-12	2012-17	2017-22	2018-20	2020-22	2021-22
Daily	0.305	0.040*	0.051	0.001**	0.372	0.399
Weekly	0.462	0.051	0.196	0.002**	0.915	0.486
Four-weekly	0.510	0.062	0.313	0.020*	0.443	0.813

4.286 We also noted that the asset betas for the gas sample were less reliable than for the full sample. The average variation by asset beta by frequency for the gas subsample was 0.13 and for the full sample was 0.07; the bid-ask spread was 0.10% for the gas subsample and 0.07% for the full sample.

4.287 We concluded in the draft decision that the statistical testing did not provide sufficient reason to separate the gas and non-gas samples. However, we noted this was a finely balanced issue, and the argument could be made for separating the samples. We were concerned about the reliability of the gas data, which weakened the case for separation, and noted that the post-COVID-19 data did not support separation, although that data was over a relatively short timeframe.

4.288 Appendix B of the draft decision included the results of further statistical testing, which included the finding that the results were similar when the comparison was between the gas sample and the electricity sample (rather than the non-gas sample which included integrated firms). We also found that there was no statistically significant difference between the electricity and non-electricity samples.

4.289 We also noted the two Australian energy network regulators that had just finished their periodical WACC reviews had not distinguished between gas and electricity in their comparator samples or provided an uplift for gas.

4.289.1 The AER used a limited domestic sample and did not limit it further by restricting it to gas businesses;[396] and

4.289.2 The ERA's international sample was very similar to CEPA's (the main difference was that the ERA included companies from Canada [397]); they did not limit the sample to gas businesses even though they were making a decision on gas pipelines.[398]

4.290 Ofgem was another regulator that did not calculate a separate asset beta for gas.[399]

4.291 Overall, our view for the draft decision was that there was insufficient reason to create separate samples for gas and electricity.

Providing an uplift to the asset beta for gas

4.292 This section of the draft decision considered the issue of whether the systematic risk of New Zealand gas companies was different to the sample set due to specific characteristics of the New Zealand gas sector.

4.293 The submitters that supported a gas uplift included:

4.293.1 First Gas, which submitted the uplift should revert to 0.10 because there has been 16 years when the average betas for gas were higher than for electricity. They also noted our previous reasoning on income elasticity of demand and the relatively low penetration of gas connections in New Zealand;[400]

4.293.2 Powerco, which noted the CEPA findings, our previous reasoning and the Oxera report.[401] Oxera concluded on theoretical grounds (higher elasticity of demand, lower gas penetration rates) that gas has a higher systematic risk which supports an uplift; and

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[396] The AER decided on an equity beta of 0.6 and leverage of 0.6. The implied asset beta is 0.24. See AER "Rate of Return Instrument" (February 2023).

[397] The reason we have not included Canadian firms in this review is to maintain consistency with the sampling method we used in the 2016 review. Two of the eight Canadian firms in the ERA's sample are predominantly gas utilities.

[398] The ERA decided on an equity beta of 0.7 and leverage of 0.55. The implied asset beta is 0.315. See Economic Regulation Authority "2022 final gas rate of return instrument" (16 December 2022).

[399] Ofgem "RIIO-ED2 Draft Determinations – Finance Annex" (29 June 2022), para 3.33.

[400] First Gas "Submission on IM Review CEPA report on cost of capital" (3 February 2023), pp. 1-3.

[401] Powerco "Submission on IM Review CEPA report on cost of capital" (3 February 2023), p. 5.

4.293.3 Vector, as they considered there was a risk of under-investment in the gas network during the energy transition.[402]

4.294 The submitters that did not support a gas uplift included:

4.294.1 Aurora Energy; however, they recommended this issue be reconsidered once the Oxera recommendation to remove unsuitable firms from the sample is completed;[403]

4.294.2 ENA, but did not provide reasons;[404] and

4.294.3 Major Gas Users Group, due to the statistical evidence from CEPA and they also considered the asset beta appeared to favour New Zealand electricity suppliers (they considered Vector's asset beta had been lower than the asset beta used in the energy sector by more than the uplift).[405]

4.295 Overall, we considered our reason for providing an uplift in 2016 still stood and there were no new reasons provided in submissions.

Conclusion on gas uplift in the draft decision

4.296 While the updated statistical analysis did not necessarily justify separating the gas sample, the results were finely balanced. We also continued to consider that gas is likely to have a higher income elasticity and that the gas networks in New Zealand may face a higher risk than gas networks overseas due to the lower rates of connection in New Zealand. Overall, we considered that an uplift should be provided.

4.297 We considered whether 0.05 was an appropriate magnitude for the uplift. We noted that the average value of asset beta of the gas subsample for the last two five-year periods was 0.47, and that we were proposing a value of 0.35 for the energy beta. That difference, at 0.12, was higher than the 0.05 current uplift.

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[402] Vector "Submission on IM Review CEPA report on cost of capital" (3 February 2023), p. 3 and paras 25 to 28.

[403] Aurora Energy "Submission on IM Review CEPA report on cost of capital" (3 February 2023), paras 19-20.

[404] Electricity Networks Aotearoa (ENA) - Rate of return issues -"Submission on IM Review CEPA report on cost of capital" (3 February 2023), p.12.

[405] Aurora Energy "Submission on IM Review CEPA report on cost of capital" (3 February 2023), paras 5 and 19-23.

4.298 However, we also noted that if we excluded the gas firm with high asset beta variability (ONEOK Inc) from the analysis, the asset beta for the gas subsample was 0.43, which reduced the difference to 0.08. In comparison, the asset beta for the non-gas sample was 0.33 (using the average of the weekly and four-weekly asset betas for the last two five-year periods).

4.299 We also noted that the average leverage of the gas sample (excluding ONEOK Inc) was 37% compared to the 41% for the energy sample. In comparison, if we:

4.299.1 applied a 0.1 uplift and changed the leverage assumption to 37%, the GPB equity beta would be 0.71; and

4.299.2 continued to apply a 0.05 uplift and did not change the leverage assumption, the GPB equity beta would be 0.68.

4.300 This analysis indicated that, even if we did take into account the higher average asset beta in the gas subsample, there was not a strong reason to change the uplift from 0.05.

4.301 For the draft decision, we proposed to maintain an asset beta uplift of 0.05 for the GPBs with the leverage that applied to the GPBs calculated from the full energy sample.

New evidence for step 6: calculating the equity beta for the draft decision

4.302 The equity beta was calculated using the asset beta and notional leverage.

4.303 We proposed applying the same notional leverage to EDBs, Transpower and GPBs. As explained in paragraph 5.17, we proposed to apply a leverage of 41% based on the average leverage of the sample, which is lower than the 42% calculated in 2016 (and compared to CEPA's calculation of 39%).

4.304 For EDBs and Transpower, an asset beta of 0.35 combined with notional leverage of 41% resulted in an equity beta of 0.59. This compared to 0.60 in the current IMs, and CEPA's estimate of 0.57.

4.305 For GPBs, an asset beta of 0.40 combined with notional leverage of 41% resulted in an equity beta of 0.68. This compared to 0.69 in the current IMs, and CEPA's estimate of 0.66.

Stakeholder views on the draft decision

4.306 Oxera for the Big 6 EDBs and Oxera for First Gas, Powerco and Vector did not support a Covid adjustment and preferred that we continue to use the existing approach (which is to calculate the average asset beta for the last two five-year periods).[406] Powernet did not agree with the Covid adjustment because they considered it would affect the certainty of the EDB's expected returns.[407] Aurora Energy considered the adjustment for Covid "introduced an element of subjectivity to the WACC calculation methodology".[408] Dr Lally submitted that our calculation of the Covid adjustment was not correct.[409] In a cross-submission, Oxera for Vector reiterated Dr Lally's submission.[410]

4.307 GPBs asked us to consider the use of daily betas, splitting the gas and electricity samples, and increasing the asset beta uplift to 0.1.[411]

4.308 MGUG opposed the asset beta uplift for GPBs.[412]

4.309 We respond to the submissions in the next section.

Final reasons

4.310 We have responded to the points made in submissions by reconsidering the relevant step in the equity beta calculation process. The submissions were focussed on step 4, which is the step that calculates the average asset beta for the comparator sample (and in particular whether to make a Covid adjustment), and step 5, which is the step that applies any adjustments to the average asset beta for the comparator sample (or alternatively split the gas and electricity samples).

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[406] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), para. 2.10; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), p. 4.

[407] PowerNet "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9.

[408] Auckland International Airport Limited (AIAL) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 15.

[409] Dr Martin Lally "The impact of future COVID-19 scenarios on beta" (22 June 2023), section 2.

[410] Oxera "Response to Commerce Commission's draft decision for IM Review 2023 on cost of capital" (report prepared for Vector, 9 August 2023), p. 15.

[411] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), para. 2.17.

[412] Major Gas Users Group (MGUG) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 20.

Regarding step 4, should we have used a different value as the Covid adjustment or not make an adjustment?

4.311 In the draft decision we used a value of 0.01 as the premium added to the pre-Covid asset beta. However, our decision on asset beta considered other information, including the average asset beta for the last two five-year periods as well as for the year to September 2022. The asset beta we applied in the draft decision (0.35) was higher than the asset beta calculated using the adjusted pre-Covid beta (0.32).

4.312 We received submissions from Oxera for First Gas, Powerco and Vector, Oxera for the EDBs and Powernet that did not support making an adjustment for a pandemic occurring in the future. Oxera stated:

> We find the NZCC's approach concerning, as it introduces non-justified non-replicable methodological steps and, in so doing, deviates from the NZCC's principles-based approach and reduces the stability and predictability of the regulatory regime.[413]

4.313 When we made the draft decision we did not have analysis for energy that was akin to the analysis provided by TDB Advisory on the application of the Flint Global method to airports. Instead, we used a method that approximated the calculation used for airports. Dr Lally has shown that our approximation is not correct because it does not account for differences in variance between the Covid and non-Covid periods of the analysis.[414] Dr Lally also noted that the Flint Global method does account for differences in variance between the Covid and non-Covid periods.[415]

4.314 We have applied the Flint Global method (in the same way we did for airports) to Vector and to the comparator sample. The results for Vector using weekly stock market data indicate a negative adjustment of between 0 and -0.03. This negative adjustment is calculated as the difference between the average asset beta for the Covid period of the five-year sample, and the average asset beta for the non-Covid period within that same five-year sample. An issue, however, is that there is a significant difference between the non-Covid asset beta calculated within the five-year sample, which is 0.34, and the pre-Covid asset beta calculated as the average of the 12 years before Covid, which is 0.28. If the value of 0.28 is used to calculate the adjustment, the adjustment is between 0.03 and 0.06.

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[413] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), para. 2.10.

[414] Dr Martin Lally "The impact of future COVID-19 scenarios on beta" (22 June 2023), section 2.

[415] Ibid, p. 5.

4.315 The results for the comparator sample indicate adjustments between 0 and 0.05. However, these results also do not seem to be reliable because the non-Covid betas used are much lower than the betas for the periods from 2007 to 2017.[416]

4.316 While the evidence is mixed, our final decision is not to apply any adjustment to the energy asset betas for Covid in the final decision. Unlike with airports there is less theoretical justification for applying an adjustment as it is not clear that energy firms would be affected by a pandemic in the same way as an airport.

4.317 As we have not applied any adjustment for Covid, we have considered whether we should continue to apply our method of calculating the asset beta as the average of the comparator sample for the last two five-year periods. The relevant data to inform this decision (using weekly and four-weekly data) are:

4.317.1 Our estimate of the pre-Covid asset beta (1 October 2007 to 28 February 2020) is 0.31.

4.317.2 The average asset beta for the last two five-year periods (1 October 2012 to 30 September 2022) is 0.36.

4.317.3 The average asset beta for the period from 1 October 2017 to 28 February 2020 is 0.19.

4.317.4 The average asset beta for the period from 1 March 2020 to 30 September 2022 is 0.41.

4.317.5 The average asset beta for the year ending 30 September 2022 is 0.36.

4.318 The variability of the asset beta estimates, and in particular the lower estimate for the period immediately prior to Covid-19, reduces our confidence in our estimate of the pre-Covid asset beta of 0.31. Given that the estimate of the asset beta for the last two five-year periods is the same as the estimate for the year ending 30 September 2022, and given that we do not consider the asset beta needs to be adjusted for the possibility of another pandemic, we have decided to continue to use our existing method of calculating the asset beta as the average of the last two five-year periods. We also consider, in the circumstances, that the continuing use of the average asset beta for the last two five-year periods addresses Oxera's concern that a change in method would affect the predictability of the regulatory regime.

[416] The mean of the non-Covid asset beta for the sample is 0.20, whereas the mean for the pre-Covid period is 0.31.

4.319 Our final values of asset beta, leverage and equity beta for EDBs and Transpower are provided in Table 4.11. The asset betas and leverage for our comparator sample, as well as the excluded firms, are provided in Attachment E.

Table 4.11 Final values of asset beta, leverage and equity beta for EDBs and Transpower

Indicator	Current IMs	Draft Decision	Final Decision
Asset beta	0.35	0.35	0.36
Leverage	42%	41%	41%
Equity beta	0.60	0.59	0.61

Should we use daily betas when considering whether to create a separate gas sample and/or a gas uplift to the asset beta?

4.320 We provided a 0.05 uplift to the gas asset beta in the draft decision. First Gas submitted that we should have used daily betas in our analysis and that including daily betas supports a 0.1 uplift.[417]

4.321 Oxera for First Gas and Oxera for the Big Six EDBs considers the sample no longer exhibits any distortion in beta estimates resulting from illiquid stocks as we have applied liquidity filters.[418] First Gas also points out that daily beta estimates have the lowest and most consistent standard errors.[419]

4.322 Incenta for Christchurch Airport argues that Oxera has not correctly conveyed the implications of Gregory et al (2015, 2018).[420] The study presents a theory that high frequency beta estimates may be less reliable when there is "opacity", which Incenta indicates is when there is uncertainty about how quickly new information affects share prices. Incenta considers that opacity is likely to be a more material issue for airport sector, therefore, using daily betas will be downward biased for airports. However, Incenta also notes that it is plausible that opacity is not an issue for electricity distribution sector given the utility nature and the resulting stability and predictability of cash flows. Therefore, Incenta says that the Gregory et al study should not rule out the use of daily betas for the energy sector.

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417 First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), section 5.

418 Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), para 2.9.

419 First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 27.

420 Incenta Economic Consulting "Cross-submission on IM Review 2023 Draft Decisions" (report prepared for Christchurch International Airport Ltd (CIAL), 9 August 2023), para 5.

4.323 The use of daily betas provides slightly more support for separating the gas and non-gas samples, based on the statistical testing of the difference in the means of the gas and non-gas samples (see Tables 4.12 and 4.13). However, overall, the statistical analysis does not support separating the sample.[421]

Table 4.12 Results of test of whether there is a statistically significant difference between the means of the gas and non-gas samples (p-values) - Excluding OKE US[422]

	2007-12	2012-17	2017-22	2017-20	2020-22	2021-22
Daily	0.305	0.040*	0.051	0.002**	0.372	0.410
Weekly	0.463	0.051	0.196	0.002**	0.915	0.491
Four-weekly	0.511	0.062	0.313	0.021*	0.443	0.777

4.324 We have analysed the effects of either including or excluding daily betas on the results from separating gas from non-gas firms in the comparator sample. There are ten firms in the gas sample. Table 4.13 shows the resulting mean asset beta and leverage from including and excluding daily betas.

Table 4.13 Effect of including and excluding daily betas for the asset beta and leverage of the gas and non-gas samples (for last two five-year periods to 30 September 2022, weekly and four weekly, excluding OKE)

	Asset beta		Leverage	
	Gas	Non-gas	Gas	Non-gas
Include daily betas	0.43	0.34	0.38	0.41
Exclude daily betas	0.42	0.33	0.38	0.41

[421] As noted in the draft decision at paragraph 4.139 of the Cost of Capital topic paper for the draft decision, there is one gas firm (OKE US Equity) that was an outlier in terms of its asset beta variability. Although we left OKE in the sample of energy firms, because its liquidity indicators did not indicate a concern, we consider that it may cause misleading inferences for the statistical testing of whether to create a separate gas sample. If a separate gas sample were created, there would need to be a decision about whether to leave OKE in the sample. We have assumed in this section that OKE would not be included in the gas sample.

[422] The p-values reported in this table and the next table are indications of the statistical significance of the difference in the means of the two samples. The more stars, the greater the level of significance. If there is no star there is no evidence of a statistically significant difference in the means of the two samples. Note that this table is slightly different to Table 4.6 in the draft decision. The draft decision had a date gap between 2012-17 and 2018-20, whereas this table does not have a date gap.

4.325 Table 4.13 indicates that the difference in the means of the asset beta for the gas and non-gas samples are similar when daily betas are included (0.09).

4.326 The effects on the WACC for gas and non-gas firms can be calculated using illustrative values for the non-asset beta and non-leverage parameters. These WACC values are shown in Table 4.14.

Table 4.14 Effect on the mid-point vanilla WACC for various scenarios of separating and not separating the gas sample[423]

	Gas with full sample and 0.1 uplift	Gas with separate sample	Gas with full sample and 0.05 uplift	Non-gas with full sample	Non-gas with separate sample
WACC	6.60%	6.29%	6.25%	5.90%	5.69%

4.327 These results indicate a significant increase to the GPB WACC from separating the sample. However, it also indicates that the benefit is similar from applying a 0.05 uplift compared to separating the sample (6.25% compared to 6.29%). A 0.1 uplift, as proposed by First Gas, would result in a comparative WACC of 6.60%, which is higher than the WACC of 6.29% from separating the sample.

4.328 Our final decision is that we base the decision about separating the sample on statistical analysis, which does not support separation. In the draft decision we said that this is a finely balanced issue. One of the factors we considered was the reliability of the gas data – the variability in the gas data is reflected in the statistical testing and weakens the case for separation.

4.329 Turning next to whether an uplift should be applied to the gas asset beta, we note that MGUG opposed the uplift to the gas asset beta on the grounds that there is no statistical basis for the uplift and because Vector's asset beta is lower than the average of the comparator sample by more than the 0.05 uplift (which may indicate the asset beta is already biased upwards for NZ firms).[424]

[423] The gas estimates assume One OK Inc is excluded from the gas sample. If it is included, the WACC for gas with a separate sample would be 6.57%. Note that the WACC calculations in this table assume a nominal risk-free rate of 4.0%, debt risk premium of 1.4%, debt issuance costs of 0.2% and TAMRP of 7%.

[424] Major Gas Users Group (MGUG) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), paras 18 and 19.

4.330 However, we consider the decision to provide an uplift is a judgment based not on statistics but other factors that relate to the risk of gas networks in New Zealand relative to the comparator sample. The draft decision reflected our views expressed in the 2016 IM review that gas is likely to have a higher income elasticity and that gas networks in New Zealand may face a higher risk than gas networks overseas due to the lower rates of connection in New Zealand. In particular, we remain of the view that stranding risk for GPBs may be partly systematic. To this extent, it is one of many factors we have recognised in calculating the asset beta of the WACC.

4.331 As we have not uncovered or received new qualitative information on the draft decision to provide a 0.05 uplift, we have decided to maintain our draft decision.

4.332 The final values for GPBs are shown in Table 4.15.

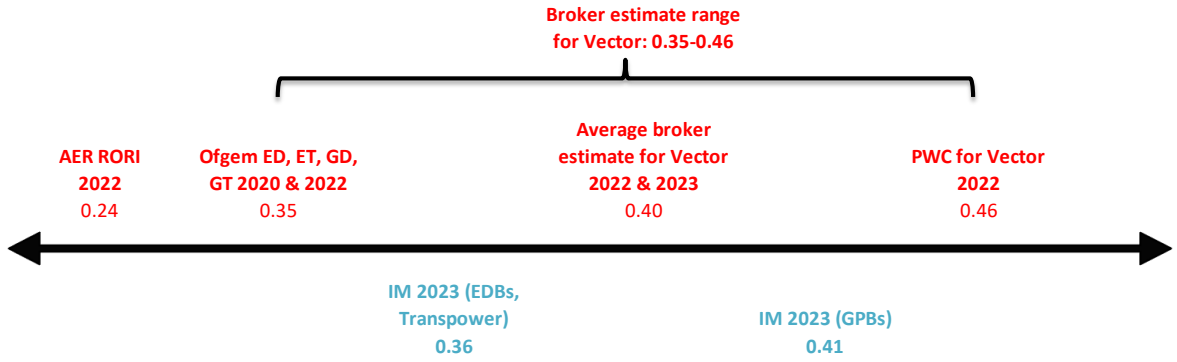
Table 4.15 Final values of asset beta, leverage and equity beta for GPBs

Indicator	Current IMs	Draft Decision	Final Decision
Asset beta for EDBs and Transpower	0.35	0.35	0.36
Uplift to gas asset beta	0.05	0.05	0.05
Gas asset beta	0.40	0.40	0.41
Gas leverage	42%	41%	41%
Recommended equity beta for GPBs	0.69	0.68	0.69

Reasonableness of our asset beta for energy businesses

4.333 We have assessed the reasonableness of our asset beta estimate of 0.36 for EDBs and Transpower, and 0.41 for GPBs, based on available comparable information, as shown in Figure 4.2.

Figure 4.2 Reasonableness checks on our asset beta estimate for EDBs/Transpower and GPBs



4.334 The above figure shows that our asset beta estimate for energy businesses falls within the range of comparable information. We consider that this supports the reasonableness of our estimate.

Tax adjusted market risk premium

Final decision

4.335 Our final decision is to use a TAMRP of 7.0%.

4.336 The TAMRP of 7.0% applies for both four- and five-year PQ paths.

Context

4.337 The MRP measures the additional expected return over and above the risk-free rate required to compensate investors for holding the market portfolio. It represents the premium investors can expect to earn for bearing systematic (market) risk. The form of the MRP that is consistent with the SBL-CAPM is the TAMRP.

4.338 The TAMRP applied in the SBL-CAPM utilises a tax adjustment to the standard MRP to take into account the treatment of taxes in New Zealand.[425] The TAMRP is neither a regulated provider-specific parameter nor an industry-specific parameter, but rather is common to all assets in the economy.

[425] The standard version of the CAPM assumes that all sources of investment income are equally taxed at the personal level. This is not a good description of the New Zealand tax regime, because both capital gains and dividends are less onerously taxed than interest. The favourable treatment of capital gains tax is due to exemption of many investors and, in respect of the rest, the opportunity for deferring payment until sale of the asset. The favourable treatment of dividends arises from dividend imputation. Consequently, it is common practice in New Zealand to invoke a CAPM that recognises the specific tax treatment of equity returns under New Zealand's imputation credit regime.

4.339 In this paper, data relating to MRP estimates has been converted to the TAMRP equivalent. In the interest of brevity, the term 'TAMRP' is used in the text that follows except where there is specific reference to an MRP value.

4.340 The TAMRP is not directly observable and therefore needs to be estimated. This is because:

4.340.1 the TAMRP is a forward-looking concept that reflects investors' expectations;

4.340.2 market returns show what happened, not what was expected; and

4.340.3 the market portfolio itself cannot be observed as market values for many assets are not known, so it requires the use of a proxy (eg, returns on an index of listed equities).

4.341 The TAMRP is also calculated using an estimate of the risk-free rate. When we estimate the TAMRP we need to specify the term of the risk-free rate. We have estimated the risk-free rate based on either a four- or a five-year regulatory period.

Draft decision

4.342 For the draft decision, we proposed to use a TAMRP of 7%. This value was the same as our final decision in 2016, although the TAMRP for GPBs was subsequently amended to 7.5% in 2022.[426]

4.343 We further proposed that where we determine a WACC for PQ purposes, that a TAMRP of 7% be used for four- and five-year PQ paths.

Our reasons for proposing a TAMRP of 7% in the draft decision

4.344 Setting a TAMRP at our best estimate gives best effect to the s 52A purpose of the Act. We considered that this should be expected to adequately compensate investors (in combination with the other elements of the cost of capital) but still limit the ability to extract excessive profits.

[426] Commerce Commission "Input methodologies review decisions. Topic paper 4: Cost of capital issues" (20 December 2016; Commerce Commission "Amendments to input methodologies for gas pipeline businesses related to the 2022 default price-quality paths weighted average cost of capital Reasons paper" (25 March 2022), para 3.4.

4.345 Our best estimate of the TAMRP for the draft decision was 7%. This estimate:

4.345.1 best reflected the range of evidence available, including both historical returns and expected future returns. These were described in greater detail (as below) and combined forward-looking and backward-looking estimates; and

4.345.2 was consistent with the range of TAMRP estimates used by New Zealand market participants, including New Zealand investment banks.

Relevance of the Commission's previous estimates of TAMRP

4.346 TAMRP, by definition, is an economy-wide parameter which should not vary by sector, service or company. As discussed below, TAMRPs are also expected to be relatively stable over time. Given this we considered our previous TAMRP decisions provide useful insights when estimating the TAMRP that best gives effect to the Part 4 objectives.

4.347 The table below shows the historic series of our estimates of the TAMRP.

Table 4.16 Estimates of the TAMRP used by the Commission.

Decision	Year of Decision	TAMRP Estimate
Airports Inquiry[427]	2002	8%
Telecommunications Service Obligations (TSO) determinations - 2001-2002	2003	8%
TSO determinations - 2002-2003 onwards	2005-2008	7%
Gas Control Inquiry[428]	2004	7%
Unison Networks Limited (Unison) Post-breach Inquiry[429]	2007	7%
Gas Authorisation[430]	2008	7%
IMs relating to the supply of electricity distribution services and gas pipeline services[431]	2010	7%
IMs relating to the supply of electricity transmission services[432]	2010	7.5% until June 2011; 7% thereafter
IMs relating to the supply of specified airport services[433]	2010	7.5% until June 2011; 7% thereafter
UCLL & UBA FPP[434]	2015	7%
Review of the IMs determined under Part 4[435]	2016	7%
Fibre IMs[436] **(Also used in the gas DPP3**[437]**)**	2020	7.5%

[427] Commerce Commission "Final Report: Part IV Inquiry into Airfield Activities at Auckland, Wellington and Christchurch International Airports" (1 August 2002).

[428] Commerce Commission "Gas Control Inquiry: Final Report" (29 November 2004).

[429] Commerce Commission "*Regulation of Electricity Lines Businesses – Targeted Control Regime – Reasons for Not Declaring Control – Unison Networks Limited*" (11 May 2007), pp. 38-39.

[430] Commerce Commission, "*Gas Authorisation Decisions Paper"* (30 October 2008).

[431] Commerce Commission "Input methodologies (electricity distribution and gas pipeline services) reasons paper" (22 December 2010).

[432] Commerce Commission "Input methodologies (Transpower) reasons paper" (22 December 2010).

[433] Commerce Commission "Input methodologies (Airport Services) reasons paper" (22 December 2010).

[434] Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Final Decision" (15 December 2015).

[435] Commerce Commission "Input methodologies review decision – Topic paper 4: Cost of capital issues" (20 December 2016).

[436] Commerce Commission "Fibre input methodologies: Main final decisions – reasons paper" (13 October 2020), from p. 441, para 6.521.

[437] Commerce Commission "Amendments to input methodologies for gas pipeline businesses related to the 2022 default price-quality paths – weighted average cost of capital – Reasons paper" (25 March 2022), pp. 13-15, paras 3.9 – 3.22, n 173.

Estimating the TAMRP

4.348 In the Process and issues paper we raised the possibility of using 7.5% as the TAMRP for all businesses regulated under Part 4, although we also indicated that we would consider how often the TAMRP should be estimated.[438] Since we published the Process and issues paper, interest rates increased and so we considered it prudent to re-estimate the TAMRP for the present review.

4.349 The TAMRP is a forward-looking concept which cannot be directly observed.

4.350 Estimating the value of the TAMRP requires a significant amount of judgement. As discussed below there are a range of expert views on matters that are relevant to the estimation of the TAMRP and there is no single approach that provides a correct estimate.

4.351 Several approaches can be used to estimate the TAMRP. These approaches include:

4.351.1 studies of historic returns on shares relative to the risk-free rate;

4.351.2 surveys of investors asking them to state their expected rate of return for the overall market; and

4.351.3 empirical estimates of the MRP from share prices and expected dividends.

4.352 In estimating the value of the TAMRP, we used all three of the above approaches by considering the following methods and information sources:

4.352.1 The Ibbotson approach, which uses data from 1931 to estimate the TAMRP.[439] A critique of this approach is that it fails to correct for pronounced unanticipated inflation between 1926 to 1990.

4.352.2 The Siegel estimates, which attempt to adjust for this effect. The Siegel 1 methodology adjusts the Ibbotson approach using the underlying assumption that TAMRP is stable over time by adding back into the estimation the average long-term real risk-free rate.[440]

[438] Commerce Commission "Part 4 Input Methodologies Review 2023: Process and issues paper" (20 May 2022), pp. 103- 105, paras 6.45 – 6.58.

[439] Dr Lally "Estimation of the TAMRP" (report to the Commerce Commission, 10 April 2023), pp. 4-10.

[440] Ibid, pp. 10-18.

4.352.3 The Siegel 2 methodology, which adjusts the Ibbotson approach on the underlying assumption that real total market returns are constant. The two Siegel methodologies can give quite different results due to these quite distinct underlying assumptions.[441]

4.352.4 Surveys of investors' views on TAMRP, which are based on the Fernandez annual survey.[442] We also considered available estimates from practitioners in New Zealand as a cross check.

4.352.5 The dividend growth model (**DGM**), which is a forward-looking methodology. This estimates the TAMRP through discounting future dividends on existing shares to the current market value of those shares.

4.353 The most common way to estimate the TAMRP is to use historic returns on the market. While ex-post returns have fluctuated significantly over time, regulators and practitioners have typically used or placed weight on estimates over long periods of time.[443]

4.354 There is debate as to whether historical premiums are accurate predictors of future premiums. A number of prominent finance experts have argued that future rates of return will be less than that experienced historically.[444]

4.355 Similarly, forward-looking estimates from the DGM approach are not without controversy.

4.355.1 The AER, in its 2018 and 2022 binding rate of return guidelines, down weighted the reliance on DGM models (compared to its 2013 guidelines). One reason for this was because the AER did not consider that the evidence it reviewed supported the assumption of a stable return on equity (eg, that there was an inverse relationship between the risk-free rate and MRP).[445]

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[441] Ibid, pp. 10-18.

[442] Fernandez, Pablo, Diego García de la Garza, and Javier Fernández Acín "Survey: Market Risk Premium and Risk-Free Rate used for 80 countries in 2023" (April 3, 2023).

[443] Conceptually, over the long term, the occasions on which the premium of actual returns over the risk-free rate exceeds investors' expectations should be offset by the occasions on which that premium is below investors' expectations. The average premium will therefore provide an estimate of the premium that on average investors look for.

[444] See for example, see Dimson, E., March P. and Staunton M., *"Triumph of the Optimists: 101 Years of Global Investment Returns*", Princeton University Press, New Jersey, 2002; Dimson, E., March P. and Staunton M., Global Evidence on the Equity Risk Premium, *Journal of Applied Corporate Finance*, Vol. 14, 2003, pp. 27-38; and Arnott, R. and Bernstein P., What Risk Premium is 'Normal'?, *Financial Analysts Journal*, Vol. 58, No. 2, March/April 2002, pp. 64-85; Credit Suisse 2012 *Global Investment returns yearbook*.

[445] Australian Energy Regulator "Rate of Return Explanatory Statement" (December 2018), p. 221; and Australian Energy Regulator "Rate of Return Explanatory Statement" (February 2023), p. 17.

4.355.2 UK regulators have used DGM models; however, they have typically been given less weight and have been used predominately as a cross check to the approach they have placed most weight on.[446]

4.355.3 Surveys of investors can provide an indication of the premium that investors will look for in the future. However, surveys can be unreliable as respondents can, for example, interpret questions in different ways.

4.356 For the draft decision, we considered that there was no one best way to estimate TAMRP and this was consistent with advice from Dr Lally. For our final decision we have considered all information before us in reaching a judgement on the best estimate of TAMRP.

Term of the risk-free rate used in estimating the TAMRP

4.357 The risk-free rate features in three places in the cost of capital calculation. It is explicitly part of both the cost of debt and the cost of equity. In addition, the risk-free rate is also part of the estimation of the TAMRP (which measures, as outlined above, the additional expected return over and above the risk-free rate required to compensate investors for holding the market portfolio).

4.358 Under s 53M of the Act, a regulatory period must be five years. We may set a shorter period if doing so better meets the purpose of the Act; however the period must not be shorter than four years. Consequently, we considered estimates consistent with a four- and five-year period. As we found for the draft decision, when rounded to the nearest 0.5%, the TAMRP estimate does not vary between four- and five-year potential terms, and so we considered a single rate for TAMRP was appropriate for all WACC determinations for Part 4.

The evidence which led us to our draft decision of a TAMRP of 7.0%

4.359 For the draft decision, the evidence from forward-looking, historic, and survey results of TAMRP supported an estimation of the TAMRP at 7.0%.

4.360 We commissioned Dr Lally to estimate the TAMRP and published his expert report alongside the draft decision. Dr Lally's estimate of the TAMRP was 7.0%. The estimate was based on the median of five different methods as shown in Table 4.17, rounded to the nearest 0.5%.

[446] Ofgem "RIIO-2 Final Determinations – Finance Annex (REVISED)" (03 February 2021), p. 166.

Table 4.17 Estimates of the TAMRP with a five-year risk-free rate

	New Zealand	Other Markets[447]
Ibbotson estimate	7.4%	7.5%
Siegel estimate: version 1	6.0%	6.5%
Siegel estimate: version 2	7.7%	6.7%
DGM estimate	5.3%	6.7%
Surveys	7.1%	7.1%
Median	7.1%	6.7%

4.361 Dr Lally also estimated the TAMRP for us in 2010, 2015, and 2019. Those estimates, with the new estimates for 2023, are shown in Table 4.1818.

[447] We take account of other markets because Dr Lally and Randal (2015) examine estimators of the MRP and show that the optimal estimator for a country should place high weight on foreign data. The estimates using only local data are very noisy and the true MRPs do not vary greatly across countries.

Table 4.18 TAMRP estimates by Dr Lally for 2010, 2015, 2019, and 2023

	2010			2015		2019		2023	
	NZ	US	Other	NZ	Other	NZ	Other	NZ	Other
Ibbotson estimate	7.3%	7.7%	7.5%	7.1%	7.0%	7.4%	7.3%	7.4%	7.5%
Siegel estimate: Version 1	6.4%	7.3%	6.6%	5.9%	5.9%	6.0%	6.6%	6.0%	6.5%
Siegel estimate: Version 2	6.4%	7.3%	6.6%	8.0%	7.5%	9.4%	8.3%	7.7%	6.7%
DGM/Cornell*	5.2%	6.8%	-	7.4%	9.0%	7.3%	8.2%	5.3%	6.7%
Surveys	8.2%	6.9%	-	6.8%	6.3%	6.4%	6.6%	7.1%	7.1%
Mean	6.8%	7.2%	7.1%	7.0%	7.1%	7.3%	7.4%	6.7%	6.9%
Median	6.9%	7.1%	7.1%	7.1%	7.0%	7.3%	7.3%	7.1%	6.7%
Rounded to 50bps	7.0%			7.0%[448]		7.5%		7.0%	

*Cornell used in 2010, DGM in 2015, 2019, 2023

[448] Dr Lally's advice notes that the correction of the error in the Ibbotson error for 2015 does not change the estimated TAMRP at that time, Martin Lally, "Estimation of the TAMRP" (September 2019), n 2.

Table 4.19 TAMRP estimates used by major New Zealand investment banks

Investment bank	TAMRP estimate
Craigs Investment Partners	6.50%
Forsyth Barr	5.50%
Jarden	7.00% and 7.25%*
Macquarie	7.50%
UBS	7.00%

***Jarden use 7% company-wide and for Vector, but 7.25% for AIAL**.

4.362 As further evidence on the appropriate TAMRP for the draft decision, we also collated investment banks' and analysts' views to better understand what estimates of TAMRP are used in the market. The table above provides the results of this survey which range from 5.5% to 7.5%. The results are not inconsistent with a TAMRP of 7.0%.

Issues relating to the TAMRP

4.363 We received submissions on the TAMRP in response to the Process and issues paper and in response to the consultation on CEPA's report on aspects of the cost of capital.

4.364 In the Process and issues paper, we raised the possibility of using 7.5% for all businesses regulated under Part 4 as we did for Fibre in 2020 and for GPBs in 2022. Views on the suggestion we might use 7.5% were superseded by the decision to
re-estimate the TAMRP.

4.365 We discuss below points raised in submissions on the Process and issues paper as they relate to:

4.365.1 the models that we use to estimate the TAMRP;

4.365.2 our approach of rounding to the nearest 0.5%; and

4.365.3 when we estimate the TAMRP.

4.366 In each case, our draft decision is to continue to use the approach described above which we used in the 2016 IM Review and in setting the Fibre IMs in 2020.

We proposed continuing to use five models to estimate the TAMRP

4.367 Our draft decision was to continue using the five models described above to estimate the TAMRP.

4.368 Chorus and IEC (writing for Chorus) suggested that we should switch to using a total market return (**TMR**) approach to estimating the TAMRP.[449] Under a TMR, the return on the market portfolio is assumed to be constant, and the MRP varies as the risk-free rate changes. They argue for a TMR approach on the basis that it would make the WACC more stable.

4.369 In the context of our models, a TMR approach would be closest to putting full weight on the Siegel 2 and DGM models.[450]

4.370 Oxera (writing for the 'Big Six' EDBs) suggested that we place greater weight on approaches that assume a negative relationship between interest rates and the return on the market (effectively a TMR approach), less weight on fixed-TAMRP approaches, and decrease the weight we place on surveys.

4.371 TDB Advisory (writing for BARNZ) submitted in support of our approach of using multiple models to estimate the TAMRP.[451]

We proposed maintaining our approach of rounding TAMRP to the nearest 50 basis points

4.372 We considered and accepted the advice we had previously received from Dr Lally on rounding the TAMRP estimate to the nearest 50 bps.

4.373 Dr Lally laid out his rationale in full in a report to the Queensland Competition Authority which he refers to in his papers.[452] He considered that the rounding has little impact on the accuracy of the estimation measured through the standard error. However, its value impact will incentivise submissions advocating an increase (or decrease) which adds to administrative burden. Over time the small over- and under-estimations implicit (but essentially unobservable) in a TAMRP rounded to the nearest 50bps will net out. In this respect it is not error in any one regulatory period which matters, but error over the life of the assets.

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[449] Chorus "Submission on IM Review Process and Issues paper and draft Framework paper" (11 July 2022), p. 4, para 12(b); and Chorus "Measures to improve the stability in WACC estimates" (11 July 2022), pp. 4 and 13 – 27, sections 1.3 and 3.

[450] A typical DGM with constant dividend growth rate assumption would produce a partial or imperfect negative correlation between the risk-free rate and the MRP.

[451] Chapman Tripp "Advice to Vector Ltd on relationship between s5ZN and s52A" (prepared for Vector, 13 October 2022) , p. 3, section 2.2.

[452] Dr Lally "The risk-free rate and the market risk premium" (23 August 2012). p. 2; and Chapman Tripp "Advice to Vector Ltd on relationship between s5ZN and s52A" (prepared for Vector, 13 October 2022), p.5

4.374 We agreed that the estimation of TAMRP is inherently subject to error and trying to refine to below 50bps is likely futile. Furthermore, the technical nature of the estimation leaves open a very wide range of areas to be 'tweaked' to produce a higher or lower estimate which, given the value to regulated providers, may generate large amounts of expert views with little benefit to end-users.

4.375 In submissions and cross-submissions on the Process and issues paper, Air New Zealand and TDB Advisory (writing for BARNZ) argued that we should use the unrounded median.[453] TDB Advisory suggested that if we continue to round, that we should round to the nearest 0.25%.

4.376 NZAA supported the suggestion of using 7.5% and opposed TDB Advisory's suggestion that the TAMRP be rounded to the nearest 0.25%. Christchurch International Airport supported rounding.[454]

4.377 Aurora Energy, Christchurch Airport, the ENA, First Gas, and Vector made submissions in support of our suggestion of using 7.5% as the TAMRP.[455] That value was arrived at by rounding the 7.3% to the nearest 0.5%.

4.378 Oxera (for the 'Big Six' EDBs) suggested that we reassess our approach to rounding, noting that it is out of line with the AER's approach of rounding to the nearest 0.1% and Ofgem's approach of rounding to the nearest 0.25%.[456]

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[453] Air New Zealand "Submission on IM Review Process and Issues paper and draft Framework paper" (11 July 2022), p. 2; and TDB Advisory "Process and Issues and draft Framework papers" (report prepared for Board of Airline Representatives New Zealand Inc., 11 July 2022), p. 5.

[454] NZ Airports Association "Cross-submission on IM Review process and issues paper, and draft framework paper" (3 August 2022), pp. 5-6, paras 23-24.

[455] Aurora Energy "Submission on IM Review Process and Issues paper and draft Framework paper" (11 July 2022), para 57; Christchurch International Airport Ltd "Cross-submission on IM Review process and issues paper and, draft framework paper" (3 August 2022), para 8; Electricity Networks Association "Submission on IM Review Process and Issues paper and draft Framework paper" (11 July 2022), p. 14; First Gas Limited "Submission on IM Review Process and Issues paper and draft Framework paper" (13 July 2022), p. 24; and Vector "Cross-submission on IM Review process and issues paper, and draft framework paper" (3 August 2022), para 58, p. 14.

[456] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big EDBs, 3 February 2023),p. 25.

4.379 We had previously considered arguments for not rounding the TAMRP, most recently in setting the Fibre IMs.[457] We received no new arguments for changing our approach to rounding the median estimate, and so proposed to continue doing so. Overall, we considered a move away from rounding would not appear to better give effect to the Part 4 purpose statement. We considered that rounding the TAMRP provided regulated suppliers with certainty without any erosion of investment incentives and was likely to reduce the need to frequently re-estimate the TAMRP. Estimating the TAMRP to a high level of accuracy was not considered practically achievable, and estimation errors will generally cancel out over the lives of the assets.

Our draft decision was to specify the value of TAMRP within the IMs

4.380 For the draft decision, we considered there was an insufficient case for changing our TAMRP estimate on a regular basis. This was similar to the practice of many advisers who do not regularly change their estimate of the TAMRP. As noted, our ability to discern small movements in the TAMRP is limited.

4.381 We considered it better meets the purpose of the IMs in s 52R to promote certainty to specify a value within the IMs. As discussed below this does not preclude the TAMRP from being amended in the IMs between our statutory reviews if this is warranted by the particular circumstances.

4.382 In a submission on the Process and issues paper, First Gas suggested that we estimate the TAMRP as part of each DPP setting process, and if that was too onerous, to estimate the TAMRP as part of the annual WACC determinations.[458]

4.383 The trade-off of more frequent estimations would be increased volatility and uncertainty compared with a value set in the IMs and most likely only provide marginal benefits in accuracy given the inherent uncertainty of the estimate.

4.384 Our estimates of the market risk premium have been relatively stable over a long period of time. There are likely to be short term changes to the TAMRP with changes in the economic environment. However, these movements may not reflect the value expected to prevail over the period until the IMs are next reviewed.

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[457] Commerce Commission "Fibre input methodologies: Main final decisions – reasons paper" (October 2020), paras 6.558-6.570.

[458] First Gas "Cross-submission on IM Review Process and issues paper, and draft framework paper" (10 August 2022)p. 24.

4.385 If there are significant changes in the economic environment, we are able to make changes to the TAMRP value in the IMs (although this would not take effect until the subsequent regulatory period after the change has been implemented).

4.386 Overall, our view at the draft decision was that it was not clear that a move to more frequent estimation would better promote the Part 4 purpose. We considered that setting the TAMRP in the IMs promoted certainty for regulated suppliers and consumers without eroding incentives for investment. Therefore, we maintained our decision to specify the value of TAMRP within the IMs.

Stakeholder views on draft decision and our consideration

4.387 We received submissions on our TAMRP draft decision, including two expert reports from Oxera (prepared separately for the 'Big Six' EDBs and the GPBs First Gas, Powerco, and Vector).[459]

4.388 Vector, Powerco, Wellington Electricity and Orion (in its cross-submission) cited the Oxera report in supporting a TAMRP of 7.5%.[460] PowerNet also supported a TAMRP of 7.5%.[461]

4.389 A4ANZ, TDB Advisory (for BARNZ), Qantas and Air New Zealand supported a TAMRP of 7%.[462]

4.390 Transpower accepted the TAMRP of 7.0% but preferred rounding to the nearest 10 bps or 25 bps.[463]

4.391 GasNet and Alpine Energy generally supported the theoretical approaches we use but wanted a more frequent update of the TAMRP.[464]

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[459] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 4; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), section 2A.3.

[460] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.24; PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.11; Wellington Electricity "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.31; Orion "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 11.

[461] PowerNet "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.10.

[462] Airlines for Australia & New Zealand (A4ANZ) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.3; TDB Advisory "Report on IM Review 2023 Draft Decisions cost of capital paper" (report prepared for BARNZ, 19 July 2023), p.7; Qantas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.3; Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.3.

[463] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.36.

[464] GasNet Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 31; Alpine Energy Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 22.

4.392 Chorus argued for a Total Market Return (TMR) approach.[465]

4.393 In response to our draft decisions, submitters raised substantive points relating to:

4.393.1 The models we use to estimate the TAMRP and the weighting assigned to each of them;

4.393.2 Consistency with broker estimates;

4.393.3 The frequency of measuring the TAMRP; and

4.393.4 The rounding approach.

4.394 We address these substantive points raised in the following sections.

Issue #1: The models we used and the weighting assigned to each of them

4.395 The most substantive submission we received was from Oxera (prepared for EDBs and GPBs).[466] Oxera examined our approach to estimating the TAMRP and argued that the DGM approach and surveys are not reliable and should be given no weight. Oxera also suggested that we put more weight on the Siegel 2 model due to its assumption about the stability of the total market return, which Oxera considers is a more realistic assumption.

4.396 Oxera suggested a TAMRP of 7.5% (based on our rounding approach) after excluding the DGM approach and surveys and giving more weight to the Siegel 2 model. They claimed that a TAMRP of 7.5% is consistent with the updated broker estimates.

(a) DGM and surveys

4.397 Oxera argued that the collection of survey data faces significant methodological limitations and the results need to be interpreted with a high degree of caution.[467]

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[465] Chorus "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.3.

[466] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 4; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), section 2A.3.

[467] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), para 4.3.

4.398 We acknowledged the limitations of the survey results when setting our previous IMs. For example, survey results can be subjective and difficult to interpret. However, we consider that surveys of investors can provide an indication of the premium that investors will look for in the future. Therefore, our view remains that survey results provide a useful data point among a series of imperfect estimators.

4.399 Oxera provided a sensitivity test on the DGM model and argued that the DGM is highly sensitive to input assumptions that may be quite subjective, such as future growth rates.[468] Oxera concluded that the DGM model is not reliable.

4.400 Oxera argued that by increasing the long-term expected inflation rate from 2% to 3% and holding all other assumptions constant, the long-term expected growth rate (g) would increase from 4.6% to 5.1%, increasing the TAMRP estimate from 5.3% to 6.2%.

4.401 We noted in the draft decision topic paper that the DGM approach is not without controversy, especially given that the Australia Energy Regulator (AER) down-weighted reliance on DGM models and UK regulators have given it less weight and used it predominately as a cross-check.

4.402 The AER considered that there are questions about reliability of measurement and differing views on the relative value of DGM-based estimates and acknowledged that the DGM estimates are highly sensitive to the assumptions used.

4.403 Although the AER highlighted the practical limitations and issues with the DGM model, they noted that:[469]

> the DGM method is a theoretically sound estimation method for the MRP. Since DGM estimates incorporate prevailing market prices, they are more likely to reflect prevailing market conditions. DGM estimates are also clearly forward-looking because they estimate expectations of future cashflows and equate them with current market prices through the discount rate.

4.404 The AER's view on the value of the DGM was supported by an expert report from Partington and Satchell in which the authors also noted that the DGM has some merit in relation to estimating the cost of equity.[470]

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[468] Ibid, pp.32-34.

[469] AER "Rate of Return Instrument: Explanatory Statement" (February 2023), p. 146.

[470] Partington and Satchell, Report to the AER: Cost of Equity Issues 2016 Electricity and Gas Determinations, April 2016, p. 27.

4.405 In light of the above discussion, our view remains that both survey results and the DGM model should be considered when estimating the TAMRP. In 2010 IM, we decided that both ex post and ex ante approaches should be used when estimating the TAMRP. We consider that both survey results and the DGM model are forward-looking approaches. Using a forward-looking or ex ante approach to estimating the MRP is consistent with the MRP in theory being an ex-ante measure.

4.406 We also consider that the DGM is only one of the five approaches when estimating the TAMRP, and that our approach moderates the effect that the DGM estimates has on the TAMRP.

Siegel models and total market return approach

4.407 Oxera recommended we place more weight on the Siegel 2 model than the Siegel 1 model, claiming that a large body of literature supports the view that the expected real market return is constant over time and that changes in the risk-free rate are largely offset by changes in the market risk premium over time.[471]

4.408 Oxera cited the reports prepared for Ofgem, which suggested there is an inverse relationship between the MRP and the risk-free rate.

4.409 Chorus argued for a total market return (TMR) approach on the basis that it would increase the stability and accuracy of the cost of equity estimate.[472] The TMR approach also assumes an inverse relationship between the MRP and the risk-free rate. In 2020 Fibre IMs, we noted that the TMR approach is equivalent to the Siegel 2 version.

4.410 Vector cited Chorus's submission in their cross-submission and argued that this reinforces their recommendation to put more weight on the Siegel 2 model.[473]

4.411 Although Chorus agreed that the TMR approach is consistent with the Siegel 2 approach, they stated that acknowledging this point does not equate to placing all weight on Siegel 2.[474] Chorus emphasised that Incenta's proposal was to estimate the TMR when deriving the cost of equity and to allow the TAMRP to be determined as a residual.

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[471] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 4B.

[472] Chorus "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.2.

[473] Vector "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 69.

[474] Chorus 'Submission on Part 4 Input Methodologies review – draft decisions' (July 2023), p.4.

4.412 We note that the TMR approach is widely used by the UK regulators. We also note that the AER has considered the TMR approach (which is also referred to as the "Wright approach") but rejected its implementation.

4.413 In 2016, the AER received advice from Partington and Satchell indicating that an inverse relationship between the risk-free rate and the MRP has no well accepted theoretical support and is not used much in practice.[475]

4.414 Partington and Satchell state that the Wright approach used in the UK probably is a mistake.[476] Moreover, they note that the Wright approach runs contrary to the well accepted view that asset prices are inversely related to interest rates:[477]

> Ceteris paribus, under the Wright approach the price of shares is insensitive to interest rate changes. This has the interesting implication that there is relatively little point in hedging interest rate risk per se. A key objective for an entity hedging interest rates is to protect the value of assets and equity against interest rate movements, but under the Wright approach there is an inbuilt hedge. Interest rates go up, but this is offset by a decline in the market risk premium.

4.415 The AER stated in their 2018 Rate of Return Instrument Explanatory Statement that the Wright model has no theoretical basis in Australia and is not an appropriate tool for regulatory use, nor is it used by market practitioners.[478] The AER continues to place no weight on the Wright approach in their 2022 Return of Return Instrument when estimating the market risk premium, and the AER's decision is supported by their Independent Panel.[479]

4.416 The discrepancy between Ofgem's and AER's views on the relationship between the MRP and risk-free rate indicate to us that we should be cautious about changing our approach. We do not consider there is sufficient evidence for either removing Siegel 2 from our method or for increasing the weight given to Siegel 2. We also do not consider there is sufficient evidence for changing the relative weighting given to the Siegel 1 and Siegel 2 approaches.

4.417 After considering the submissions, our view is that we have not been presented with evidence that warrants a change in our approach to estimating the TAMRP.

4.418 We recognise that all the estimators we use have potential weaknesses. However, we are not persuaded that removing some estimators or adding weight to others would result in a better estimate.

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[475] Partington and Satchell, Report to the AER: Cost of Equity Issues 2016 Electricity and Gas Determinations, April 2016, p.30.

[476] Ibid.

[477] Ibid, pp.30-31.

[478] AER "Rate of return instrument - Explanatory Statement" (December 2018), p.85.

[479] Independent Panel Report prepared for AER Draft Rate of Return Instrument (July 2022), p.26.

4.419 We consider that there is no consensus on a 'correct' method for estimating the TAMRP and neither is there likely to be a 'correct' weighting of the methods. We have therefore decided to maintain our draft decision of giving equal weight to all five different approaches and use the median estimate.

Issue #2: Consistency with broker estimates

4.420 Oxera argued that the broker estimates we report do not fully represent the view of these institutions. Oxera stated that a recent Forsyth Barr report (prepared for Vector) suggested their estimate of TAMRP is 7.5% compared with what we reported of 5.5%.[480] Similarly, an UBS report (prepared for Vector) stated a TAMRP of 7.5% while we report a TAMRP of 7.0%.[481]

4.421 We have sought clarification from brokers on their TAMRP estimates we reported in the draft decision topic paper:[482]

4.421.1 Forsyth Barr confirmed that Oxera is incorrect and the estimate of 7.5% is Forsyth Barr's forecast of our proposed estimate. They also confirm that their internal estimate of the TAMRP for NZ valuation purpose is still 5.5%;

4.421.2 UBS clarified that the TAMRP estimate of 7.5% is for calculating regulatory allowable returns such as for the Fibre IMs. They confirm that they use a TAMRP of 7% for valuation purposes.

4.422 Our conclusion is that the estimate of the TAMRP for the draft decision was based on information that is consistent with brokers estimates.

Issue #3: The frequency of estimating the TAMRP

4.423 Our draft decision was to specify the value of TAMRP within the IMs. However, GasNet and Alpine Energy suggested that we should update the TAMRP estimate more frequently (as part of DPP process) as this would better align with market conditions prevailing at the time.[483]

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[480] Oxera 'Response to the New Zealand Commerce Commission's draft decision for Part 4 Input Methodologies Review 2023 on the cost of capital' (Prepared for the New Zealand electricity distribution businesses, July 2023), Section 4C.

[481] Ibid.

[482] We sought clarification from Forsyth Barr and UBS regarding the Oxera's claim on their TAMRP estimates in September 2023.

[483] GasNet Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 31; Alpine Energy Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 22.

4.424 Chorus submitted that it would like us to prescribe the TMR approach in the IMs, then the TAMRP to be calculated at the time of each cost of capital determination.[484]

4.425 We consider that our estimates of the TAMRP have been relatively stable and more frequent estimation would increase the volatility and uncertainty of the estimate compared with setting the value in the IMs and most likely provide only marginal improvements in accuracy given the inherent uncertainty of the estimate.

4.426 If there are significant changes in the economic environment, we can consider whether the changes are sufficiently material to warrant a reassessment of the WACC parameters in the IMs, including to update the TAMRP value prior to a reset.

4.427 Therefore, we have maintained our decision to specify the value of TAMRP within the IMs.

Issue #4: Rounding approach

4.428 Transpower accepted the TAMRP of 7.0% but preferred the AER or Ofgem's rounding approaches (10 bps or 25 bps).[485] Transpower did not provide the reasons or evidence for its preferred rounding approaches. We have decided to maintain the rounding approach in our draft decision as we do not consider that there are sufficient reasons for us to change our draft decision. However, we also note that as the TAMRP median estimate was 7.1% the TAMRP would have been 7.0% even if we had changed our rounding approach to 25bps.

Final decision

4.429 Our final decision is to use a TAMRP of 7.0% for both four- and five-year regulatory period. This includes:

4.429.1 maintaining our current approach of giving equal weight to all five approaches and using the median estimate;

4.429.2 maintaining our current rounding approach that is to round our TAMRP estimate to the nearest 0.5%; and

4.429.3 maintaining our current approach of specifying the TAMRP estimate within the IMs.

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[484] Chorus "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.4.

[485] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.36.

Equity issuance costs

Final decision

4.430 Our final decision is to maintain our current approach of not including an equity issuance cost allowance.

Background

4.431 We considered whether to provide an allowance for equity issuance costs when we established the IMs in 2010,[486] when we reviewed the IMs in 2016,[487] and in establishing the Fibre IMs in 2020.[488]

4.432 In general, we did not consider that an allowance for equity issuance costs is required. We note that:

4.432.1 equity capital is normally available in perpetuity and does not need refinancing;

4.432.2 each company chooses what proportion of its profits it will retain in the businesses. Retaining profits can be used to finance growth in the asset base without incurring issuance costs; and

4.432.3 in general, given the characteristics of regulated providers, their ownership, and their capacity to contribute additional equity, there is no evidence of a material issue regarding equity raising costs.

Draft decision

4.433 Our draft decision was to maintain our approach of not including an equity issuance cost allowance.

Reasons for our draft decision

4.434 We noted that our draft decision to apply inflation indexation to Transpower's RAB may result in Transpower needing to increase its equity using funds beyond the amounts available in retained earnings and dividends and decided that we would await submissions on our draft decision before considering this matter further.

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[486] Commerce Commission "Input methodologies (electricity distribution and gas pipeline services): Reasons paper" (December 2010), p. 462.

[487] Commerce Commission "Input methodologies review decisions – Topic paper 4: Cost of capital issues" (December 2016), pp. 139-140.

[488] Commerce Commission "Fibre input methodologies: Main final decisions – reasons paper" (October 2020), p. 458.

Submitters' views on equity issuance costs and our considerations

4.435 Unison suggested including an allowance for capital raising costs within the IMs:[489]

> EDBs and Transpower may need to seek additional equity funding to keep pace with the extent of investment required to enable customers to decarbonise. There is currently no explicit allowance for capital raising costs within the WACC IM, which may be inconsistent with the principle of achieving an expectation of real FCM.

4.436 Wellington Electricity supported Unison's suggestion of including an allowance for equity issuance costs:[490]

> the increasing investment programmes (driven by the ERP) will mean that networks are likely to have to raise additional equity as they approach their debt lending limits.

4.437 ENA and CEG (on behalf of ENA) suggested that we include in our financial model an allowance for equity raising costs.[491]

4.438 CEG presented modelling for Aurora Energy, Orion, Unison, Vector and Wellington Electricity showing that over the next five years, if they pay out 63% of pre-tax income as dividends, and maintain a leverage of 42%, they will all need to raise equity capital.[492]

4.439 However, we noted that the five networks for which CEG presents evidence are expected to generate cashflow returns to equity that are large enough to meet their equity financing needs while maintaining a leverage ratio of 42%.[493]

4.440 As ENA and CEG recognised, retained earnings are cheaper than dividend reinvestment programmes. For a firm to pay dividends, and then incur the cost of raising new equity through more expensive means is not efficient.

4.441 Therefore, we considered that there is no reason to provide an allowance for equity issuance costs for the EDBs.

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[489] Unison – "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022), para 44.

[490] Wellington Electricity "Cross-submission on IM Review Process and issues paper, and draft framework paper" (10 August 2022), p. 5.

[491] Electricity Networks Aotearoa (ENA) - Rate of return issues -"Submission on IM Review CEPA report on cost of capital" (3 February 2023), pp. 20-21.

[492] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Authority Networks, February 2023), p. 40.

[493] The sum of 'Dividend at Assumed Payout Ratio' and 'Retained Cashflow Available for Reinvestment under Assumed Payout Ratio' is greater than the 'Equity' component.

Stakeholder views on our draft decision

4.442 We received submissions on our draft decision not to include an allowance for equity issuance costs, including expert reports from CEG (prepared for the ENA) and Oxera report (prepared for the 'Big six' EDBs).[494]

4.443 CEG recommended including a model of equity raising costs to deal with electrification and changes to indexation of Transpower's RAB.[495] CEG suggest that it is important to set out and include in the IMs what happens when retained earnings are insufficient to fund the equity part of required investment and a firm is required to raise equity externally.

4.444 Oxera, ENA, Transpower, Vector, Alpine Energy, Wellington Electricity, GasNet, and Unison (in its cross-submission) all disagreed with our draft decision:[496]

4.444.1 Vector and Wellington Electricity cited the Oxera report and submitted that retained earnings may not always be sufficient to finance investment. Oxera's report agreed with our draft decision that reducing and reinvesting dividends is a natural source of equity financing for RAB growth.[497] However, Oxera argued that if the only way to finance capex is to significantly reduce dividends (while keeping a notional gearing), then either an allowance for equity issuance cost is justified, or a higher revenue allowance is required.[498] Oxera also mentioned that Ofgem and Ofwat provide, or are planning to provide, an allowance for equity issuance costs.

4.444.2 Alpine Energy and Wellington Electricity also submit that suppliers may need additional equity to fund decarbonisation projects while maintaining a reasonable gearing ratio.

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494 CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), section 7; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 8B.

495 CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), section 7.

496 Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), section 4.5; Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.36; Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 71; Alpine Energy Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 23; Wellington Electricity "Submission on IM Review 2023 Draft Decisions" (19 July 2023), section 4.5; GasNet Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 32; Unison Networks "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), pp. 2-3.

497 Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 8B;

498 Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), para 8.19.

4.444.3 Vector and Wellington Electricity also submitted that not paying a dividend (or paying a lower-than-expected dividends) for a long period of time is not sustainable.

4.444.4 Transpower submitted that if we introduce RAB indexation for Transpower, then our modelling has shown that significant equity injections may be required.

4.444.5 GasNet argued that as gas is being phased out, there is a need to raise additional equity to fund replacement capex.

4.444.6 Transpower, CEG and Oxera submitted that overseas regulators (including AER, Ofgem and Ofwat) have equity issuance costs allowance, and suggest we consider their approaches.

Reasons for our final decision

Our consideration of submissions

4.445 CEG provided a model of equity issuance costs based on the model used by the AER, but assuming a payout ratio of 63% of taxable income.

4.446 The AER's approach to equity issuance costs is based on the same principles that our draft decision was based on. In their 2011 Powerlink draft decision, the AER write that: [499]

> A TNSP should only be provided an allowance for equity raising costs where cheaper sources of funding (e.g. retained earnings) are insufficient, subject to the gearing ratio and other assumptions about financing decisions being consistent with regulatory benchmarks.

4.447 Similarly:[500]

> The AER has accepted that equity raising costs are a legitimate cost for a benchmark efficient firm **only where external equity funding is the least–cost option available**. (Emphasis added.)

4.448 CEG have not shown that it is efficient for a firm to pay dividends at a pre-determined level and then incur costs to raise new equity, or that this is the lowest cost way of funding the equity portion of RAB growth.

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[499] Australian Energy Regulator "Powerlink Transmission determination 2012-13 to 2016-17 – Draft Decision" (November 2011), p. 152.

[500] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Networks Association, February 2023), para 128.

4.449 While Oxera agrees that "reinvesting dividends is a natural source of equity financing for RAB growth", they argue that if the only way to finance capex is to significantly reduce dividends, then either an allowance for equity issuance costs is required or higher revenue allowances are justified.

4.450 Oxera do not address our argument that it is not efficient for businesses to pay dividends and then incur costs raising new equity. Faced with the choice of making investments that are expected to return their cost of capital or paying dividends, we expect that firms will generally invest because it maximises the total return to owners.

4.451 We disagree with that GasNet that replacement capex will need to be funded with new equity. We expect that replacement capex can be funded out of depreciation. As GPBs have indexed RABs and we have decided to shorten asset lives, we expect that depreciation will be more than sufficient to cover the cost of replacement capex.

Our view

4.452 We maintain our view suppliers should use their lowest-cost source of equity to fund the equity portion of new investment, and that for most suppliers retained earnings will be sufficient to meet these needs. Where suppliers need to raise external equity after exhausting retained earnings, as may be the case for Transpower, the equity raised is perpetual and so the costs are amortised over a long period of time. We have therefore maintained our draft decision not to include an allowance for equity issuance costs in the IMs.

4.453 However, we recognise that equity issuance costs are a legitimate business expense and may revisit this issue at a reset.

Chapter 5 Other WACC parameters

Purpose of this chapter

5.1 This chapter discusses our decisions for the parameters that are used in the estimation of the cost of capital but do not comfortably sit in either the cost of debt or cost of equity chapters. Those parameters are leverage, tax rates and the standard error of the WACC.

Structure of this chapter

5.2 This chapter begins by explaining why we maintain our current approach to estimating a notional leverage, which includes a discussion of the leverage anomaly associated with the use of the SBL-CAPM.

5.3 We then discuss the tax rates we have decided to use in our WACC estimates.

5.4 Finally, we discuss our approach to determining updated estimates of the standard error of the WACC.

Leverage

Final decision

5.5 We have decided to maintain our existing approach to estimating notional leverage, which is to use the leverage informed by our asset beta comparator samples. We have decided on a leverage of:

5.5.1 41% for EDBs, GPBs and Transpower; and

5.5.2 23% for airports.

Background

5.6 Leverage refers to the mix of debt and equity capital that is used to fund an investment. It is used in two places when estimating the cost of capital. The first is to convert the equity beta into an asset beta (and vice versa). The second is to derive a WACC by weighting the estimates of the cost of debt and the cost of equity.

5.7 We estimate notional leverage by calculating the average leverage of our comparator sample. We do this because we use the SBL-CAPM, which accounts for the absence of capital gains tax in New Zealand but has an anomaly (the 'leverage anomaly'). For a given level of systematic risk, and consideration of tax costs, an increase in leverage is not expected to change the WACC. That is, the effects of leverage on converting the asset beta to an equity beta exactly offsets the effects of leverage on changing the weight between the costs of equity and debt.

5.8 However, the SBL- CAPM results in the WACC increasing when leverage increases because the increase in the equity beta more than offsets the lower weight to the cost of equity.

5.9 One way of dealing with this anomaly would be to use a debt beta when converting the asset beta to equity beta. An alternative, which is our approach, is to assume the financial risk of the benchmark firm is the same as the average financial risk of the comparator sample. In making this assumption, we avoid the complexity of converting asset betas to equity betas when notional leverage differs from the notional leverage of the comparator sample. This was discussed in more detail in our 2010 IMs.[501]

Issues raised in submissions up to the Draft decisions

5.10 In relation to leverage, Oxera's report for the Major Electricity Users Group (MEUG) recommended that we:[502]

5.10.1 review the comparator sample to only include firms that are similar to the New Zealand networks;

5.10.2 should consider placing more weight on the two most recent five-year periods; and

5.10.3 should align the period over which leverage and betas are assessed.

5.11 CEG's report for the ENA noted that setting the benchmark leverage equal to the sample average leverage avoids the need for estimating a debt beta.

[501] Commerce Commission "Input Methodologies (Electricity distribution and Gas pipeline services) reasons paper" (December 2010), paras 6.6.4 - 6.6.16.

[502] Electricity Networks Aotearoa (ENA) - Rate of return issues -"Submission on IM Review CEPA report on cost of capital" (3 February 2023), p. 14.

Draft decision

5.12 In our draft decision we proposed to maintain our 2016 approach to estimating notional leverage, which is to use the average leverage of our asset beta comparator samples. This resulted in leverage of 41% for EDBs, GPBs and Transpower, and 26% for airports. In the 2016 IMs we determined notional leverage of 42% for EDBs, GPBs and Transpower, and 19% for airports.

Reasons for our draft decision

Approach to estimating leverage

5.13 As noted above, CEG's report for the ENA acknowledged that our method of estimating leverage using the average of the comparator sample is appropriate, and we did not receive other submissions on this matter.

5.14 In relation to Oxera's report for the MEUG, we agree that we should align the period over which leverage and betas are assessed. However, the COVID-19 pandemic caused us to re-examine whether we should continue to set asset betas by using the two most recent five-year periods. We decided to use our judgement in determining asset betas by considering pre-COVID-19 as well as post-COVID-19 information, because we did not know the extent that COVID-19 was a systematic event.

Energy

5.15 The implication for leverage was that we needed to use judgement in determining an estimate of leverage. The following table shows our draft decision estimates of leverage for the energy comparator sample over different periods.

Table 5.1 Estimates of draft decision leverage for the energy comparator sample, by period

	2007-2012	2012-2017	2017-2022	2018-2020	2020-2022	2021-2022
Leverage	44%	40%	41%	38%	42%	40%

5.16 For energy, our estimate of the pre-COVID-19 leverage (which uses the 2007-2012, 2012-2017 and 2018-2020 periods) was 42%. In comparison, the estimate of leverage for 2020-2022 was 42% and for 2021-2022 was 41%. The average of the last two five-year periods was also 41%.

5.17 We considered that 41% is the best estimate of leverage for the energy suppliers for the period of the IMs and is consistent with our judgement for the average asset beta from our comparator sample. As leverage has been trending down since 2007, we considered that we should not put much weight on the 2007-2012 data. We noted that the COVID-19 period did not appear to have had much effect on leverage. We also noted that 41% was the average leverage of the last two five-year periods and of the last year.

Airports

5.18 The following table shows the estimates of leverage for the draft decision airports comparator sample over different periods.

Table 5.2 Estimates of draft decision leverage for the airports comparator sample, by period

	2007-2012	2012-2017	2017-2022	2018-2020	2020-2022	2021-2022
Leverage	36%	28%	24%	20%	28%	28%

5.19 Our estimate of the pre-COVID-19 leverage (which uses the 2007-2012, 2012-2017 and 2018-2020 periods) was 30%. In comparison the estimate of leverage for 2018- 2020 was 20% and for 2021-2022 was 28%. The average of the last two five-year periods was 26%.

5.20 We considered that 26% was the best estimate of leverage for airports and was consistent with our judgment for the average asset beta from our comparator sample. As with energy, we considered that the data indicated leverage had decreased since 2007 and that we should not put much weight on the 2007-2012 data.[503]

5.21 We noted that the COVID-19 period may have increased leverage; however, leverage was lower in the pre-COVID-19 period of 2018-2020. In the circumstances, we consider the estimate of 26% accounts for the decline in leverage during the pre-COVID-19 periods as well as the 2021-2022 estimate that indicates leverage may have increased as a result of COVID-19.

[503] At the 2016 IM Review we used a larger sample to estimate leverage of 19%. For this draft decision we are using a smaller sample, so the 19% estimate is not comparable to the 26% estimate for this draft decision.

Stakeholder views on our Draft decisions

5.22 As the level of notional leverage in our WACC is informed by the asset beta comparator sample, submissions generally focused on the most relevant comparators to use for the energy and airport comparator samples. See our final decisions on estimating the asset beta for a discussion of how we reached our final comparator sample (see from paragraph 4.49).

5.23 Transpower agrees with our draft decision to update the leverage estimate for EDBs and Transpower from 42% to 41%.[504]

5.24 Vector submitted that it was not supportive of updating the leverage to 41% but did not provide reasoning why.[505]

Reasons for our Final decision

Approach to estimating leverage

5.25 We have maintained our existing approach of using the average leverage from the asset beta comparator sample to estimate the asset beta and leverage. We use the same comparator sample to estimate the asset beta and leverage to mitigate the 'leverage anomaly'. However, we have also maintained the approach from our draft decision to apply judgement in setting the sample periods that we use to set the asset beta and leverage (refer to asset beta section for reasoning on why we have chosen our preferred sample periods).

Energy

5.26 We have decided to maintain the same energy asset beta comparator sample as applied in our draft decision. Our draft decision used the last two five-year periods (2012-2017 and 2017-2022) to estimate the asset beta (to which we then applied a Covid-19 period adjustment) and we have used these samples again for our final decision. Our estimate of leverage for energy (41%) is also the average of the last two five-year sample periods.

5.27 As stated in our draft decisions, we consider that 41% is the current best estimate of leverage for the energy suppliers for the period of the IMs and is consistent with our judgement for the average asset beta from our comparator sample. We note that the COVID-19 period does not appear to have had much effect on leverage and therefore we have given most weight to the last two five-year sample periods.

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[504] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 37.

[505] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 10.

5.28 The following table shows the estimates of leverage for the energy comparator sample over different periods (averaging the weekly and four-weekly leverage).

Table 5.3 Estimates of leverage for the energy comparator sample, by period[506]

	2007-2012	2012-2017	2017-2022	2017-2020	2020-2022	2021-2022
Leverage	44%	40%	41%	39%	42%	40%

Airports

5.29 We have analysed the leverage of our final comparator sample for different periods to decide on a leverage value that is relevant to future periods but based on a robust amount of historical information to avoid times of abnormal economic conditions. As noted in our Draft decisions, there may have been an impact of Covid-19 on leverage.

5.30 We have applied judgement and arrived at a final decision of 23% leverage for airports. Our decision has been informed by:

5.30.1 the average leverage of our sample period for the last two five-year sample periods is 23%; and

5.30.2 the leverage of our sample period for the pre-covid sample periods is 25% (noting that leverage was higher in the earliest of the pre-covid periods compared with the more recent periods).[507]

5.31 The following table shows the estimates of leverage for the airports comparator sample over different periods (averaging the weekly and four-weekly leverage).

Table 5.4 Estimates of leverage for the airports comparator sample, by period[508]

	2007-2012	2012-2017	2017-2022	2017-2020	2020-2022	2021-2022
Leverage	28%	23%	23%	20%	25%	24%

[506] Note that we have slightly changed the timing of the period from 2018-2020 in the draft to 2017-2020 in the final analysis

[507] As with energy, we consider this data indicates leverage has decreased since 2007 and that we should not put much weight on the 2007-2012 data.

[508] Note that we have slightly changed the timing of the period from 2018-2020 in the draft decision analysis to be 2017-2020 in the final analysis for consistency with the rest of the data.

Tax

Final decision

5.32 Our final decision is to:

5.32.1 maintain the approach of using the statutory corporate tax rate at the time when estimating the WACC (currently 28%); and

5.32.2 maintain the approach of using an investor tax rate that reflects the maximum prescribed investor rate under the Portfolio Investment Entity (**PIE**) regime at the time when estimating the WACC (currently 28%).

Context

5.33 The corporate tax rate enters the cost of capital estimation when estimating a post-tax cost of capital. The corporate tax rate is the statutory corporate tax rate for businesses entities set by the New Zealand Government.

5.34 The investor tax rate is the average marginal personal rate across all investors in the economy. This forms part of the SBL-CAPM equation. This adjustment to the classical CAPM is incorporated to reflect the fact that the New Zealand tax regime permits the use of imputation credits (attached to dividend payments) to offset personal tax obligations and the fact that most investors are exempt from tax on capital gains, while interest income is not.

Draft decision

Corporate tax rate

5.35 In our draft decision we proposed to maintain the approach of using the statutory corporate tax rate when estimating the WACC. The current statutory corporate tax rate is 28%.

5.36 By linking to the statutory corporate tax rate, the IMs would continue to allow any future changes in tax rates to flow through to the calculation of the WACC.

Investor tax rate

5.37 We proposed to maintain the approach of using an investor tax rate that reflects the maximum prescribed investor rate under the PIE , which is currently 28%. The investor tax rate is the average marginal personal tax rate across all investors in the economy.

5.38 Under the PIE regime, individuals are able to limit their maximum tax liability on interest earned to the corporate tax rate. We acknowledge that there is a range of statutory tax rates for interest earned by individuals depending on their total taxable income. Using the maximum prescribed PIE rate is a useful proxy for estimating the average marginal investor tax rate. We also noted this parameter has little effect on the final allowed rate of return.

Stakeholder views on draft decision and our consideration

5.39 Transpower supported our draft decision of maintaining our current approach to investor tax rate and corporate tax rate.[509]

5.40 Vector did not support our draft decision on tax rates but did not provide any detailed explanations.[510]

5.41 We have therefore decided to maintain our current approach to tax rates for the reasons set out above as there is not sufficient evidence to warrant a change.

Standard error of the WACC

Final decisions

5.42 Based on the analysis we have undertaken, our final decisions are to:

5.42.1 change the standard error of the WACC for EDBs/Transpower to 0.0108 (from 0.0101 in our draft decision);

5.42.2 change the standard error of the WACC for GPBs to 0.0112 (from 0.0105 in our draft decision);

5.42.3 change the standard error of the WACC for airports to 0.0169 (from 0.0153 in our draft decision); and

5.42.4 maintain the standard error of leverage at zero (some submissions suggested introducing a standard error for leverage).

Summary of our standard error of the WACC

5.43 Our final decisions on the standard errors are summarised in table 5.5 below.

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[509] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.37.

[510] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.10.

Table 5.5 Final standard errors of the WACC

	EDBs and Transpower	GPBs	Airports
Standard error of the asset beta	0.13	0.13	0.19
Standard error of the TAMRP	0.015	0.015	0.015
Standard error of the debt premium	0.0015	0.0015	0.0015
Standard error of overall WACC[511]	0.0108	0.0112	0.0169

5.44 All parameters other than the asset beta, TAMRP, and debt premium are assumed to have a standard error of zero.

Background

5.45 The cost of capital IM accounts for uncertainties in parameter estimates by specifying the standard error which allows for the estimation of the cost of capital at a particular percentile.

5.46 Regulated businesses and interested parties can use the standard error estimate to derive a distribution for the cost of capital to reflect the possible spread between estimated and true parameter values underlying the cost of capital.

5.47 This section discusses our approach to determining updated estimates of the standard error of the WACC. The standard error of the WACC is used to calculate different WACC percentile estimates, for example:[512]

5.47.1 for EDBs and Transpower the standard error is used to calculate the 65th percentile WACC estimates used for PQ path regulation;

5.47.2 for GPBs, we publish the standard error of the WACC; and

5.47.3 for airports, we publish the standard error of the WACC, enabling interested parties to generate a distribution for our WACC estimates.

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[511] We noted that while the formula for calculating the standard error of the overall WACC differs slightly for vanilla and post-tax WACC estimates, in both cases the values are 0.0108 (for EDBs/Transpower), 0.0112 (for GPBs), and 0.0169 (for airports) when rounded to four decimal places.

[512] We assume that the WACC is normally distributed. Therefore, different WACC percentiles can be estimated using the relevant z-scores, our mid-point WACC estimate, and the standard error of the WACC.

Approach to estimating the standard error of the WACC

5.48 Under the current IMs, we combine standard errors for the asset beta, debt premium and TAMRP to determine an overall standard error of the WACC. We propose to maintain the 'complex analytical approach' to calculate the standard error of the WACC.[513]

5.49 For the complex analytical approach, we use the following formula to estimate the standard error of the WACC by combining the standard error estimates of each parameter:

$$\sqrt{var\left(\widehat{TAMRP}\right)var\left(\widehat{B_a}\right) + E^2\left(\widehat{TAMRP}\right)var\left(\widehat{B_a}\right) + E^2\left(\widehat{B_a}\right)var\left(\widehat{TAMRP}\right) + (1-T_c)^2\left[var(\hat{p})var\left(\hat{L}\right) + E^2(\hat{p})var\left(\hat{L}\right) + E^2\left(\hat{L}\right)var(\hat{p})\right]}$$

Where:

$var\left(\widehat{TAMRP}\right)$ is the square of the standard error of the estimated TAMRP;

$E^2\left(\widehat{TAMRP}\right)$ is the square of the estimated TAMRP;

$var\left(\widehat{B_a}\right)$ is the square of the standard error of the asset beta;

$E^2\left(\widehat{B_a}\right)$ is the square of the estimated asset beta;

T_c is the corporate tax rate;

$var(\hat{p})$ is the square of the standard error of the debt premium;

$E^2(\hat{p})$ is the square of the estimated debt premium;

$var\left(\hat{L}\right)$ is the square of the standard error of leverage; and

$E^2\left(\hat{L}\right)$ is the square of leverage.

5.50 The standard errors we determined in the 2016 IMs are shown in 0.

[513] The main alternative to the 'complex analytical approach' is the 'simple analytical approach' which would involves the IMs determining an upper and lower bound for each of those parameters that the IM considers has uncertainty associated with it. These bounds would be determined based on qualitative judgement. For a detailed description of 'complex analytical approach', see Commerce Commission "Input methodologies (electricity distribution and gas pipeline services) Reasons paper" (December 2010), para H11.19.

Table 5.6 Standard errors of the WACC determined in the 2016 IM Review

	EDBs and Transpower	GPBs	Airports
Standard error of the asset beta	0.12	0.12	0.16
Standard error of the TAMRP	0.015	0.015	0.015
Standard error of the debt premium	0.0015	0.0015	0.0015
Standard error of overall WACC	0.0101	0.0105	0.0146

5.51 All parameters other than the asset beta, TAMRP, and debt premium are assumed to have a standard error of zero for the reasons we lay out below:

5.51.1 **Leverage**: to address the leverage anomaly we use a notional leverage estimate based on the average leverage of our comparator firms. This is to make the cost of capital invariant to changes in leverage (as the equity beta and leverage are calculated using the sample of comparator firms rather than independently). Applying a standard error would undermine this purpose.

5.51.2 **Risk-free rate**: although the risk-free rate does vary, there is only very small uncertainty as to what the rate actually is at any one time. Variations in the risk-free rate can be hedged by regulated providers. That is, a standard error associated with the risk-free rate plays no purpose in measuring uncertainty associated with our estimate in the cost of capital.

5.51.3 **Debt issuance costs and tax rates**: we consider that these parameters are not associated with significant levels of uncertainty.

5.52 This leaves the standard errors associated with estimating the asset beta, TAMRP, and debt premium. We explain our reasons for the draft and final decisions for each of the standard error parameters in the following sections.

Stakeholder views up to the draft decisions

5.53 Vector suggested that we include a standard error for leverage:[514]

> The Commission calculates the standard error of the WACC considering only three parameters (the TAMRP, debt premium and asset beta). This assumes the other parameters of the WACC can be known with any certainty. However, this is not the case for notional leverage, the risk-free rate or debt issuance costs. For example, the optimal leverage for EDBs may not be correct. The standard error for leverage may be material as the Commission uses a large and diverse set of comparators which is likely to include companies with very different leverages in the estimate. Although the Commission compares its estimates of the mid-point WACC with independent third parties, it doesn't compare the estimates it could generate through applying alternative methodologies. This differs from the approach taken by other regulators which consider a range of parameter values. Not considering alternative sources of evidence will tend to lead to an under-estimate of the allowed point estimate within the range.

Draft decisions

5.54 In our draft decision we proposed to:

5.54.1 maintain the standard error of the WACC for EDBs/Transpower at 0.0101;

5.54.2 maintain the standard error of the WACC for GPBs at 0.0105;

5.54.3 change the standard error of the WACC for airports to 0.0153 (from 0.0146 in the 2016 IM); and

5.54.4 maintain using a leverage standard error of zero.

Summary of our draft decisions

5.55 Based on the analysis described below, our draft decision was that the standard errors in Table 5.7 should apply.

Table 5.7 Updated standard errors of the WACC under this draft determination

	EDBs and Transpower	GPBs	Airports
Standard error of the asset beta	0.12	0.12	0.18
Standard error of the TAMRP	0.015	0.015	0.015
Standard error of the debt premium	0.0015	0.0015	0.0015
Standard error of overall WACC[515]	0.0101	0.0105	0.0153

[514] Vector "Submission on IM Review CEPA report on cost of capital" (3 February 2023), p 11.

[515] We noted that while the formula for calculating the standard error of the overall WACC differs slightly for vanilla and post-tax WACC estimates, in both cases the values are 0.0101 (for EDBs/Transpower), 0.0105 (for GPBs), and 0.0153 (for airports) when rounded to four decimal places.

Reasons for our draft decisions

Standard error of the asset beta

5.56 We updated our estimate of the standard error of the asset beta, based on the draft decision comparator samples used to estimate asset beta and leverage. Based on this analysis, we proposed to set:

5.56.1 a standard error of the asset beta of 0.12 for EDBs, Transpower, and GPBs; and

5.56.2 a standard error of the asset beta of 0.18 for airports.

Energy

5.57 The estimates used in our determination of the standard error of the asset beta for the energy comparator sample is summarised in Table 5.88.

Table 5.8 Standard error of the asset beta for draft decision energy comparator sample

	2007-2012	2012-2017	2018-2020	Average
Weekly	0.11	0.14	0.12	0.12
Four-weekly	0.11	0.11	0.14	0.12
Average	0.11	0.12	0.13	0.12

5.58 We noted that when we estimate the asset beta, we use judgement because we do not know the extent that COVID-19 was a systematic event. We considered that our asset beta estimate was broadly consistent with the pre-COVID-19 long-term average weekly and four-weekly estimates.

5.59 For the purpose of calculating the standard error of the asset beta we used the 12 years prior to COVID-19, consisting of two five-year periods (2007-2012, 2012-2017) and one two-year period (2018-2020). We applied a weight of 5/12, 5/12 and 2/12 to the three periods, and average over estimation frequencies and time periods, which led to a standard error of the asset beta of 0.12 (rounded to two decimal places).

5.60 We determined that the updated standard error of the asset beta of 0.12 should apply to EDBs, Transpower and GPBs. This estimate was the same as we set in our 2016 IMs.

Airports

5.61 We also updated the standard error of the asset beta for the airports draft decision comparator sample, as summarised in Table 5.9. Averaging across the weekly and four-weekly estimates for the three pre-COVID-19 periods, weighted as discussed in the asset beta section, resulted in a standard error of the asset beta for airports of 0.18. This was a slight increase from our 2016 IMs standard error for airports of 0.16.

Table 5.9 Standard error of the asset beta for draft decision airports comparator sample

	2007-2012	2012-2017	2018-2020	Average
Weekly	0.13	0.28	0.18	0.20
Four-weekly	0.08	0.26	0.10	0.15
Average	0.11	0.27	0.14	0.18

Standard error of the TAMRP

5.62 The TAMRP is a difficult parameter to estimate and is subject to substantial potential error. In 2008 Dr Lally estimated the standard error associated with the TAMRP at 0.015.[516] We used the estimate of 0.015 in the 2010 IMs, 2016 IM Review and 2020 Fibre IMs.

5.63 In light of no further evidence, our draft decision was to maintain a 0.015 estimate of the standard error for the TAMRP.

Standard error of the debt premium

5.64 In the 2016 IM Review, we determined that a fixed standard error of the debt premium of 0.0015 should apply. [517] We noted that this parameter has very little impact on the standard error of the overall WACC.

5.65 In the absence of any further evidence, our draft decision was to maintain a fixed standard error of the debt premium of 0.0015 as in the 2016 IM Review.

Standard error of leverage

5.66 We noted that there was a submission suggesting that we introduce a standard error for leverage (see paragraph 5.52).

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[516] See Dr Lally "The Weighted Average Cost of Capital for Gas Pipeline Businesses" (October 2008), Appendix 2.

[517] For reasoning on how we reached this decision, see Commerce Commission "Input methodologies review decisions – Topic paper 4: Cost of capital issues" (20 December 2016), paras 596-602.

5.67 Our draft decision was to maintain our view that leverage should have a standard error of zero. As explained in paragraph 5.51.1 above, due to the anomaly associated with the simplified SBL-CAPM, we apply a notional leverage estimate based on the average leverage of our comparator sample. This notional level of leverage is necessary to make the cost of capital invariant to changes in leverage (as the equity beta and leverage are calculated using the sample of comparator firms rather than independently).

Application of the standard error of the WACC for airports

5.68 We proposed to maintain our 2016 IM Review approach to publish our mid-point estimate of the cost of capital together with the standard error of the WACC for airports. The standard error can then be used to determine the probability distribution of the WACC estimate and any additional WACC percentile required.

Stakeholder views on draft decision

5.69 Transpower agreed with our draft decision of maintaining the standard error of WACC for EDBs and Transpower at 0.0101.[518]

5.70 Vector did not support our draft decision of maintaining the standard error of WACC for EDBs and Transpower at 0.0101 and maintaining the standard error of WACC for GPBs at 0.0105.[519] However, Vector did not provide any further reasons.

5.71 NZ Airports Association resubmitted the Earwaker and Bush report (which was a submission on our 2016 draft decisions).[520] NZ Airports Association submitted that in 2016 they invited us to consider the impact that the heterogeneity of airports will have on the standard error estimate for asset beta. As noted in the Earwaker and Bush report, they expected that the standard error for airports should be materially higher than the standard error for EDBs and GPBs to account for the heterogeneity.[521]

Reasons for our final decisions

Approach to estimating the standard error of the WACC

5.72 We have continued using the 'complex analytical approach' described in the 2010 IMs reasons paper to calculate the standard error of the WACC. The formula is outlined in paragraph 5.49.

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[518] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.37.

[519] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.10.

[520] NZ Airports Association "John Earwaker & Dr Harry Bush - Auckland Airport's estimate of beta May 2018" (19 July 2023); NZ Airports Association "John Earwaker and Dr Harry Bush - Evidence relating to the assessment of the WACC percentile for airports August 2015" (19 July 2023).

[521] NZ Airports Association "John Earwaker and Dr Harry Bush - Evidence relating to the assessment of the WACC percentile for airports August 2015" (19 July 2023), p.27.

5.73 We assume that leverage, risk-free rate, debt issuance and associated costs and tax rates all have a standard error of zero for the reasons we set out in paragraphs 5.51.1 to 5.51.3.

5.74 The changes in the standard error of the WACC since the draft decision mainly arise from us revising our estimates of the standard error of the asset beta based on updated comparator samples and time periods for determining asset beta and leverage.

Standard error of the asset beta

5.75 When we estimate the asset beta of the firms in our comparator sample, we also estimate a standard error for the asset beta from the comparator sample. We can use these standard errors and the individual estimates of the asset betas of comparators to inform the standard error for the overall asset beta estimate using the methodology laid out by Dr Lally in 2008.[522]

5.76 We have undertaken updated analysis of the standard error of the asset beta, based on our comparator samples used to estimate asset beta and leverage which have changed since the draft decision. Based on this updated analysis, we have determined:

5.76.1 a standard error of the asset beta of 0.13 should apply to EDBs, Transpower, and GPBs; and

5.76.2 a standard error of the asset beta of 0.19 should apply to airports.

Energy

5.77 For the regulated energy suppliers (ie, EDBs, Transpower and GPBs) we have calculated the standard error of the asset beta using the last two five-year periods of the final comparator sample. This is consistent with the two periods used to estimate the asset beta for energy.

Table 5.10 Standard error of the asset beta for final energy comparator sample

Period	2012-2017	2017-2022	Average
Weekly	0.14	0.14	0.14
Four weekly	0.11	0.16	0.13
Average	0.12	0.15	0.13

[522] We followed the approach set out in Dr Lally (2008) to estimate the standard error of the asset beta. Martin Lally "The weighted average cost of capital for gas pipeline businesses" 28 October 2008, Appendix 3, pp. 170-178.

Airports

5.78 In our draft decisions, we estimated the asset beta standard error from the comparator sample used to estimate the asset beta (standard error of 0.18 based on 8 comparators). We considered that this estimate was reasonable as it was close to the 0.16 value that we used as the standard error for airports in 2010 and 2016 IMs.

5.79 For our final decisions we have updated our asset beta comparator sample to include two new comparators and remove one from the draft decision sample. The standard error based on the updated comparator sample produces a standard error of the asset beta of 0.28, which is significantly above the draft decision value and the 2010 and 2016 asset beta standard errors (as well as more than double our asset beta standard error for energy).[523]

5.80 Given our final asset beta for Airports of 0.67, a standard error of 0.28 means that an asset beta of 0.95 is only one standard deviation above our midpoint estimate. We consider that the standard error result based on the updated asset beta comparator sample is not reasonable.

5.81 We consider that a more appropriate approach is to apply judgment in estimating the asset beta standard error for Airports. We consider that 0.19 is appropriate given that it is close to, but higher than, our draft decision asset beta standard error and is also the standard error of asset beta of the final comparator sample for the 2017-2020 period (ie, the period immediately pre-covid).[524]

5.82 In setting the standard error of the asset beta for Chorus in the Fibre IMs, we considered that the asset beta standard error calculated by averaging over the two 5-yearly periods (0.21) implied an asset beta range that was implausibly large.[525] We noted that the large standard error of the first five year period (0.29 for the 2009-2014 period) implied a two standard deviation range around the asset beta of between -0.07 and 1.09, which we considered to be unreasonable. Therefore, our final decision for Fibre was to use the standard error from only the most recent (2014-2019) asset beta sample.

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[523] We also note that we have slightly modified the time period for the final pre-covid period in estimating the asset beta and standard error (from 2018-2020 to 2017-2020).

[524] Averaged across weekly and four-weekly asset beta standard errors for final comparator sample for the 2017-2020 sample period.

[525] Commerce Commission "Fibre input methodologies: Main final decisions – reasons paper" (13 October 2020), paras 6.891-6.901.

5.83 As a cross-check, we can use the relative standard error to compare our decision for regulated providers with our estimates of asset beta and the associated standard error in our other regulated sectors.[526] Table 5.11 below shows that the standard error for our final decision is in the range of the standard errors we have determined for the other sectors that we regulate, noting that the Airports asset beta is significantly higher than the other regulated sectors (particularly energy).

Table 5.11 Asset beta relative standard errors

	Asset beta	Standard error	Relative standard error
Fibre (2020 IMs)	0.50	0.14	28%
EDBs/Transpower	0.36	0.13	36%
GPBs	0.41	0.13	32%
Airports	0.67	0.19	28%

Standard error of the TAMRP

5.84 Our draft decision was to maintain a 0.015 estimate of the standard error for the TAMRP. We used the estimate of 0.015 in the 2010 IMs, 2016 IM Review and 2020 Fibre IMs.

5.85 We received no submissions on this point in consultation on our draft decisions and our final decision is to confirm our draft decision to maintain a 0.015 estimate of the standard error for the TAMRP.

Standard error of the debt premium

5.86 When we set the IMs in 2010, we specified a formula for estimating the standard error of the debt premium and 0.0015 as a minimum value that would apply where there are insufficient data to use the formula. In 2010 and in 2016 there were insufficient data to estimate the standard error of the debt premium and so we used the alternative minimum value of 0.0015.

5.87 We note that this parameter has very little impact on the standard error of the overall WACC. For example, the standard error of the debt premium needs to be more than double to have any impact on the standard error of the WACC for EDBs and Transpower (when rounded to four decimal places).

[526] The relative standard error shows the significance of the standard error relative to the sample point estimate. It can be calculated as Relative standard error (RSE) = (standard error/point estimate) * 100.

5.88 Our draft decision was to maintain a fixed standard error of the debt premium of 0.0015 as in the 2016 IM Review.

5.89 We received no submissions on this point in consultation on our draft decisions and our final decision is to confirm our draft decision to maintain a fixed standard error of the debt premium of 0.0015.

Standard error of leverage

5.90 We maintain our draft decision to maintain the standard error of leverage at zero.

5.91 We use the average leverage of the asset beta comparator sample to avoid the leverage anomaly, so we are not estimating the value and therefore there is no 'error' in our estimation.

Application of the standard error of the WACC for airports

5.92 Our decision is to maintain our 2016 IM Review approach to publish our mid-point estimate of the cost of capital together with the standard error of the WACC for airports.

5.93 For price-quality regulated EDBs and GPBs, and Transpower, we set an explicit WACC percentile as the return on capital. However, for airport regulation we do not price-quality regulate and instead compare our WACC estimate to that of Airports in a price setting event to assess its reasonability.

5.94 The standard error can be used to determine the distribution of the WACC estimate and allow us and interested parties to assess whether airports are limited in their ability to extract excessive profits or not.

Chapter 6 Additional cost of capital issues

Purpose of this chapter

6.1 This chapter explains our final decisions in respect of the main identified cost of capital issues for the review that do not fit neatly into the cost of debt or the cost of equity chapters above. The issues considered in this chapter are:

6.1.1 the appropriate WACC percentile;

6.1.2 adjusting the EDB and Transpower IMs to allow for a WACC for a four-year regulatory period for EDBs, DPPs, and Transpower's Individual Price-quality Paths (**IPPs**); and

6.1.3 a split cost of capital.

The appropriate WACC percentile

Final decisions

6.2 Our final decisions are to:

6.2.1 use the 65th percentile of the WACC for PQ regulation of EDBs and Transpower, and the 50th percentile (mid-point) of the WACC for PQ regulation of GPBs; and

6.2.2 publish for the purposes of ID regulation: the 25th, 50th, 65th, and 75th percentile of the WACC for EDBs and Transpower; the 25th, 50th, and 75th percentile of the WACC for GPBs; and the mid-point estimate and standard error of the WACC for airports.

Purpose and context

6.3 In this section, we explain:

6.3.1 Our approach to considering a WACC uplift,

6.3.2 Our draft decisions, including our response to submissions received as part of our consultation processes,

6.3.3 Our final decisions, including our response to submissions received in response to our draft decisions.

Approach to considering an uplift for the WACC

Rationale for providing an uplift

6.4 In setting the WACC percentile, we balance limbs (a) and (d) of the Part 4 purpose statement. The purpose statement requires that suppliers of regulated goods or services:

6.4.1 s 52A(1)(a): have incentives to innovate and to invest, including in replacement, upgraded, and new assets; and

6.4.2 s 52A(1)(d): are limited in their ability to extract excessive profits.

6.5 We also consider the promotion of the outcomes in s 52A(1)(b) and (c).

6.6 The WACC that we determine is an estimate of the true cost of capital of the businesses that we regulate. If we determine a WACC at the true cost of capital, we balance limbs (a) and (d): businesses will have an incentive to invest but will be limited in their ability to earn excessive profits.

6.7 The midpoint WACC is our best, unbiased estimate of the true cost of capital of the businesses we regulate.[527] However:

6.7.1 our estimate of the WACC is uncertain and we cannot observe whether we have set the WACC too high or too low; and

6.7.2 there may be an asymmetry between the costs and benefits of setting the WACC too high versus setting it too low.

6.8 Specifically:

6.8.1 If we set the WACC below the true cost of capital, regulated businesses will be limited in their ability to earn excessive profits, but they may under-invest. If the under-investment goes undetected and is allowed to accumulate over time, it may result in outages; and

6.8.2 If we set the WACC above the true cost of capital then regulated businesses may over-invest where the cost of such over-investment would outweigh the benefits to consumers, or regulated businesses will not invest but earn above-normal returns at the expense of consumers.

[527] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services Reasons paper" (30 October 2014), paras 4.25-4.26.

6.9 This leads to a possible asymmetry in the cost of setting the WACC too high versus setting the WACC too low. Setting the WACC too high is expensive for consumers because they pay higher bills. However, setting the WACC too low may result in even higher costs for consumers if it leads to outages. Outages from an unreliable network are expensive for consumers and remediating an unreliable network is likely to take some time.

6.10 Considering the asymmetric consequences of over- and under-investment over the long term is one of the economic principles that we use as a guide to best promote the Part 4 purpose. This economic principle recognises the trade-off between the higher costs to consumers of an uplift to the WACC with the expected benefits of reducing the risks of under-investment (such as improved quality, including reduced risk of large-scale supply outages).[528]

6.11 A WACC uplift (percentile above the 50th) is expensive for consumers because it directly increases consumer bills. It is also poorly targeted in the sense that the higher bills paid by consumers cannot be linked directly either to increased investment in reliability or to improvements in reliability. Nonetheless, an uplift is one of the tools that we consider may be appropriate to mitigate the risks of underinvestment.[529]

6.12 In this section we consider the appropriate WACC percentile for PQ regulation of EDBs, Transpower and GPBs against these concerns.

Background to the current uplift

6.13 In setting the original IMs in 2010, we decided to use the 75th percentile for the WACC for PQ regulation of EDBs, Transpower, and GPBs.

6.14 Following the High Court appeal and criticisms of the lack of an empirical basis for choosing the 75th percentile, we undertook further work in 2014.

[528] We considered these issues in the Commerce Commission "Part 4 Input Methodologies Review 2023: Framework paper" (13 October 2023), p. 51, paras 4.20-4.23.

[529] Note, for example, that we did not consider that an uplift was warranted in the case of Fibre.

6.15 The evidence we considered in the 2014 review included:[530]

6.15.1 relevant academic literature, notably a 2011 paper by Professor Ian Dobbs regarding welfare loss asymmetries arising from uncertainty in the WACC;

6.15.2 independent reports prepared by our expert advisors: Oxera, Professor Ingo Vogelsang, Professor Julian Franks, Dr Martin Lally, Economic Insights, and Professor Dobbs; and

6.15.3 expert reports submitted on behalf of interested parties in response to our draft decision and other consultation papers we released.

6.16 As part of that work, Oxera developed a loss analysis model that allowed us to compare the costs in higher consumer bills that result from setting the WACC above the midpoint to the benefits of the expected costs of outages avoided.

6.17 As a result of that further work, in 2014 we decided to use the 67th percentile of the WACC for EDBs, Transpower, and GPBs. In arriving at the decision to reduce the percentile from the 75th percentile, we placed greatest reliance on:[531]

6.17.1 the results of the loss analysis model developed for us by Oxera; and

6.17.2 an analysis of RAB multiples.

6.18 We also gave weight to the views of independent expert advisors and the fact that comparable overseas regulators often adopted WACCs above the midpoint.[532]

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[530] In addition to papers and reports cited elsewhere in this reasons paper: Franks "Memorandum" (20 June 2014), Dobbs "Proposed amendment to the WACC percentile for the Allowed Rate of Return: Comments on the Application of the Dobbs [2011] model" (17 September 2014), Lally "The Appropriate Percentile for the WACC estimate" (report to the Commerce Commission, 19 June 2014), Economics Insights "Regulatory Precedents for Setting the WACC within a Range" (11 October 2014), Dobbs "Modelling Welfare Loss Asymmetries Arising from Uncertainty in the Regulatory Cost of Finance" Journal of Regulatory Finance 39 (12 October 2010), pp. 1-28.

[531] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services Reasons paper" (30 October 2014), para 6.41.

[532] Ibid, para 5.84.

6.19 However, we also found it was not possible to define a specific percentile based purely on empirical evidence given the fundamental uncertainty on key relationships. For example, it is extremely difficult to estimate empirically the link between the WACC allowed by the regulator, the level of investment by regulated suppliers, and how this affects quality of service. In reaching our final decision, we exercised judgement in picking a point between the 60th and 75th percentile to balance the relative costs and benefits to consumers.[533]

6.20 We considered that investments could be broadly categorised into investments in quality, demand growth, innovation, and economic investments. We discuss these 6.39 below. While we considered that it may be appropriate to incentivise investments in quality (reliability) using an ex-ante mechanism, we considered that investments in innovation, economic investments with a positive net benefit for consumers, and investments to meet demand growth are generally better incentivised by targeted mechanisms that reward businesses for achieving pre-defined targets.

6.21 We concluded that the main reason to set a WACC percentile above the mid-point is to mitigate the risk of under-investment relating to service quality generally and contributing to major supply outages in particular. However, compared to setting the WACC at the mid-point, a WACC uplift should also reduce the risk of under-investment in other types of investment.[534]

6.22 In 2020 we decided to use the mid-point WACC for Fibre. In reaching that decision, we applied the loss analysis model and the reasoning that we developed in 2014 to the factual context of regulated fibre services and the objectives of Part 6 of the Telecommunications Act.

Draft decisions

6.23 Our draft decisions were:

6.23.1 to use the 65th percentile of the WACC for PQ regulation of EDBs and Transpower, and the 50th percentile (mid-point) of the WACC for PQ regulation of GPBs; and

6.23.2 to publish for the purposes of ID regulation: the 25th, 50th, 65th, and 75th percentile of the WACC for EDBs and Transpower; the 25th, 50th, and 75th percentile of the WACC for GPBs; and the 50th percentile and standard error of the WACC for airports.

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[533] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services Reasons paper" (30 October 2014), para 6.413.

[534] Ibid, para X18.

Evidence that we considered in arriving at our draft decisions

The appropriate percentile

6.24 The analysis of the appropriate percentile included consideration of:

6.24.1 submissions and cross-submissions on the Process and issues paper;

6.24.2 CEPA's report for the Commission;

6.24.3 submissions received in response to a consultation process based on CEPA's report;[535] and

6.24.4 CEPA's response to submissions received in response to the consultation process based on their report.[536]

6.25 CEPA provided us with an update of Oxera's (2014) report. While they do not draw conclusions about the WACC percentile that we should adopt, they note that there are two key changes in their update that pull in different directions:

6.25.1 Their update of the loss analysis model points to an optimal percentile between the 68th and 83rd for electricity. Although CEPA note that they consider that their cost of outages may be too high, in which case the optimal percentile is lower than the range that their results suggest.[537] The details are discussed in the analysis section.

6.25.2 Their update of international regulatory precedent points to more regulators considering whether to use WACCs above the mid-point and then choosing to aim at the mid-point.[538]

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[535] We received expert reports from CEPA (for the Commission), CEG (for the ENA), Oxera (for the 'Big 6' EDBs, and for Vector, First Gas, and Powerco), and Frontier (for Transpower). Most individual submissions from suppliers rely on their expert reports.

[536] CEPA "Review of Cost of Capital 2022/ 2023: response to submissions" (report to the Commerce Commission, 15 May 2023).

[537] CEPA "Report on Cost of Capital 2022/ 2023" (report to the Commerce Commission 'IM Review 2023' (29 November 2022), section 4.6; CEPA "Review of Cost of Capital 2022/ 2023: response to submissions" (report to the Commerce Commission, 15 May 2023), p. 5 and section 2.5.

[538] CEPA "Report on Cost of Capital 2022/ 2023" (report to the Commerce Commission 'IM Review 2023' (29 November 2022), table 4.3.1, p. 27.

6.26 Stakeholder views on the appropriate percentile can be summarised as:

6.26.1 the Major Electricity Users' Group (**MEUG**) and Major Gas Users Group (**MGUG**) support the 50th percentile (mid-point).

6.26.2 suppliers support the 67th percentile as a minimum but argue for higher. From the expert reports commissioned by suppliers:

6.26.2.1 Oxera writing for the 'Big Six' EDBs support the 70th percentile as the midpoint of the range from the 65th to 75th. They note that the current 67th percentile is within their preferred range;[539]

6.26.2.2 Oxera writing for Vector, First Gas, and Powerco support retaining at least the 67th percentile;[540]

6.26.2.3 CEG writing for the ENA support the 79th percentile from a range of 75th to 84th;[541] and

6.26.2.4 Frontier writing for Transpower support at least the 80th percentile out of the 80th, 90th, or 95th.[542]

6.27 The main difference between consumer groups and suppliers is the evidence that they emphasise.

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[539] Oxera "Review of the percentile of WACC distribution" -'Submission on IM Review CEPA reports (report prepared for 'Big 6 EDBs', 31 January 2023), p. 44.

[540] Oxera "Asset beta and WACC percentile for New Zealand GDBs" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for First Gas, PowerCo and Vector, 1 February 2023), p. 50.

[541] CEG "Memorandum: Updating the 2014 WACC Percentile" 'Appendix B -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Authority Networks, 26 January 2023), p. 1.

[542] Frontier Economics "Response to CEPA WACC report" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for Transpower, 1 February 2023), para 2 (a), p. 4.

6.28 Suppliers and experts for suppliers emphasise:

6.28.1 Estimates of the optimal percentile that results from updating our loss analysis model, including CEPA's update for us.

6.28.2 The expected increase in investment associated with decarbonisation.[543]

6.28.3 That EDBs have earned returns below our expected levels.[544]

6.29 In supporting the 50th percentile, consumer groups emphasise a wider range of types of evidence.

6.30 MEUG point to:[545]

6.30.1 a shift in regulatory precedent towards midpoint WACCs;

6.30.2 the loss analysis model considers only current-year nominal variables, and so ignores dynamic effects;

6.30.3 our estimate of the costs of outages is too high. Major outages have multifactorial causes. In estimating the optimal percentile, we assign all the benefits from avoiding outages to investment in distribution and transmission;

6.30.4 it would be difficult for the hypothesised prolonged under-investment to take place given that we: (i) evaluate our regulatory settings and rules at least every seven years, and (ii) scrutinize asset management plans (**AMPs**) of regulated suppliers;

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[543] CEG "Memorandum: Updating the 2014 WACC Percentile" 'Appendix B -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Authority Networks, 26 January 2023), para 2 and 8; Ibid, pp. 16-40; Frontier Economics "Response to CEPA WACC report" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for Transpower, 1 February 2023), pp. 17-19, paras 52-65; Oxera "Oxera "Review of the percentile of the WACC distribution that should be targeted by the NZCC" (report prepared for 'Big Six EDBs', 31 January 2023), section 5.2 pp. 39-41; Oxera "Asset beta and WACC percentile for New Zealand GDBs" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for First Gas, PowerCo and Vector, 1 February 2023), paras 4.16 and 4.65-4.73.

[544] Oxera "Review of the percentile of the WACC distribution that should be targeted by the NZCC" (report prepared for 'Big Six EDBs', 31 January 2023), p. 33. We note that this is not an issue with the level of the WACC: see Commerce Commission "Part 4 Input methodologies Review 2023 - Draft decision - Financing and incentivising efficient expenditure during the energy transition topic paper" (14 June 2023), chapter 5b for a discussion of the impact of inflation on returns.

[545] Points 6.29.1.1 - 6.29.1.5 are from Major Electricity Users Group "Submission on IM Review CEPA report on cost of capital" (10 February 2023), pp. 2-5; points 6.29.1.6 and 6.29.1.7 are from Major Electricity Users Group "Submission on IM Review Process and issues paper" (11 July 2022), para 7 - 8.

6.30.5 all parts of the economy face climate change and decarbonisation risks. We should rely on market signals (sector asset betas) to capture the effect of climate and decarbonisation risks;

6.30.6 the cost of the uplift is quantifiable, and we should provide evidence of the magnitude of the benefits; and

6.30.7 that we should consider alternative mechanisms, such as accelerated depreciation or an uplift only where a business has made a case for it. The burden of demonstrating the need for anything beyond a midpoint WACC should fall to the supplier of the regulated service.

6.31 MGUG point to:[546]

6.31.1 a shift in regulatory precedent towards midpoint WACCs, including the AER's view that any uplift is arbitrary and will lead to less efficient outcomes than the mid-point;

6.31.2 the asymmetric risk of under-investment for major gas users is moderated by the option of switching to other energy sources (liquefied petroleum gas (**LPG**) or electricity); but also

6.31.3 that the Climate Change Commission has estimated that it will cost gas users $5.3 billion to transition to other sources of energy;[547] and

6.31.4 that while Powerco has expressed concerns over policy uncertainty impacting the economics of infrastructure investment, Vector's and First Gas's asset management plans do not support the view that GPBs are either underinvesting or planning to curtail investment.

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[546] Major Gas Users Group "Submission on IM Review CEPA report on cost of capital" (3 February 2023), para 6; "Major Gas Users Group "Cross-submission on IM Review Process and issues paper, and draft framework paper" (3 August 2022), p. 5, para 21-28.

[547] Major Gas Users Group "Cross-submission on IM Review Process and issues paper, and draft framework paper" (3 August 2022), p. 4, para 18; Ministry for Business Innovation and Employment "Managing the phase out of fossil gas and opportunities to repurpose infrastructure for renewable gases: report back and proposed next steps" (9 June 2022), p. 20, para 147.

How we arrived at our proposed percentiles

The starting point for our review

6.32 As we noted earlier, in 2014 we conducted an extensive review into the issue of a WACC uplift. Consequently, we are not starting these considerations afresh but building on the existing evidence base.[548]

6.33 This evidence base was both qualitative and quantitative and we have sought to update both. To this end we commissioned CEPA to refresh the quantitative model we used in 2014 and provide an update on international regulatory practice. We have reconsidered evidence on RAB multiples, as well as other evidence on the reasonableness of our WACC estimates, and we have considered the decarbonisation context looking forward. We have also considered other changes in the overall regulatory regime, including monitoring of assets, the introduction of a quality incentive scheme for EDBs, and enforcement action taken over breaches of quality standards

The appropriate percentile for regulated electricity lines companies

6.34 As part of this review, we have reconsidered the main reasoning and evidence behind our 2014 decision and asked whether this has changed. This has included:

6.34.1 the potential impact of de-carbonisation;

6.34.2 the incentives to invest, including the quality incentives scheme for EDBs;

6.34.3 our improved ability to monitor and address quality issues;

6.34.4 the updated results of the loss analysis model;

6.34.5 evidence from our reasonableness checks; and

6.34.6 decisions made by comparable international regulators.

6.35 Our draft decision was to use the 65th percentile for the purposes of PQ regulation for EDBs and Transpower. In reaching this draft decision we considered:

6.35.1 The evidence from the loss model suggests a range between the 55th and 75th percentile. The 65th percentile is the mid-point of this range.

[548] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services Reasons paper" (30 October 2014).

6.35.2 Our reasonableness checks also point to there having been no investment problem under the current 67th percentile. Our updated parameters produce commercially realistic WACCs at the 65th percentile.

6.35.3 In 2014 there was a tendency for comparable international regulators to use a percentile above the 50th. CEPA's update of the evidence points to more regulators aiming to the mid-point than was the case in in 2014.

6.35.4 We introduced a quality incentive scheme for EDBs in 2014. The scheme rewards EDBs for exceeding quality standards and penalises them for falling short.

6.35.5 We have taken enforcement action against regulated suppliers for breaching quality standards. In 2014 this was a possibility. We have now undertaken such action.

6.35.6 Improvements in summary and analysis, and information disclosure more generally, mitigate the risk of sustained under-investment going unnoticed. Because we have better information, we can take more targeted measures to address shortfalls in investments in reliability, and less reliance is needed on setting a WACC percentile above the mid-point. However, we are also aware that the likely increased reliance on electricity for the economy may make the cost of outages greater.

The potential impact of de-carbonisation

6.36 Suppliers asked us in 2014, and again in the present review, to expand the scope of the benefits that are considered in estimating the appropriate percentile. They argue that where possible future investments offer positive net benefits to consumers, and the investments might not take place without an uplift, that we should consider the net benefit of that investment.[549]

[549] Our argument for the limited purpose of the WACC uplift is set out in paragraphs 3.36-3.44 and 5.79-5.83 of the 2014 Reasons paper. We consider the specific types of investment—in network quality, to meet demand growth, in innovations, and economic investments—in paras 5.53-5.77 (Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" (30 October 2014), paras 3.36-3.44, 5.79-5.83, and 89-95).

6.37 In the present review, the arguments for a wider purpose for the percentile have been made specifically with respect to decarbonisation, the increased electrification of the economy, and the expanded role of EDBs in managing a smart network. While some of the arguments do relate to reliability, there are also arguments for expanding the scope of benefits that we consider in assessing the appropriate percentile.[550]

6.38 While recognising the importance of these investments, and the need for greater investment than has taken place in the recent past, we considered that the WACC percentile is the wrong tool to incentivise these types of investments except to the extent that they relate to the expected costs of outages.

6.39 In 2014 we identified four categories of investment:[551]

6.39.1 Quality: investments to provide services at the quality consumers demand, which could include investments to maintain service quality (including aspects of resilience to the reliability of service), and investments to improve service quality;

6.39.2 Demand growth: investments to meet current and future consumer demand for regulated services, which could include increased demand from existing consumers, and increased demand due to new consumers;

6.39.3 Innovation: innovation investments, in either regulated services or related unregulated services; and

6.39.4 Economic investments: investments that have a positive net benefit to consumers of regulated services, and/or to the wider economy (eg, investments to reduce transmission grid congestion and that enhance competition in generation).

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[550] Vector "2023 Cost of Capital consultation" (30 March 2023), paras 9-10; CEG "Updating the 2014 WACC percentile" (report prepared for the ENA, October 2022), section 3; Frontier Economics "Response to CEPA WACC report" (report prepared for Transpower, 01 February 2023) paras 23-28; Oxera "Review of the percentile of the WACC distribution that should be targeted by the NZCC" (report prepared for Aurora, Orion, Powerco, Unison, Vector, Wellington Electricity, 31 January 2023), section 5.2.

[551] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services - Reasons paper" (30 October 2014), para 3.37.

6.40 As noted, in 2014 several submissions from regulated suppliers have suggested that a WACC uplift should be used to avoid the risk that, without the uplift, specific investments with a positive net benefit to consumers would not occur.[552] In their view this is particularly the case for certain innovation investments, economic investments, and for investments to meet new demand. According to these submissions, we should be concerned about investments 'at the margin' and ensure that positive incentives are in place to stimulate such investments. In the present review, equivalent requests have been made with respect to decarbonisation.

6.41 We were mindful that a WACC uplift will apply to the entire RAB, and not just to any incremental investment that is expected to not otherwise occur without the WACC uplift. With a WACC uplift consumers pay a significant expected ex-ante 'premium', in the form of higher prices over the long term, to mitigate the risk of under-investment.[553]

6.42 Consequently, we recognised there is a risk that consumers pay the premium due to the WACC uplift but:

6.42.1 the WACC uplift makes little or no difference to marginal investment incentives and future investment levels; or

6.42.2 the incremental investment occurs, but that investment makes little or no difference to the likelihood that future costs are avoided (eg, the costs of major supply outages); or

6.42.3 more generally, the incremental investment occurs, but over time the benefits to consumers do not equal, let alone exceed, the costs of the uplift through higher prices.

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[552] See for example CEG "Updating the 2014 WACC percentile" (October 2022), section 6, noting para 112.

[553] See Ingo Vogelsang "Review of New Zealand Commerce Commission 'Proposed amendment to the WACC percentile for electricity lines services and gas pipeline services' paper published on July 22, 2014" (report to the Commerce Commission, 31 July 2014), para 14; Ingo Vogelsang "Reply to Comments on my June 12, 2014, paper 'On the economic effects of allowing a WACC above the mid-point'" (report to the Commerce Commission, 20 October 2014), para 14.

6.43 To the extent that any additional positive incentives to actively promote greater investment might be justified, we considered that targeted ex-post investment incentive mechanisms (involving rewards and/or penalties that affect allowable revenue) are likely to be more effective for some types of investment than an ex-ante WACC uplift. This is because, with a targeted ex-post investment incentive mechanism:

6.43.1 any rewards or penalties can be specifically linked to a particular benefit/outcome having occurred, or to the investment that is expected to result in that benefit/outcome occurring;

6.43.2 the scheme would not require consumers paying a premium through higher prices without those benefits (or investments) necessarily occurring; and

6.43.3 because the premium relates to the marginal investment/benefit (rather the entire RAB), in circumstances where the expected benefit arises (or the investment occurs) it would be a more cost-effective way of delivering that benefit than a WACC uplift.

6.44 On the other hand, a targeted ex-post incentive scheme was considered likely to have limitations in avoiding major supply outages because:

6.44.1 it is difficult to link an effective reward mechanism to the avoidance of a major outage occurring;

6.44.2 where an ex-post penalty is applied, the cost to consumers will have already been incurred once any penalty takes effect;

6.44.3 it can be difficult to determine the liability for an outage, whether the outage was due to negligence, or what prudent actions the supplier should have taken to mitigate the risk and impact of the outage; and

6.44.4 any ex-post penalty would potentially be very large, but the level at which the penalty can realistically be set is likely to be significantly lower than the cost incurred by consumers due to the outage.

6.45 Therefore, the main reason we have set a WACC uplift is to mitigate against the risk of under-investment relating to service quality generally and contributing to major supply outages in particular. However, higher WACC may incentivise greater investments of all kinds, and compared to setting the WACC at the mid-point, a WACC uplift should also reduce the risk of under-investment in other types of investment as well.

6.46 We also noted that since we decided to use the 67th percentile of the WACC, we have introduced a quality incentive scheme for EDBs.[554] Under the scheme, EDBs are rewarded when they exceed pre-determined quality standards and are penalised when they fall short of them. While there is an overlap between the intent of the WACC uplift and the quality incentive scheme, we do not consider the quality incentive scheme to be sufficient to fully mitigate the risks of under-investment.

6.47 Further, where investments yield cost savings, then in addition to the ex-ante expectation of earning the WACC as a return on these investments, suppliers will also benefit under the existing incentive scheme.[555]

6.48 The practical implication of being clear as to the main purpose of the uplift is that it puts boundaries on the benefits that we considered when we use the loss analysis model to estimate the optimal percentile. We further considered how de-carbonisation impacts on our analysis of this issue. We concluded it is mainly relevant to the extent that is relates to the likelihood or impact of outages. As the economy becomes more dependent on electricity, we should expect the costs of outages to increase.

6.49 The issue was also raised as to whether the WACC percentile uplift incentivises energy networks to choose a capex solution where an operating expenditure (**opex**) solution would have been optimal (capex bias problem).[556] Such a capex bias could harm innovative opex solutions to meet the de-carbonisation challenge.

6.50 We did not consider that it is necessary to make any adjustment to the model or the results to account for capex bias. Because the WACC percentile uplift is applied to the whole RAB, the magnitude of any capex bias is likely to be too small to have a real impact on the cost of the uplift:

6.50.1 annual capex is a fraction of the RAB;

6.50.2 capex that should optimally have been opex is a fraction of capex; and

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[554] Commerce Commission "Electricity Distribution Input Methodology Amendments Determination 2014" (27 November 2014) and Commerce Commission "Default price-quality paths for electricity distribution businesses from 1 April 2020 - Final decision" (27 November 2019), Chapter 7 and Attachment M.

[555] CEG "Memorandum: Updating the 2014 WACC Percentile" 'Appendix B -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Authority Networks, 26 January 2023), pp. 29-30, para 83-86 estimate savings from a smarter network of 4%-8% for distribution hardware and 10% for transmission expenditure.

[556] Commerce Commission: "Electricity distributors' expenditure incentives under the current Part 4 approach and under a totex approach Staff working paper to inform 7 November 2022 workshop 'Forecasting and incentivising efficient expenditure for EDBs'" (1 November 2022).

6.50.3 where capex is substituted for opex, consumers still benefit from the capex, and so the net cost to consumers of the capex bias is the difference between the cost of the capex and the cost of the opex for which it was substituted.

6.51 Accordingly, the magnitude of the cost of any capex bias is small relative to the total cost of the uplift.

6.52 We also considered the issue of the uplift inducing over-investment when we developed our current framework. Professor Vogelsang, instructed by the Commission, expressed concern that the loss analysis model only considered nominal values for a single estimation year, and did not account for the impact of using a percentile above the 50th on future investment decisions.[557] MEUG raised similar concerns when they noted that the model ignores dynamic effects.

6.53 However, as Professor Vogelsang noted in his review of our final reasons paper, the additional investments that may be made because of the uplift (that do not relate directly to network reliability) do provide benefits to consumers. Consequently, the net cost of these additional investments to consumer welfare is less than the total amount of benefit from any additional investment that is induced by having the WACC above the mid-point.[558]

The incentives on investment and our ability to monitor and address quality issues

6.54 In 2014 we recognised there are influences other than the WACC on incentives to invest. Under PQ regulation, suppliers face many factors other than WACC which can impact on their investment decisions:

6.54.1 an incentive to reduce capex (and opex) within the regulatory period (once regulatory allowances have been set);

6.54.2 investors in regulated suppliers having a longer-term focus, and being less likely to concentrate on incremental, within control period, incentives for investment;

6.54.3 quality standards, and the consequent penalties for breaching these;

6.54.4 the need for a regulated business to credibly argue for an investment allowance at the beginning of the next regulatory period;

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[557] Ingo Vogelsang "Review of Oxera's report, Input methodologies – Review of the '75th percentile' approach" (10 July 2014), p. 4, para (5)-(6).

[558] Ingo Vogelsang "Review of New Zealand Commerce Commission "Amendment to the WACC percentile for electricity lines services and gas pipeline services", Reasons paper published on October 30, 2014." (24 October 2014) p. 8, para 22d.

6.54.5 summary and analysis of relative supplier performance (including scrutiny of asset management plans), and of supplier performance over time, under ID regulation; and

6.54.6 other factors outside the Part 4 regulatory regime (including, for example, mandated safety standards and the potential for reputational harm to directors if "the lights go out").

6.55 We noted that the impact of the WACC, including any uplift, on incentives to invest needs to be considered in the context of an incentive regime that rewards under-spending of allowances and the mitigants against under-spending described above.

6.56 We also noted that these alternative mitigants to this quality issue have been strengthened in three respects since 2014.

6.56.1 We have imposed penalties on businesses for breaching quality standards. In 2014 the possibility of taking action existed, but we had not done so.

6.56.2 We introduced a quality incentive scheme for EDBs in 2014. The scheme rewards regulated suppliers for exceeding quality benchmarks and penalises them for falling short of the quality benchmarks.

6.56.3 We have increased our scrutiny of asset management plans and we collect more information about assets and investments through ID than we did in 2014.[559] We agree with MEUG (cited above) that the likelihood of under-investment going undetected has decreased since 2014. Both of these point to less reliance being needed on a WACC percentile to mitigate the risk of under-investment leading to outages.

[559] For example, we now publish a dashboard that includes information on reliability data, asset ages, and asset reliability for EDBs.

The updated results of the loss analysis model

6.57 We used the loss analysis model developed in 2014 to estimate empirically the costs and benefits of a percentile above the mid-point. As part of our 2014 review, we considered several models that offered alternative approaches to estimating the costs and benefits of a WACC uplift. The one we view as being most useful is one developed for us by Oxera and is based on the loss analysis approach. The loss analysis model estimates the optimal WACC percentile by comparing the cost of higher bills for consumers to the benefits of avoided outage costs based on a consumer welfare standard.[560]

6.58 The loss analysis model could not provide a precise answer given the fundamental uncertainties which exist such as the linkage between under-investment and outage risk, however the results of the loss analysis can be useful in guiding judgement.[561]

6.59 In their submissions on the present review, Oxera cite a recent academic paper by Romeijnders and Mulder in which the authors develop a model that examines the costs and benefits of a higher WACC with the expected costs of under-investment leading to outages.[562] It expresses the idea of the loss analysis model that we use, but with added complexity relative to our loss analysis model (for example, the likelihood of network disturbances quadratically increases in average age of the infrastructure, suppliers can only replace a fraction of their assets every year, but restore that fraction to new if the regulatory allowance for the cost of capital exceeds their internal cost of capital).

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[560] We considered whether our analysis of the appropriate percentile should be based on a consumer- or total-welfare standard. Our decision was to use a consumer welfare standard: Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services Reasons paper" (30 October 2014), para 2.35 and Attachment A.

[561] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services Reasons paper" (30 October 2014), paras X14 to X16.

[562] Oxera "Asset beta and WACC percentile for New Zealand GDBs" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for First Gas, PowerCo and Vector, 1 February 2023), paras 4.25-4.29 and 4.39-4.40; Oxera "Review of the percentile of WACC distribution" -'Submission on IM Review CEPA reports (report prepared for 'Big 6 EDBs', 31 January 2023), section 5.1 and A2.

6.60 In their review of Oxera's submissions, CEPA note that the Romeijnders and Mulder model depends on the specific behavioural assumption that regulated suppliers will only invest if the WACC is greater than their cost of capital. As CEPA note, this is one very specific behavioural assumption, and different, equally reasonable behavioural assumptions, could lead to different answers:[563]

> If the regulator determines an allowed return based on an estimate of WACC that is unbiased, then over the life of an energy network assets (decades), the investor can anticipate receiving an expected return that is close to its cost of capital. Therefore, even if the current allowed return is below the WACC, it is rational for an investor to continue to invest in the network.
>
> If a regulatory framework incentivises network reliability with financial rewards and penalties, then failing to invest in network quality will lead to a change in returns that is not simply allowed return x change in RAB. This may make the marginal impact on changes in investments that affect network quality higher than the allowed return.

6.61 We agreed with CEPA that in modelling the response of regulated suppliers to the regulated WACC, different behavioural assumptions will lead to different outcomes. However, we do consider that if, at a reset, a WACC is set that is materially below the level needed to compensate investors, it is reasonable to suppose that businesses may rationally seek to delay investment and that this underinvestment can accumulate over time. As discussed, we agreed with CEPA that incentives other than the WACC impact decisions to invest.

6.62 We considered that there are more fundamental reasons for continuing using our loss analysis model in preference to the Romeijnders and Mulder model. The optimal percentile that we estimate with the loss analysis model is uncertain because the inputs (the annual cost of outages) and some of the relationships (the link between the WACC, under-investment, and outages occurring) are uncertain.[564] That is why we needed to consider wider evidence and apply judgement in deciding on the appropriate WACC percentile. We did not consider that there is value in using a more complex model that expresses a similar idea, where the additional refinements and complexity do not address any of the underlying uncertainties.

6.63 We therefore continued to rely on our loss analysis model for guidance but emphasise again that it is an aid to judgement.

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[563] CEPA "Review of Cost of Capital 2022/ 2023: response to submissions" (report prepared for Commerce Commission, 15 May 2023), para 2.2.2.

[564] We explain the uncertainties around the percentile uplift more fully in Commerce Commission " Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services - Reasons paper " (30 October 2014), paras X15-X16, 4.5, and 4.12.

6.64 In estimating the optimal percentile using our loss analysis model, we needed to make two choices that are uncertain: the amount by which the WACC needs to be below the true cost of capital before under-investment occurs; and the cost of outages when they occur.

6.65 In the past we have used the loss analysis model to estimate the optimal percentile at two thresholds:[565]

6.65.1 where under-investment takes place if the WACC is more than 0.5% below the true cost of capital; and

6.65.2 where under-investment takes place if the WACC is more than 1% below the true cost of capital.

6.66 In 2014 we wrote that it is consistent with our view of the workings of financial markets that a shortfall of 0.5–1% (or more) is likely to increase the risk of triggering a rebalancing of medium-term investment plans, and a move by investors towards deferring investment as far as possible. While submissions consider alternatives to the 0.5% and 1% thresholds, we did not consider there is a good reason to move away from emphasising them.[566]

6.67 Estimating the costs of outages was more difficult, and submitters have taken different approaches to estimating them.

6.67.1 Oxera (2014, in advice prepared for the Commission) estimated the cost of outages as a percentage of Gross Domestic Product (**GDP**) using evidence from international studies. From a wide range of 0.4%-1.8% of GDP ($0.7-3.7 billion), they settled on a preferred range of $1-3 billion. Their analysis then relied on the lower bound of $1 billion. [567]

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[565] For a discussion on these thresholds see Commerce Commission, "Fibre input methodologies: Main final decisions - reasons paper" (13 October 2020), paras 6.822 - 6.828.

[566] Commerce Commission “Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services Reasons paper” (30 October 2014), para 5.22.3. For a fuller discussion, see Commerce Commission, "Fibre input methodologies: Main final decisions - reasons paper", (13 October 2020), paras 6.822 to 6.828. For an example of a submission that uses thresholds other than 0.5% and 1%, see CEG "Memorandum: Updating the 2014 WACC Percentile" 'Appendix B -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Authority Networks, 26 January 2023), p. 6, Figure A1.1.

[567] Oxera “Review of the ‘75th percentile’ approach” (report to the Commerce Commission, 23 June 2014), p. 44.

6.67.2 CEPA (2022, writing for the Commission) start with the $1 billion that Oxera used in 2014 and update it to the present using changes in the value of lost load to arrive at an estimated cost of $1.9 billion.[568]

6.67.3 Oxera (2023, for the 'Big Six' EDBs and for Vector, Powerco, First Gas) update the studies that they used in 2014, arriving at a wide range of 0.13%-1.8% of GDP ($0.9-6.4 billion). They argue that a 2011 study by the American Association of Civil Engineers (**ASCE**) is the most reliable basis for estimating blackout costs. By Oxera's calculations, the ASCE range for the cost of outages is between 0.29%-0.38% of GDP (1.102-1.444 billion). Taking account of CEPA's update, Oxera arrive at a slightly different preferred range of $1-1.9 billion.[569]

6.67.4 CEG estimate the cost of outages as a percentage of the value of the RAB. Their starting point is 6.8% of the combined Transpower and EDB RABs, which corresponds with Oxera's (2014) use of $1.0 billion as their preferred estimate of the cost of outages.[570]

6.68 To standardise the comparison, we estimated the optimal percentile for EDBs and Transpower using our best estimate of the submitters' costs of outages with our updated estimate for the standard error of the WACC, and a combined EDB and Transpower RAB of $18.4 billion. Where the costs of outages are expressed as a percentage of GDP, we estimated a New Zealand dollar cost of outages using a 2022 nominal GDP of $380 billion. We also accounted for the fact that consumers pay before-tax costs of the uplift, while businesses receive the after-tax benefits.[571]

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[568] CEPA "Review of the cost of capital 2022/2023" (report to the Commerce Commission, 29 November 2022), pp. 24, 40.

[569] Oxera "Review of the percentile of WACC distribution" -'Submission on IM Review CEPA reports (report prepared for 'Big 6 EDBs', 31 January 2023), pp. 25-28, section 4.14, including Table 4.1; Oxera "Asset beta and WACC percentile for New Zealand GDBs" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for First Gas, PowerCo and Vector, 1 February 2023), pp. 41-45, section 4.2.3, para 4.42 - 4.56, including Table 4.4.

[570] CEG "Memorandum: Updating the 2014 WACC Percentile" 'Appendix B -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Authority Networks, 26 January 2023), p. 4, para 11 explains their approach writing that: "on the assumption that the RAB grows more or less in line with the value of the electricity supply chain this allows for a simple comparison across periods with different RABs."

[571] The treatment of taxes is discussed in our 2014 Reasons paper: Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" (30 October 2014), p. 119, para 6.58 and accompanying n.

6.69 We considered that the most relevant estimates:

6.69.1 CEPA's estimate of outage costs of $1.9 billion;

6.69.2 Oxera's preferred range for outage costs of $1.0-1.9 billion;

6.69.3 ASCE's range for outage costs, our calculation based on Oxera's estimated percentage of GDP, of $1.1-1.45 billion; and

6.69.4 our calculation of outage costs based on CEG's estimate of outage costs of 6.8% of the RAB of $1.25 billion.

6.70 In 2014, Oxera focused on the low estimate of outage costs. We did the same here. In response to MEUG's concern that our estimate of the cost of outages is too high given that major outages typically have multifactorial causes, and we are assigning the benefits of avoiding those costs to electricity lines companies only, we noted that while we estimate the full range of costs of outages, we use the lower bound estimate in the empirical analysis.

6.71 In response to MEUG's request that we quantify the benefits of the uplift, we considered the estimates of the costs of outages and the probability of those costs being incurred, based on the standard error of the WACC and the threshold at which we evaluate the optimal percentile, provide a reasonable estimate of the benefit of the uplift.

6.72 The results were as follows:[572]

6.72.1 CEPA's estimated costs of $1.9 billion yields an optimal percentile of:

6.72.1.1 68% at the 1% threshold; and

6.72.1.2 83% at the 0.5% threshold.

6.72.2 Oxera's preferred estimate of $1.0 billion yields an optimal percentile of:

6.72.2.1 48% at the 1% threshold; and

6.72.2.2 67% at the 0.5% threshold.

[572] We are uncertain on why there are differences between the percentiles that the experts argue for in their reports and the optimal percentiles reported in this memo which we have calculated from their estimates of outage costs. We suspect it may be due to the treatment of taxation. Because the uplift is calculated to give businesses an after-tax return, while consumers pay pre-tax revenue, the uplift is less effective than it would be if there were no corporate taxes.

6.72.3 The ASCE estimate of $1.1 billion, based on our and Oxera's calculations, yields an optimal percentile of:

6.72.3.1 52% at the 1% threshold; and

6.72.3.2 70% at the 0.5% threshold.

6.72.4 The estimate of $1.25 billion based on CEG's use of 6.8% of the RAB yields an optimal percentile of:

6.72.4.1 56% at the 1% threshold; and

6.72.4.2 74% at the 0.5% threshold.

6.73 We did not specify the optimal percentiles in 2014, but instead highlighted Oxera's view that the optimal percentile lay between the 60th and 70th percentiles.[573]

6.74 The range of percentiles based on the Oxera, ASCE, and CEG estimates of the cost of outages are similar to the range that Oxera found in 2014 given the inherent range of uncertainty. The only estimate that was materially different is CEPA's, and we noted CEPA's concern that their estimate is more likely to be too high than too low. Specifically, while they have updated Oxera's 2014 estimate of $1 billion using the change in the Value of Lost Load, they are concerned that the $1 billion was too high as a starting point.[574] We noted that the lower end of Oxera's range today is lower than the $1 billion that they used in 2014.

6.75 Overall, the loss analysis model results supported the use of a percentile between the 55th and the 75th for PQ regulation, with the 65th percentile as the mid-point of the range.

Reasonableness checks and other evidence on the appropriate percentile

6.76 We considered wider evidence that the 67th percentile has provided adequate incentives for investment, and that our forward-looking estimates suggest that the 65th percentile will provide adequate incentives for investment.

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[573] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" (30 October 2014), p. 119, p. 102, para 6.6.

[574] CEPA "Review of Cost of Capital 2022/ 2023: response to submissions" (report to the Commerce Commission, 15 May 2023), p. 27, para 6.1.2.

6.77 We undertook reasonableness checks of our updated parameters by:

6.77.1 comparing the WACCs that our updated parameters produce relative to the WACCs used by investment analysts and other regulators. We consider that the investment analysts' forecasts are most relevant as comparators; and

6.77.2 considering the RAB multiple for the sale of Eastland Network and broker estimates of the RAB multiples for the regulated parts of Vector's business.

6.78 We estimated illustrative WACCs using our updated parameters and the 65th percentile. In Figure 7.1 we presented a comparison of our illustrative WACCs to broker estimates of Vector's cost of capital and regulatory WACCs from comparable international regulators. Our illustrative 65th percentile WACC was at the upper end of broker estimates of Vector's cost of capital. Because of this, we considered that the 65th percentile will provide adequate incentives for investment.

6.79 RAB multiples are the ratio of the market value of a regulated asset to its regulatory book value. RAB multiples are impacted by more than just the WACC. Among other influences, they incorporate future expectations of regulatory settings and the expected ability of the business to earn higher returns through the incentive scheme, and there will always be a concern that the purchaser has overpaid.

6.80 In November 2022 it was announced that the Eastland Network was being sold. The sale was completed on the 31st of March 2023. The announced sale price is at a reported RAB multiple of 1.38.[575] The RAB multiple for the Eastland sale suggests that equity holders are not being under-compensated with the WACC at the 67th percentile. Similarly, broker estimates of the RAB multiple for Vector that are presented in Table 7.6 are greater than one. These estimates supported the view that shareholders have been adequately compensated with the WACC at the 67th percentile.

6.81 We noted that Aurora Energy applied for a CPP in 2020 to address historical under-investment in its network. We did not consider Aurora Energy's under-investment to have been influenced by the cost of capital however, but due to other factors such as its underlying asset management capability and governance.[576]

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[575] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" (30 October 2014), Attachment C, pp. 149-173.

[576] Some of the issues around Aurora Energy's governance structure are discussed here.

6.82 Finally, we conducted a full confidential debt survey as part of this review. The results showed that regulated businesses have continued to raise debt. Given that they would only do so if it was in the best interests of their shareholders, we considered that shareholders have been adequately compensated when we have set the WACC at the 67th percentile.

6.83 The evidence from our reasonableness checks suggested that there has been no issue where the WACC has been set at the 67th percentile, and that on a forward-looking basis, the 65th percentile will produce commercially realistic WACCs.

International regulatory practice

6.84 When we decided to use the 67th percentile of the WACC in 2014, among the evidence that we considered was that comparable international regulators often exercised judgement by choosing a WACC above the mid-point, either directly or by using individual parameters that were generous in favour of suppliers.[577]

6.85 In their report for us, CEPA provided an update on international regulatory practice.[578] Their update points to an increased tendency among regulators to choose the mid-point WACC than was the case in 2014. For example, in 2014 Oxera reported that between 2009 and 2012, Ofgem's decisions for energy transmission and distribution were made between the 58th and 83rd percentiles. CEPA's update points to Ofgem's most recent decisions being made at the 50th and 51st percentiles.[579]

6.86 Oxera questioned the strength of CEPA's evidence of regulators aiming to the mid-point, citing the example of three regulators that have made recent decisions to use a WACC above the mid-point.[580] In response to these submissions, CEPA have reaffirmed their finding of more regulators aiming for the mid-point. They noted that in one instance of aiming up that Oxera point to, the CMA used our uplift as part of their reasons for using a WACC above the mid-point.[581]

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[577] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services - Reasons paper" (30 October 2014), paras X20.3 and 5.84.3; Oxera "Review of the '75th percentile' approach" (report to the Commerce Commission, 23 June 2014), section 3.5.

[578] CEPA "Report on Cost of Capital 2022/ 2023" (report to the Commerce Commission 'IM Review 2023' (29 November 2022), section 4.3.

[579] CEPA "Report on Cost of Capital 2022/ 2023" (report to the Commerce Commission 'IM Review 2023' (29 November 2022), table 4.2.

[580] Oxera "Review of the percentile of WACC distribution" -'Submission on IM Review CEPA reports (report prepared for 'Big 6 EDBs', 31 January 2023), section 4.5 and Appendix A1; and Oxera "Asset beta and WACC percentile for New Zealand GDBs" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for First Gas, PowerCo and Vector, 1 February 2023), pp. 3-4 and paras 4.17-4.24.

[581] Commerce Commission "Input methodologies review 2023 -CEPA "Review of Cost of Capital 2022/ 2023: response to submissions" (report prepared for Commerce Commission, 15 May 2023), paras 2.11.4.

6.87 MGUG point to CEPA's evidence in arguing that we should use the mid-point, highlighting the AER's statement that any movement away from the midpoint is arbitrary.[582] We agreed with CEPA and MGUG that comparable international regulatory practice has shifted from aiming up to the mid-point and we have considered this evidence in arriving at our draft decision. However, we disagreed with the contention that any departure must necessarily be arbitrary. Where we have decided to use a percentile above the mid-point, that decision has been based on considerations that include a quantification of the costs and benefits to consumers of the uplift.

Summary of our draft decision to use the 65th percentile for EDBs and Transpower

6.88 Our draft decision was to use the 65th percentile for PQ regulation of EDBs and Transpower. We considered a wide range of evidence in arriving at this decision.

6.89 We used the same broad framework for determining the appropriate percentile that we developed in 2014.

6.90 We updated our estimate of the appropriate percentile using the loss analysis model. The results point to a range of the 55th to the 75th percentile. The 65th percentile is the mid-point of this range.

6.91 We considered the available evidence on RAB multiples. This evidence suggests that there was no investment issue with the 67th percentile of WACC being used for price-quality regulation. However, the RAB multiple evidence can only tell us that the WACC was unlikely to be too low. On a forward-looking basis, our updated parameters produced commercially realistic WACCs at the 65th percentile when compared to estimates of the cost of capital for regulated suppliers from brokers and investment analysts.

6.92 We considered the evidence that comparable international regulators are increasingly aiming to the mid-point in setting WACCs. This is a change from 2014, when comparable international regulators were setting WACCs above the mid-point, either directly or through the choice of parameters that were generous to regulated suppliers.

6.93 In addition to the results of the loss analysis model, reasonableness checks, and consideration of the decisions of comparable international regulators, we also considered changes in our own regulatory regime. In 2014 we noted that incentives to invest are motivated by more than just the expected return on investments.

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[582] Major Gas Users Group "Submission on IM Review CEPA report on cost of capital" (3 February 2023), paras 24-26.

6.94 A key concern a percentile above the mid-point is meant to address is that deterioration in the quality of the network goes undetected over time and results in material events such as outages. Since 2014, our regime has improved in three respects that have a bearing on incentives to invest and the likelihood that businesses will underinvest or that the underinvestment will go undetected.

6.94.1 Our monitoring of asset quality has improved. As noted, we now publish live dash boards that include asset ages. We also undertake scrutiny of asset management plans. The increased scrutiny decreases the likelihood that under-investment would go undetected.

6.94.2 In 2014 we introduced a quality incentive scheme for EDBs. The scheme rewards regulated suppliers for exceeding quality standards and penalises them for falling short of quality standards. The quality incentive scheme provides EDBs with financial incentives to maintain their network.

6.94.3 Since 2014 we have undertaken enforcement action against EDBs that have breached quality standards. While enforcement action existed as a possibility before 2014, that fact that we have undertaken action makes the expectation that we will do so in the future more credible. Enforcement action, and the associated direct and indirect (reputational) costs, increase the incentive for regulated suppliers to maintain their network.

6.95 We considered that our draft decision to use the 65th percentile was a conservative one. The improvements in our monitoring and enforcement and the quality incentive scheme all point to less reliance being needed on the WACC uplift to reduce the probability that EDBs (in particular) and Transpower do not maintain their networks. These considerations were supported by the considered decisions by other regulators increasingly to set WACCs at the mid-point.

6.96 Our draft decision to use the 65th percentile was based partly on our desire to provide regulatory stability, including using the same model that we have used in the past to estimate the appropriate range for the uplift. We also took into account the significant degree of uncertainty in our empirical estimate of the appropriate percentile. The optimal range that we estimated is wider than in 2014.

6.97 We did not consider that the improvements in our monitoring and enforcement are a substitute for setting the WACC at an appropriate level. However, we reiterated that the mid-point WACC is our best, unbiased estimate of the true cost of capital, and that any uplift results in a WACC that is above our best estimate of the true cost of capital.

Should we apply the uplift to gas?

6.98 In 2014 we analysed the empirical case for the 67th percentile solely with reference to electricity distribution and transmission. We then applied that decision equally to electricity distribution, Transpower, and gas distribution and transmission because we believed the issues relevant to the decisions for these services to be similar enough for the same percentile to apply.[583] In the Process and issues paper we asked for views on whether it is appropriate for any uplift that we determine with reference to electricity to also be applied to gas.

6.99 As noted above:

6.99.1 MGUG favour removing the uplift for gas;

6.99.2 Oxera, writing for Vector, First Gas, and Powerco, support retaining at least the 67th percentile.

6.100 First Gas support the uplift for gas, writing that:

> "The intuition [for gas] is the same as for electricity. The Oxera report carefully traces the intuition and empirics for choosing the 67th percentile of the WACC range for regulated energy networks – that when consumers are deprived of a reliable energy supply the costs incurred are greater than the costs incurred for the same level of over-investment. In our view this asymmetry applies as much to consumers of gas pipeline services as to consumers of electricity lines services."
>
> […]
>
> "(c)onsumers (particularly major gas users) have emphasised the importance of reliable gas supply as they move to decarbonise their operations. In consultation on our 2022 asset Management Plan, we asked stakeholders what outcome is most important to them: price, risk, safety or reliability. Half of respondents listed reliability as the number one priority – twice the number of respondents that believed price should be our highest priority." [584]

6.101 As discussed above, the loss model that we used in deciding to use the 67th percentile was developed solely with reference to electricity outages. In 2014 we decided to apply the uplift to GPBs on the basis that gas pipelines are sufficiently similar to electricity networks that the same arguments apply.

6.102 The reason the loss model is based on electricity outages is that there is established literature on the cost of electricity outages. Oxera drew on this literature in 2014. We were not aware of any studies on the economic costs of outages to consumers of gas.

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[583] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services Reasons paper" (30 October 2014), para 1.26.

[584] First Gas Group "Submission on IM Review CEPA report on cost of capital" (3 February 2023), pp. 3- 4.

6.103 Oxera (writing for Vector, First Gas, and Powerco) make three specific points in favour of retaining the uplift for gas:[585]

6.103.1 as compensation for residual stranding risk;

6.103.2 to enable investment in renewable gas infrastructure; and

6.103.3 to ensure an orderly energy transition.

6.104 Having considered the available evidence, we did not consider that the points made by Oxera provide a sufficient basis for an uplift and responded with the following points.

6.104.1 The main purpose of the uplift is to avoid outages from under-investment. The only point that Oxera raise that relates to under-investment or network reliability is related to energy transition and asset stranding.

6.104.2 Under the Act, we only regulate gas pipelines services, ie, the conveyance of natural gas by pipeline. Incentivising a transition to alternative uses would likely fall outside the purpose of the Act in relation to gas pipelines.

6.104.3 For the most part we do not consider that these risks are systematic, and so they are not compensated or mitigated through the WACC.[586] We elaborated further on this point in the Draft Decision Financing and incentivising efficient expenditure as set out in the Energy Transition topic paper.[587] There we noted that the gas sector faces specific non-systematic risks which are not accounted for in the parameters that determine the WACC (see topic 3d).

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[585] Oxera "Asset beta and WACC percentile for New Zealand GDBs" – 'Submission on IM Review CEPA report on cost of capital' (report prepared for First Gas, PowerCo and Vector, 1 February 2023), p. 47, para 4.65.

[586] Citing the 2010 IMs, we explained in the 2014 Reasons paper that we considered a more appropriate response to asset stranding would be to change the depreciation profile for the at-risk assets: Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" (30 October 2014), p. 64, n 157. For an explanation of how we are handling stranding risks, see Commerce Commission "Part 4 Input methodologies Review 2023 - Draft decision - Financing and incentivising efficient expenditure during the energy transition topic paper" (14 June 2023), Topic D.

[587] Commerce Commission "Input methodologies review 2023 - Draft decision - Financing and incentivising efficient expenditure during the energy transition topic paper" (14 June 2023), para 3.184.

6.104.4 Asset stranding risks are being addressed through adjustments to asset lives.[588] We described in more detail our current approach to addressing asset stranding risk in topic 3d of the Financing and incentivising efficient expenditure during the energy transition topic paper.[589]

6.105 Having reconsidered the available evidence, we believed that there are two important respects in which gas is likely to differ from electricity:

6.105.1 the cost of electricity outages relative to the cost of gas outages; and

6.105.2 the likelihood that under-investment will go undetected and that this undetected under-investment will lead to outages is likely lower for gas.

6.106 While we had no empirical basis for estimating a magnitude, we expected that the cost of outages will be lower for gas users than for electricity users. For many users, gas is a secondary energy source, and so the cost of outages is likely to be lower than for electricity. Gas outages do not result in electricity outages, but electricity outages result in gas outages as many applications for gas—continuous flow water heating and cooking equipment in domestic application—rely on electricity to run. In addition, electricity outages can have an impact on telecommunications, which gas outages do not.

6.107 The evidence on reliability is that gas networks are more reliable than electricity networks. The reason that there are more studies on the costs of electricity outages than gas outages is that there are more of them.

6.108 As part of our reporting on the performance of the electricity and gas networks, we report on the:[590]

6.108.1 System Average Interruption Frequency Index (**SAIFI**): The average number of times a consumer experiences an outage (total outages divided by total consumers); and

6.108.2 System Average Interruption Duration Index (**SAIDI**): the minutes of outages each consumer would experience if the total time for all outages were divided between all consumers.

6.109 The differences between electricity and gas are large for both measures.

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[588] Commerce Commission "Default price-quality paths for gas pipeline businesses from 1 October 2022 Final Reasons Paper" (31 May 2022), Chapter 6.

[589] Commerce Commission "Input methodologies review 2023 - Draft decision - Financing and incentivising efficient expenditure during the energy transition topic paper" (14 June 2023), Topic 3d.

[590] Our most recent report for electricity distributers can be downloaded here.

6.110 The SAIFI for:

6.110.1 Electricity distributers is 1.47;

6.110.2 Gas distributers is 0.01.

6.111 The SAIDI for:

6.111.1 Electricity distributers is 210.2 (101.3 planned, 108.9 unplanned);

6.111.2 Gas distributers is 1.51.

6.112 These differences in reliability point to engineering differences that were not accounted for in our previous decision to apply the uplift to gas businesses.

6.113 Our draft decision was to use the 50th percentile for gas. This was based primarily on these two points: the expected differences in costs of outages and the differences in reliability. Any set of estimates of the optimal percentile made using a lower expected cost of outages (in proportion to GDP) and the much lower probability of undetected under-investment leading to outages includes the mid-point within the range or sits entirely below the mid-point. We do not consider that it is appropriate to use a WACC that is less than our best, unbiased estimate of the true cost of capital, and so our draft decision was to use the 50th percentile.

6.114 The draft decision is supported by MGUG's observation, which we agree with, that the risk of under-investment in gas is moderated by the ability of gas users to switch to alternative fuels (LPG and electricity).[591] This observation is consistent with our view that gas is a secondary energy source.

6.115 In reaching our draft decision for gas, we also considered the wider changes in our regime that we noted above, including improvements in our scrutiny of AMPs and improvements in ID. We also took account of the change in regulatory precedent discussed above. We noted with respect to the reasonableness checks that our only estimate of a RAB multiple for gas is for Vector, and the RAB multiple of one reflects regulatory uncertainty around climate change.

[591] Major Gas Users Group "Submission on IM Review CEPA report on cost of capital" (3 February 2023), para 6(c).

Our draft decision regarding the appropriate WACC percentile for ID regulation

6.116 We also needed to consider the consequential impact of our draft decision on the WACC determinations for ID regulation.[592] Here:

6.116.1 Given our draft decision to use the 65th percentile of WACC for the purpose of PQ regulation of EDBs and Transpower, we will publish the 25th, 50th, 65th and 75th percentiles of WACC for ID regulation for EDBs and Transpower.

6.116.2 For GPBs, our draft decision to use the mid-point of the WACC for the purposes of PQ regulation will also be reflected in continuing to publish the 25th, 50th, and 75th percentiles, but no longer publishing the 67th percentile of WACC in ID regulation WACC Determinations.

6.117 We noted that in practice interested parties can calculate whatever percentile of WACC they may be interested in from the information available.

6.118 In 2016 we amended the approach to airport ID regulation by no longer publishing the 25th and 75th percentile.[593] Instead we decided to publish our mid-point estimate of the WACC together with the standard error of that estimate. The standard error can be used to determine the probability distribution of the WACC estimate and any individual WACC percentile required.

6.119 Under our approach to reviewing airport PSEs we allow for airports to justify departures from our best estimate of WACC for the airport sector and we can consider the evidence supporting those departures.

6.120 We believed this approach has worked well in the PSEs that have occurred since the amendments and we had no reason to move from that approach now, hence our draft decision was that no amendments are required.

Reasons for our final decision

6.121 We now consider the reasons for our final decisions. We report stakeholder views on our draft decisions and our consideration points.

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[592] In 2014 we issued a separate reasons paper: Commerce Commission, "Amendments to the WACC percentile range for information disclosure regulation for electricity lines services and gas pipeline services: Reasons Paper, (12 December 2014).

[593] Commerce Commission, "Input methodologies review decisions Topic paper 6: WACC percentile for airports" (20th December 2016), Table X1.

Stakeholder views on our draft decision

6.122 We received submissions on our draft decisions from a range of interested parties. Among these, we received expert reports from Oxera for the Big Six EDBs, CEG for the ENA, NZIER for MEUG, and Oxera for Vector, First Gas and Powerco.[594] The NZIER report summarises our decision and expert reports received as submissions on it without commenting on the decision itself.

6.123 Suppliers and their experts oppose our draft decision to use the 65th percentile of the WACC for EDBs and Transpower. Oxera, in a report for the 'Big Six' EDBs, argues for the 67th percentile.[595] Alpine Energy, Aurora, the BusinessNZ Energy Council, Horizon Energy, Orion, Powerco, Powernet, Transpower, Unison, Vector, Wellington Electricity disagrees with our draft decision to change from the 67th to the 65th percentile.[596] CEG, in a report for the ENA, argues for the 79th percentile.[597] The ENA supports retaining our 2014 decision of the 67th percentile.[598]

6.124 Counties Energy argues that we should use the 50th percentile for Transpower.[599] Transpower writes in their cross-submission that Counties Energy has not offered any empirical basis to support using a percentile for Transpower that is different from the percentile that is used for EDBs.[600]

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[594] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023); CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023); Major Electricity Users Group (MEUG) "NZIER - WACC uplift setting report" (9 August 2023); Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023)

[595] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), p. 53.

[596] Alpine Energy Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 20; Aurora Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 14; BusinessNZ Energy Council (BEC) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp. 1-2; Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 1; Horizon Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 13; Orion "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 16; PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9; PowerNet "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 12; Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 150; Unison "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 48; Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 139; Wellington Electricity "Submission on IM Review 2023 Draft Decisions" (19 July 2023), section 4.3.

[597] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), p. 52.

[598] Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 7.

[599] Counties Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp. 1-2.

[600] Transpower "Cross-submission on IM Review 2023 Draft Decision" (9 August 2023), paras 15-16.

6.125 Contact Energy supports using the 60th percentile for EDBs and Transpower, writing that "(A)ll the updated analysis, new evidence, and evolved regulatory settings point to the current 67th percentile being too high."[601] In support of their view, Contact Energy points to the updated loss analysis results; the use of the 50th percentile overseas not having led to the hypothesised problems with underinvestment; the introduction since the 2014 percentile decision of the EDB incentive scheme and IRIS; and the fact that we have now taken enforcement action and improvements in our ID regime.[602]

6.126 In response to Contact Energy's suggestion that we should use the 60th percentile, Transpower writes that: "Nothing in their [Contact Energy] submission substantiates this claim."[603]

6.127 MEUG supports our decision to use the 65th percentile for EDBs and Transpower but continues to argue for the 50th percentile. MEUG writes that: "(B)y maintaining WACC above the true cost of capital, consumers will pay more for electricity than we consider reasonable."[604] In their cross-submission, Transpower writes that: "(W)hile we do not agree with the Commission's judgement about lowering the WACC percentile, the Commission has provided sound evidence and basis justifying a WACC uplift."[605] Vector disagrees with MEUG, writing that the quoted statement is: "nonsensical since nobody knows the true cost of capital."[606]

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601 Contact Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 45.

602 The capex IRIS for EDBs and quality incentive scheme were both introduced in 2014: Commerce Commission "Amendments to input methodologies for electricity distribution services and Transpower New Zealand Incremental Rolling Incentive Scheme" (27 November 2014); and Commerce Commission "Default price-quality paths for electricity distributors from 1 April 2015 to 31 March 2020 Quality standards, targets, and incentives " (28 November 2014).

603 Transpower "Cross-submission on IM Review 2023 Draft Decision" (9 August 2023), para 18.

604 Major Electricity Users Group (MEUG) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), paras 8-10.

605 Transpower "Cross-submission on IM Review 2023 Draft Decision" (9 August 2023), para 17.

606 Vector "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 48.

6.128 Suppliers and their experts oppose our draft decision to use the 50th percentile for GPBs. First Gas, Gasnet, Powerco, and Vector support maintaining the 67th percentile.[607] Oxera, in a report for First Gas, Powerco and Vector, writes that it: "consider that there is sufficient evidence to warrant a WACC uplift (in line with EDBs) for a number of reasons" and that "a WACC uplift for GPBs in line with the previously used 67th percentile continues to be an appropriate tool to address this asymmetry, and should be retained."[608]

6.129 MGUG does not express a clear view on the draft decision to use the 50th percentile for gas but write that they see no evidence of the conditions that they consider would justify an uplift. It further notes to the extent that the cost of outages will fall on them, it would prefer to take the risk rather than pay for an uplift: "(W)e will bear the costs of outages and non-performance directly. We wish to carry the risks that have been cited to induce the Commission to err on the side of generosity to suppliers."[609]

6.130 Methanex supports our draft decision to use the 50th percentile for GPBs.[610] Vector disagrees with Methanex.[611]

6.131 We set out in brief the main substantive points raised in submissions. Our response to these issues follows below.

6.132 The main substantive points that relate to the percentile generally or to the percentile for EDBS and Transpower are that:

6.132.1 In focussing on reliability investments, we have interpreted our economic principle of considering the asymmetric outcomes of over- and under-investment too narrowly.[612]

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[607] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 3; GasNet Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para. 26 ;PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), 10; Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 45.

[608] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), pp. 2 and 5.

[609] Major Gas Users Group (MGUG) "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), paras X2 and 3.

[610] Methanex "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 3.

[611] Vector "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 43.

[612] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 14; see also PowerCo "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 3.

6.132.2 That our calculation of the optimal uplift using the loss analysis model and identification of the appropriate range for the uplift is flawed:

6.132.2.1 Oxera objects to our focussing on outage costs of $1 billion as representative of their views.[613]

6.132.2.2 Transpower queries the weight that we place on the ASCE report.[614]

6.132.2.3 CEG objects that it is unable to replicate our results using its (CEG's) model.[615]

6.132.2.4 CEG notes that the calculation of the optimal percentile depends on the standard error of the WACC, and that part of the change in the optimal percentile is due to changes in the standard error of the WACC.[616]

6.132.2.5 Oxera argues that we should not make any adjustment for taxes.[617]

6.132.3 The evidence before us does not support the draft decision to change from the 67th percentile for EDBs and Transpower, and that the evidence before us provides as much support for retaining the 67th percentile as for the 65th percentile.[618] In a similar vein, some submitters argue that we should retain the 67th percentile for the sake of regulatory stability.[619]

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[613] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), paras 6.9-6.10.

[614] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 34, para 153.

[615] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), paras 203-204.

[616] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), paras 211-212.

[617] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), paras 6.7-6.8.

[618] Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 5; Transpower "Cross-submission on IM Review 2023 Draft Decision" (9 August 2023), paras 19-20; Wellington Electricity "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), section 3.1.3; Horizon Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 12.

[619] Oxera "Response to the New Zealand Commerce Commission's draft decisions for Part 4 Input methodologies Review 2023 on the cost of capital relating to the gas sector" (19 July 2023, for First Gas, Powerco and Vector), para 3.2; Transpower "Cross-submission on IM Review 2023 Draft Decision" (9 August 2023), para 19; Horizon Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), paras 4-13; Orion "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 16; PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9; Unison Networks "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 48; Vector "Cross-submission on IM Review 2023

6.132.4 That we should consider a wider range of potential benefits from the uplift when we estimate the optimal percentile.[620] For EDBs and Transpower, this is typically expressed in terms of the risks around decarbonisation, and the benefits that consumers will forego if the investments that are expected to be needed for decarbonisation are not made .[621] In the case of gas, this is expressed as supporting an orderly energy transition.[622] Vector notes that we are not proposing an ex post mechanism to incentivise investment in decarbonisation.[623]

6.133 While we consider that these are the main substantive points raised, we also address the following points:

6.133.1 Oxera argues that we should pay more attention to their interpretation of a recent academic article.[624]

6.133.2 As noted above, Counties Energy suggests that we should use the 50th percentile for Transpower.[625]

6.133.3 Submitters disagree over the relevance of comparable international regulators increasingly targeting the mid-point to the New Zealand situation.[626]

Draft Decisions" (9 August 2023), p. 1 and para 47; Wellington Electricity "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 3.1.3; GasNet Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 26 ; First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 23.

620 Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 29, also paras 46 and 47.

621 Alpine Energy Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 20; Aurora Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 14; BusinessNZ Energy Council (BEC) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp. 1-2; Energy Trusts of New Zealand Inc (ETNZ) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp. 1-2; PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9; PowerNet "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 12; Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), paras 150 and 153; Unison "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 50; Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), paras 27 and 30; Electricity Networks Aotearoa (ENA) "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 2; Transpower "Cross-submission on IM Review 2023 Draft Decision" (9 August 2023), para 21;

622 Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 7; First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp. 2, 13, 21-24; PowerCo "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 3.

623 Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 52.

624 Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), 6.23-6.24.

625 Counties Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp. 1-2.

626 Major Electricity Users Group (MEUG) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 13; Wellington Electricity "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), section

6.133.4 PowerCo and Unison point to our conclusion that EDBs and GPBs have not earned excessive profits as a reason not to reduce the percentile.[627]

6.133.5 Vector argues the wider tools that we claim will mitigate the risk of underinvestment were "nearly all" in place in 2014.[628]

6.133.6 Vector argues that our decision is based solely on the view that the "probability of major outages occurring in the energy sector is lower now than in 2014."[629]

6.134 As noted above, several submitters opposed our draft decision to use the 50th percentile for gas.

6.135 First Gas argues that in deciding to use the 50th percentile for gas, we are simply changing our minds over evidence that we considered in 2014.[630]

6.136 With respect to our argument that we do not have a basis for estimating an uplift for gas:

6.136.1 Oxera estimates a percentile for gas using the loss analysis model and costs based on the cost of the 2010 Maui outage. Oxera also estimates the costs that would be required to justify the use of the 67th percentile.[631]

6.136.2 First Gas and Oxera highlight gas leaks and First Gas highlights the time that it takes to relight gas pipelines as factors that should be considered as part of the costs and benefits of the uplift for gas.[632]

3.1.3; Electricity Networks Aotearoa (ENA) "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 2; Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 5.

627 PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 10; Unison "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 50

628 Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 29; Vector "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 12.

629 Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 28.

630 First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 2.

631 Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), 3.32-3.38.

632 First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023) p. 18; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), paras 3.42-3.46.

6.137 First Gas argues that we underestimate the costs of outages to consumers: [633]

6.137.1.1 The reason that there are studies of the costs of electricity outages but not for the cost of gas outages is that there is greater public interest in electricity outages.

6.137.1.2 Our reliance on SAIDI and SAIFI data are unpersuasive because GTBs do not report SAIDI and SAIFI data.

6.137.1.3 SAIDI and SAIFI data do not reflect the significant consequences of low frequency, high consequence events.

6.138 First Gas argues that GPBs face higher systematic risk than EDBs and Transpower, and so should have a higher WACC.[634]

6.139 Vector argues that reducing the percentile may slow the transition to renewable gas.[635] Similarly, First Gas argues that we should apply s 5ZN of the CCRA in considering the percentile for gas, and that doing so would support retaining the 67th percentile because it would support the transition to renewable gases.[636]

6.140 Powerco argues that there are few incentives to reward GDBs for maintaining the reliability of their networks."[637]

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[633] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 16.

[634] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 2; First Gas "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), 4.

[635] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 43; Vector "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 46.

[636] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 24.

[637] PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 11.

6.141 We have received in submissions points directed at our consideration of the percentile, but which we consider are not relevant to the WACC uplift issue:

6.141.1 A number of parties submitted around current and expected increasing costs, including of debt financing. Energy Trusts of New Zealand writes that: "the IMs will quickly be overtaken by the need for a major investment surge, at a time when a number of sectors will be competing for funds, labour, and other resources."[638] PowerNet argues that we should retain the 67th percentile because of the rising cost of debt and "strain on resourcing."[639] Similarly, Orion argues as reason to retain the 67th percentile, that reducing the uplift "leaves EDBs undercompensated for the challenges of increased expenditure incurred DPP3 going forward" and that "Covid impacts has meant increased costs to do the same work." In its cross-submission Orion writes that: "we have not had the opportunity to recover costs since 2020." [640]

6.141.2 Energy Trusts of New Zealand writes that: "(A)ny resultant drop in distribution income from that move [reduction in the percentile] would be likely to be absorbed in retail margins."[641]

6.141.3 Vector argues that setting the percentile at the 50th for gas and 65th for electricity will make gas cheaper relative to electricity, and so slow the transition from gas to electricity.[642]

6.141.4 Vector raises financeability in the context of the percentile, arguing that "it is impossible to come to any robust conclusions about whether the draft decision would cause financeability problems without first modelling the impacts upon EDBs' cashflows and key financial metrics."[643]

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[638] Energy Trusts of New Zealand Inc (ETNZ) "Submission on IM Review 2023 Draft Decisions" (19 July 2023) pp.1, 2.

[639] PowerNet "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 12.

[640] Orion "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 16; Orion "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 9.

[641] Energy Trusts of New Zealand Inc (ETNZ) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.1

[642] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 32.

[643] Ibid para 34.

Our response to stakeholder views

6.142 We address the main issues raised in submissions. None of the issues raised offer a coherent counter to the full set of arguments that we presented in support of our draft decision. Rather, they raise specific points against aspects of our reasoning. Notably, suppliers and experts writing for suppliers have tended to overlook our improved scrutiny of asset quality, improved ID, and the fact that we have now taken enforcement action, which together are an important reason to rely less on the uplift.

6.143 The NZIER, in a report for MEUG, writes that:

> Overall, the Commission's comments seem to anticipate the arguments made in the expert reports. While the Commission acknowledges differences of opinion with the experts on some points, the expert reports do not seem to include new arguments that are not addressed by the Commission in the draft decision.[644]

6.144 We address issues that relate to EDBs and Transpower or are common to EDBs and Transpower and GPBs first. We then consider issues that relate specifically to gas. Finally, we explain why we consider that some of the issues raised are beyond the scope of our review of the percentile.

6.145 Asymmetric risk principle: First Gas argues the asymmetric risk principle is broader than our focus on reliability investments and the cost of outages, writing that:

> The Commission asserts that the asymmetric risk principle is mainly about avoiding outages, and therefore the issues raised by Oxera on behalf of First Gas are not relevant to percentile.
>
> While the Commission has tended to focus on consumer losses from outages, that is not the only asymmetric risk of under-investment. The principle articulated in the Commission's reasons papers has broader application: any investment that benefits consumers is relevant to WACC percentile if the forgone benefits of that investment would exceed the disbenefit of higher prices in the short term. The Court endorsed that broader principle in Wellington International Airport Limited v Commerce Commission. And the Commission has in the past considered other asymmetric consequences of under-investment; for example the timing of technology change in relation to Chorus' copper UBA and UCLL services. The Commission's statement now that WACC percentile is only a matter of outages has no theoretical or empirical support.[645]

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644 Major Electricity Users Group (MEUG) "NZIER - WACC uplift setting report" (9 August 2023), p. 2.

645 First Gas "Submission on the IM Review 2023 Draft Decisions" (19 July 2023), p. 13, section 4.3.

6.146 We disagree with First Gas and consider that the focus on reliability investments is well supported by our previous work. Any uplift needs strong justification. Not only does it result in higher costs for consumers, but it may incentivise excess investment and inefficiency. Both of these were noted by the High Court in considering the uplift:[646]

> [1472] In the first place, the expectation of earning (only) a normal return on new investment ought to be an attractive proposition for a regulated supplier. In the price control regulatory framework, the return is almost guaranteed. Each supplier is a monopoly. The normal regulatory imperative in such circumstances is to prevent suppliers from over-investing. Why then, should higher likely returns be provided?
>
> [1473] Secondly, it is far from obvious that higher than normal expected returns would stimulate greater efficiency of any kind. On the contrary, they would render excess profits likely, even if less effort were made by suppliers to generate efficiencies than in a workably competitive market. In monopoly enterprises, the concern is always to prevent inefficiency creeping in. Providing a revenue cushion is not the way to create the right incentives.

6.147 We have not been able to identify the "broader principle" claimed by First Gas. However, we note that the court had sympathy for MEUG's view that our approach to estimating the asymmetric costs of over- and under-investment lacked a solid base [1470] and that there was broad agreement from the WACC conference that a loss function approach was appropriate, but that "no flesh was put on the idea" [1464, 1465].

6.148 Following the High Court's criticisms, we undertook a major project to consider whether an uplift was appropriate. We describe this project above under the heading *'Background to the current uplift'.*

6.149 The focus on reliability investments developed out of that project. Following a critique of our draft decision by Professor Vogelsang (requested by the Commission), we undertook further work to consider the types of investment that might be appropriately incentivised by a WACC uplift. In his review of our final reasons, Professor Vogelsang wrote that: "The Commission argues convincingly that reliability investments remain the overriding category to be incentivized by a WACC uplift."[647]

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[646] *Wellington International Airport Ltd & ORS v Commerce Commission* [2013] NZHC 3289 [11 December 2013] available at: https://www.justice.govt.nz/jdo_documents/workspace___SpacesStore_f440247a_5cb0_4faa_a806_c64c168c416b.pdf

[647] Vogelsang, I. "Review of New Zealand Commerce Commission "Amendment to the WACC percentile for electricity lines services and gas pipeline services", Reasons paper published on October 30, 2014" (24 October 2014), para 7.

6.150 Our decision to focus on reliability investments in 2014 is in contrast with our 2010 Reasons, which focused on arguments around dynamic efficiency.[648]

6.151 We consider that our 2010 Reasons have been superseded by our 2014 decisions and associated Reasons. While we have considered arguments for broadening the scope of the benefits that we consider in determining the appropriate uplift (discussed below), we consider that our starting point of focussing on reliability investments is consistent with our existing approach.

6.152 We note First Gas does not address our reasons for focussing on reliability investments. We discuss these below where we consider arguments for considering a wider range of benefits from the uplift.

6.153 Calculation: Part of the evidence that we considered in arriving at our draft decisions was a set of estimates of the optimal percentile calculated using our loss analysis model. The model was developed for us in 2014 by Oxera. The logic of the model is that if the WACC that we determine is less than the cost of capital by more than a threshold amount, underinvestment takes place, and the cost of outages is incurred.

6.154 The most uncertain variable used in estimating the optimal percentile is the cost of outages.[649] In our update of the model, we used the estimated cost of outages from expert reports, including CEPA (for the Commission), CEG, and Oxera as well as an estimate from an engineering report cited by Oxera (the ASCE report).

6.155 In response to our draft decisions Oxera took issue with our identification of $1 billion as Oxera's estimate of the cost of outages.

[648] Note Vogelsang's demonstration that in the case of the uplift, providing the current level of investment is close to optimal, then there is an inversion of the usual truth that dynamic effects dominate static effects. In this case, the opposite is true.

[649] The other variables are the RAB, the company tax rate, the threshold at which underinvestment takes place, and the standard error of the WACC.

6.156 We agree that the use of NZD1 billion is not a complete representation of the evidence Oxera has presented, but for the purposes of updating the loss analysis model, it is an accurate reflection of Oxera's submission on the CEPA consultation.[650] For example, Oxera wrote:[651]

> We therefore consider the estimates of NZ$1bn-NZ$1.9bn from the ASCE 2011 paper to be more reliable for our assessment, and draw insight from the lower bound of this estimate (ie NZ$1bn) in our analysis.

6.157 And further, after considering the appropriateness of applying the results of the ASCE study, an engineering report based on the American network, to New Zealand:[652]

> Therefore, it seems plausible that a relatively small level of under-investment could result in New Zealand moving towards evidence of underinvestment as in the USA, making the NZ$1bn figure above a realistic estimate of the impacts on NZ.

6.158 Oxera suggests that we should instead have used NZ$1.45bn, as the mid-point of the NZD1-1.9 billion range identified in the quote above. We disagree. In 2014 we considered it appropriate to focus on costs at the lower end of the estimated range. We consider that it is consistent with our previous reasoning to continue focusing on the lower end of the estimated range. As we discussed in the reasons for our draft decisions, major outages typically have multifactorial causes, and we are assigning the benefits of avoiding those costs to electricity lines companies only.

6.159 Transpower submits that Oxera's estimate of the cost of outages depends heavily on the ASCE study, and that we should not use them to "substantiate each other."[653] Transpower further argues that the ASCE study was completed in 2011, and that our decision to use the bottom of their range may no longer be appropriate given the expected increase in reliance on electricity.

6.160 We agree with Transpower on the first point – although the estimates are not identical, Oxera places the greatest weight on the ASCE study in arriving at their estimate of the cost of outages. We also agree with Oxera's assessment that of the studies they cite, the ASCE study warrants the greatest weight.

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[650] We took the same approach with CEPA's estimate of the cost of outages. While CEPA expressed concerns that their estimate of $1.9 billion was too high, they did not attempt to quantify the extent to which it was too high, and so we used $1.9 billion as their estimate. Suppliers did not object to this decision.

[651] Oxera "Review of the percentile of WACC distribution" -'Submission on IM Review CEPA reports (report prepared for 'Big 6 EDBs', 31 January 2023), p. 27.

[652] Ibid, p. 27.

[653] Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 34, para 153.

6.161 However, we do not use the Oxera and ASCE estimates to "substantiate each other." Our identification of the appropriate range and choice of percentile are based on judgement. We report the optimal percentiles based on the ASCE report because we believe it contains information in addition to the information contained in the optimal percentile based on Oxera's report.

6.162 On the age of the ASCE study, we note that in 2014 we considered that the ASCE study may overstate the costs of outages for New Zealand as there was already evidence of an investment gap for electricity infrastructure in the US. Given the increased electrification of the economy since 2014, we agree with Oxera in considering the ASCE study to be a more reasonable estimate of the cost of outages today.

6.163 CEG reports that it is unable to reproduce our results with its (CEG's) model. Although we published our model alongside our draft decisions, CEG has not commented on it.

6.164 We have not examined CEG's model, however we note that we are able to produce results that are very close to its if we do not account for taxes. Given outage costs of 6.8% of GDP:

6.164.1 CEG's model produces an optimal percentile of the 67th at the 1.0% threshold and the 82nd percentile at the 0.5% threshold.

6.164.2 When we use CEG's estimate of outage costs but without adjusting for tax, our model solves for an optimal percentile of the 66th percentile at the 1.0% threshold and the 82nd percentile at the 0.5% threshold.

6.165 We therefore consider that the most likely reason that CEG has been unable to reproduce our results is that it has failed to account properly for the fact that the uplift received is post-tax for suppliers, but that consumers pay costs including taxes.

6.166 CEG notes correctly that the optimal percentile calculated using our loss analysis model depends on the standard error of the WACC, and that a smaller standard error yields a higher optimal percentile, but (potentially) a lower uplift as the smaller standard error is then used to calculate the magnitude of the uplift. We consider that it is appropriate that we calculate the optimal percentile using the standard error that we have determined as part of our final decisions, which is what we have done.

6.167 Our estimate of the optimal percentile includes a tax adjustment that reflects that consumers pay pre-tax revenues. Oxera objects to the tax adjustment, arguing that taxes fund government expenditure, which contributes to the welfare of the population, and that there is a significant overlap between the population and the consumers of the regulated service.[654]

6.168 We consider that it is appropriate to take taxes into account in determining the appropriate percentile. The cost to consumers of consuming the regulated service is the pre-tax price, while the incentive effect of the uplift for suppliers is expected post-tax returns. Accordingly, we consider it is appropriate to account for taxes as they create a wedge between the cost of the uplift as paid by consumers and the incentives that it creates for suppliers.

6.169 We further note that under the Act we are only able to consider the interests of consumers in their capacity as consumers of the regulated service. We therefore may not consider the secondary effects of transfers and services funded by taxes.

6.170 Overall, we consider that the results from updating the loss analysis model that we published with our draft decisions reflected the information that was before us.[655]

6.171 Evidence for changing the percentile: A number of submissions argue the evidence before us equally supports retaining the 67th percentile and the 65th percentile and so we should not change the IM; or that we should retain the 67th percentile for the sake of regulatory stability.

6.172 The ENA argues our identification of a range of the 55th to 75th as "somewhat arbitrary" and that because it is "essentially the same as the 2014 range" that we should retain the 2014 decision.[656] Wellington Electricity writes that: "the decision to apply a 65th WACC percentile has been made without compelling evidence and that the decision departs from the well-understood and predictable methodology used in past resets."[657] Horizon Energy writes that the "arguments and reasonableness checks used by the Commerce Commission to support setting the WACC at the 65th percentile would equally apply to a decision to retain the WACC at the 67th percentile."[658]

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654 Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), para 6.8.

655 Commerce Commission "Input methodologies review 2023 - Draft decision - Cost of capital topic paper" (14 June 2023), para 6.70.

656 Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 5; Transpower "Cross-submission on IM Review 2023 Draft Decision" (9 August 2023), paras 19-20.

657 Wellington Electricity "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), section 3.1.3.

658 Horizon Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 12.

6.173 In a similar vein, a number of parties have submitted that we should retain the 67th percentile for the sake of regulatory stability[659] For example, Horizon writes that we should retain the 67th percentile because regulatory certainty has "a high, unquantified value" and that "unnecessary, small judgement-based adjustments only undermine confidence in the stability of the regime."[660] Similarly, PowerCo writes that "(T)he objective to maintain regulatory stability supports the retention of at least the 67th WACC percentile."[661]

6.174 Transpower argues that retaining the 67th percentile would be consistent with the s 52R IM purpose.[662] Oxera notes that most of the assets currently in the EDB RABs were commissioned when either the 75th of 67th percentile was being used, and that we should be cautious about using a lower percentile.[663]

6.175 As we explained in our Framework Paper, the overarching objectives of the IM review are to:[664]

6.175.1 promote the Part 4 purpose in section 52A more effectively;

6.175.2 promote the IM purpose in section 52R more effectively (without detrimentally affecting the promotion of the section 52A purpose); and

6.175.3 significantly reduce compliance costs, other regulatory costs, or complexity (without detrimentally affecting the promotion of the section 52A purpose).

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659 Oxera “Response to the New Zealand Commerce Commission’s draft decisions for Part 4 Input methodologies Review 2023 on the cost of capital relating to the gas sector” (19 July 2023, for First Gas, Powerco and Vector), para 3.2; Transpower "Cross-submission on IM Review 2023 Draft Decision" (9 August 2023), para 19; Horizon Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), paras 4-13; Orion "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 16; PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9; Unison Networks "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 48; Vector "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 1 and para 47; Wellington Electricity "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 3.1.3; GasNet Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 26 ; First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 23.

660 Horizon Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), paras 10 and 11.

661 PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9.

662 Transpower "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 151.

663 Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for ‘Big Six’ EDBs', 19 July 2023), para 6.31.

664 Commerce Commission “IM Review 2023 - Draft Framework paper” (20 May 2022), para 3.12.

6.176 We further explained that we remain of the same view that we held in 2016, that "there is no statutory threshold for making changes to the IMs as part of the review" and that "(R)ather, our approach is to only make IM changes that will likely promote one or more of the overarching objectives."[665] However we did note that "we must be mindful of the importance of predictability, which plays a role in suppliers incentives to invest in accordance with section 52A(1)(a)." [666]

6.177 As we explained in our draft decision to use the 65th percentile, in setting the WACC percentile, we balance limbs (a) and (d) of the Part 4 purpose statement. The purpose statement requires that suppliers of regulated goods or services:

6.177.1 s 52A(1)(a): have incentives to innovate and to invest, including in replacement, upgraded, and new assets; and

6.177.2 s 52A(1)(d): are limited in their ability to extract excessive profits.

6.178 We also consider the promotion of the outcomes in s 52A(1)(b) and (c).

6.179 In arriving at our draft decision, we considered a wide range of evidence. We updated our estimate of the appropriate percentile using the loss analysis model. The updated range has a lower minimum, the 55th percentile, and a lower mid-point, the 65th percentile. We also considered evidence of RAB multiples, the current practises of comparable international regulators, improvements in our monitoring, the quality incentive scheme that we introduced for EDBs in 2014, and the fact that we have now taken enforcement action for breaches of quality standards.

6.180 These changes and improvements in regime point to less reliance needing to be placed on the WACC to reduce the probability that EDBs and Transpower do not maintain their networks. Overall, we consider that our decision to use the 65th percentile is supported by the evidence and gives appropriate weight to regulatory stability and predictability.

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[665] Commerce Commission "Part 4 Input Methodologies Review 2023 - Framework paper" (13 October 2022) paras 3.24 and 3.25.

[666] Ibid, para 2.24.

6.181 Benefits of uplift / decarbonisation: Suppliers and experts writing for suppliers argue that materially higher levels of investment are expected to be needed in the foreseeable future than has been the case in the recent past. In most cases, the expected increase in investment is linked to decarbonisation and the increased electrification of the economy.[667]

6.182 Suppliers argue that there are net benefits to consumers from these decarbonisation investments being made (and not delayed), and so our estimate of the cost of underinvestment should include the loss of consumer benefits that will result if the investments are not made.[668]

6.183 Vector describes the categories of investment that we identified in 2014 as "drivers" of investment and argue that decarbonisation should be considered an additional driver of investment. CEG argues that we did not respond to their arguments about EDBs becoming DSOs, and the forgone costs of delaying that transition being of an order of magnitude larger than outage costs.

6.184 Vector describes our focus on reliability investments as myopic and point to our having considered the benefits of bringing forward technology changes when considering the percentile for fibre.[669]

6.185 We addressed these arguments when we explained the reasons for our draft decision. Except as noted below, the submissions that we received on this issue did not address our reasons for only considering the costs of outages when we updated our estimate of the optimal percentile using the loss analysis model. Briefly:

6.185.1 The uplift applies to the whole of the RAB, and the costs of the uplift is paid by consumers in advance of the intended investments being made.

6.185.2 There is no direct link between the uplift and the targeted investments. It is possible that consumers may pay the cost of the uplift without the intended investments being made.

6.185.3 Therefore, we consider that we should only use the uplift for incentivising investments that cannot be incentivised by targeted investment schemes.

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667 CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023) paras 185-197, esp. para 195; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), paras 3.39-3.41; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), paras 6.19-6.22

668 CEG "Response to 2023 IM draft decision on the cost of capital" (July 2023), para. 195.

669 Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 29, also paras 46 and 47.

6.186 We further note that where the investments generate the cost savings, that suppliers will benefit from these investments through the Incremental Rolling Investment Scheme.

6.187 As a practical matter, we note that where submitters argue that the benefits of decarbonisation investment should be added to the benefits of outages avoided, the result is typically for a higher percentile than the 67th. Given that there appears to have been no issue with investment at the 67th percentile, we do not consider that a percentile higher than the 67th would be justified.

6.188 We emphasise a point that we made in 2014 and again in the reasons for our draft decision: the uplift applies to the whole of the RAB, and so incentivises investments of all types, including investments in demand growth and to meet the needs of decarbonisation.

6.189 In a submission on our reasons for focusing on reliability investments, Vector argue that decarbonisation investments are: "(i) often 'enabling' in character, and (ii) produce benefits both within and without the electricity market that are difficult to identify and quantify in advance" and so "hard to target with an ex-post mechanism." Further, that "if EDBs do not invest to support decarbonisation the Commission will not necessarily know what benefits are foregone."[670]

6.190 Vector does not specify the nature of the investments that contribute to decarbonisation but that are "difficult to identify and quantify in advance," so it is difficult to assess the claim that they will be hard to incentivise with an ex-post mechanism. However, we note the following:

6.190.1 To the extent that decarbonisation investments create benefits outside of the electricity market, and these are benefits other than to consumers of the regulated service, then we may not consider them in assessing the appropriate uplift.

6.190.2 While our decision on the percentile uplift is a matter of judgement, we nonetheless consider that having some empirical basis for estimating the appropriate range for the percentile is important. To the extent that the benefits described by Vector cannot be quantified, we have no basis for including them in our estimate of the appropriate range for the uplift.

[670] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 51.

6.191 CEG raises that we have not addressed their arguments for demand growth as a justification for a higher uplift.[671] As we explained in the reasons for our draft decision, we do not consider that it is appropriate to use a WACC uplift to incentivise investment to meet demand growth.

6.192 Romeijnders and Mulder: Oxera submitted that we should give some weight to a recent academic study by Romeijnders and Mulder (R&M).[672] The authors construct a model that captures the same intuition as our loss analysis model, but with additional refinements (for example, the likelihood of network disturbances quadratically increases in average age of the infrastructure, suppliers can only replace a fraction of their assets every year, but restore that fraction to new if the regulatory allowance for the cost of capital exceeds their internal cost of capital).

6.193 We responded to Oxera's suggestion of giving weight to the R&M paper in our draft decision.[673] Based on their interpretation of the R&M paper, Oxera advocates giving weight to the 77th percentile. Given the evidence of EDB performance at the 67th percentile, we accept Oxera's interpretation of the R&M paper as offering support for continuing to use the 67th percentile.

6.194 Transpower to the 50th percentile: Counties Energy argues that we should use the 50th percentile for Transpower because: "Transpower faces a much lower risk profile with pricing under the TPM, limited risk from decarbonisation and the cost impact on customers is greater than EDBs."[674] Counties specifically notes that under the TPM Transpower does not face risks around new connections. Counties Energy goes on to note that Transpower is a state-owned enterprise whose "principal existence is to provide a critical infrastructure service" and that "(C)onsequently the risk of under-investment because of a lower WACC doesn't exist."[675]

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671 CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), para 213.

672 Oxera "Response to the New Zealand Commerce Commission's draft decision for Part 4 Input Methodologies Review 2023 on the cost of capital" (19 July 2023, for the Big 6 EDBs), para 6.24.

673 Commerce Commission "Cost of capital topic paper: Part 4 input methodologies review 2023 – draft decision (13 June 2023), paras 6.57-6.61.

674 Counties Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp. 1-2.

675 Ibid, pp. 1-2.

6.195 In 2014 we gave specific consideration to the question of whether to use the same percentile for Transpower as for the EDBs. We undertook further work between the draft and the final decision, before ultimately deciding to use the same percentile for the Transpower as for the EDBs. In his review of our 2014 reasons paper, Professor Vogelsang considered that on balance the decision to use the same percentile for Transpower was justified.[676]

6.196 We do not agree with Counties Energy on several points. First, we set the WACC based on a notional benchmark that is blind to the ownership structure. Transpower and the PQ regulated EDBs are treated identically in our approach to the cost of capital despite being in a mix of public and private ownership. Second, we are explicitly not including decarbonisation investments as a reason for the uplift. Similarly, new connections are part of investment in network growth, and beyond the scope of the investments that we consider in determining the uplift. Third, we do not consider that it is reasonable to use a lower WACC for Transpower simply because they have the largest RAB, and so largest impact on consumer bills.

6.197 Overall, we consider that continuing to use the same percentile for Transpower as the EDBs is justified, and that the arguments presented by Counties Energy are not sufficient to warrant a change to our draft decision.

6.198 International precedent: Submitters have differing views about the relevance of decisions by comparable international regulators increasingly to choose the mid-point. MEUG agrees that the shift in international practise supports our decision to reduce the percentile uplift.[677] Wellington Electricity disagrees with MEUG, arguing that "a comparison of WACC percentiles can't be made without considering the whole regulatory framework".[678] The ENA disagrees with MEUG for similar reasons, claiming that the comparison is "selective" and based on regulators in jurisdictions "with materially different regulatory regimes".[679] The ENA writes that:[680]

> none of the regimes that use mid-point WACC are analogous to the light touch industry-wide DPP and each of those regimes includes a vast array of flexibility and uncertainty mechanisms that are not present in the New Zealand regime.

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[676] Vogelsang, I. "Review of New Zealand Commerce Commission "Amendment to the WACC percentile for electricity lines services and gas pipeline services", Reasons paper published on October 30, 2014." (24 October 2014), para 27.

[677] Major Electricity Users Group (MEUG) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 13.

[678] Wellington Electricity "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), section 3.1.3.

[679] Electricity Networks Aotearoa (ENA) "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p. 2.

[680] Electricity Networks Aotearoa (ENA) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 5.

6.199 As we discussed in the reasons for our draft decision, when we decided in 2014 to use the 67th percentile, among the evidence that we considered was a tendency among comparable international regulators to exercise judgement and choose a WACC above the mid-point, either directly or by using individual parameters that were generous in favour of suppliers.

6.200 We considered that for the present review that it would be appropriate again to give some consideration to the practises of comparable international regulators. In doing so, we found a shift towards targeting the mid-point. However, we note that the practises of comparable international regulators are only a part of the evidence that we considered and that greater weight is given to the loss analysis and our considerations of our own regime.

6.201 We disagree with the ENA's claim that the comparison is selective. As we noted in our draft reasons, in 2014 we made a comparison to Ofgem's decisions for electricity distribution, and we have again in the present review highlighted Ofgem's decisions, which show a clear shift from aiming up to using the mid-point.

6.202 Overall, we consider that our consideration of the practises of comparable international regulators is appropriate and note that submissions offered no criticism of the specific comparisons that we made.

6.203 Profitability: PowerCo and Unison cite the finding in our summary reports on EDB performance that EDBs have not earned excessive profits.[681] They claim that this is evidence that the purpose of the Act is being met at the 67th percentile and that we should therefore continue to use the 67th percentile. PowerCo and Oxera make similar arguments for GPBs.[682]

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[681] PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 9; Unison "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 50.

[682] PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 10;
Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023)
Oxera "Response to the New Zealand Commerce Commission's draft decisions for Part 4 Input methodologies Review 2023 on the cost of capital relating to the gas sector" (19 July 2023, for First Gas, Powerco and Vector), para 3.16-3.19.

6.204 Our assessment of profitability is based on the WACC used, and that includes any uplifts. If we used a lower WACC for the profitability assessment, we might have arrived at a different conclusion. We further note that there are many reasons why a supplier might earn a return different to the WACC, but none of them has any bearing on whether the WACC itself is appropriate. Direct evidence of under- or over-investment would more relevant, but if we could perfectly monitor investment relative to the appropriate level, there would be reduced need for the uplift.

6.205 Tools available in 2014: Part of our reasons for our draft decision to use the 65th percentile for EDBs and Transpower was that our regime has improved in other respects, and that consequently we are less reliant on the uplift than we were in 2014. In response, Vector write that: "almost all the measures the Commission says it can now harness to mitigate the risk of underinvestment in resilience/reliability were available in 2014."[683]

6.206 As we emphasised in the reasons for our draft decision, we consider that our monitoring of EDB assets and scrutiny of AMPs has improved since 2014. We did not claim that these were new activities introduced since 2014. However, the EDB Quality Incentive Scheme was introduced after the final decision on the percentile was made in 2014.

6.207 Probability of major outages: Vector claims that the decision to use the 65th percentile is: "based on a solitary factor. The Commission thinks the probability of major outages occurring in the electricity sector is lower now than in 2014."[684]

6.208 We agree with Vector to the extent that we consider that improvements in our regime have reduced the likelihood of underinvestment leading to under-investment and outages. However, our estimate of the optimal percentile was informed by using the loss analysis model that we developed in 2014. By continuing to evaluate the model at the 0.5% and 1% thresholds, we are effectively holding the probability of outages from underinvestment constant from our 2014 analysis.

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683 Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 29.

684 Ibid, para 28.

The appropriate percentile for gas

6.209 We received a number of points in submissions that relate specifically to the percentile for GPBs.

6.210 We are simply changing our minds: First Gas and PowerCo argue that we are simply changing our mind about evidence that we considered in 2014.[685] First Gas writes that:

> the Commission has not obtained new evidence that supports a change in its view on the appropriate percentile for gas pipelines, but has rather simply changed its mind on the basis of the same evidence that it accepted in 2014 in support of an uplift. That does not meet the threshold the Commission has set itself in its decision-making framework, and undermines the predictability and stability in the WACC methodology that is essential to maintaining investment incentives over multiple regulatory periods.

6.211 Similarly, Powerco writes that:

> The draft decision for using the midpoint percentile of the WACC for gas is not well evidenced, with no empirical evidence and reasoning for what has changed since the 2014/2016 decisions.[686]

6.212 As we explain above, our primary considerations in our percentile decisions are the s 52A purpose, guided by our economic principle that there may be an asymmetry between the costs and benefits of over- and under-investment. There is no specific threshold for making decisions.

6.213 Oxera writes that our decision in 2014 to use the same percentile for gas as electricity was supported by experts writing for the Commission:[687]

> Dr Martin Lally investigated whether various percentiles should be applied to different industries, but determined that predicting these differential rates would be too complex.
>
> Professor Ingo Vogelsang emphasised the importance of treating various circumstances identically for policy consistency, emphasising the significance of regulatory stability. According to him, this approach eliminates complex studies and produces more predictable results.

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685 First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 13; PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 10.

686 PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 10.

687 Oxera "Response to the New Zealand Commerce Commission's draft decisions for Part 4 Input methodologies Review 2023 on the cost of capital relating to the gas sector" (19 July 2023, for First Gas, Powerco and Vector), para 3.2.

6.214 Vogelsang's position is more nuanced than the quote suggests. In the report cited, Vogelsang writes that: "(T)he gas case and the airports case and the telecommunications case may differ enough to justify different percentiles" and that "(O)ne can only know this for sure if an analysis similar to the one done here on electricity grids is done for at least one of the other industries."[688] However, he also notes that even where major differences suggest a different approach, that we may decide against a case-by-case approach, particularly where there are compensations elsewhere in the regime.

6.215 In a similar vein and as discussed above, Vogelsang's review of the final decisions (cited above) considered the decision to give the same uplift to Transpower as to the EDBs. That decision was given specific consideration at the time and Vogelsang (in particular) considered that it was important to consider the case for applying the uplift to Transpower separately from the EDBs.[689]

6.216 In the advice that Oxera cites, Dr. Lally's starting point is of using the same percentile for all industries because it is too difficult to estimate the appropriate uplift for a specific industry. However, Dr. Lally did consider that differences between industries may be appropriate, writing that the: "one exception that I would make would be not to use a margin in circumstances in which the appropriate margin is considered to be much lower than normal."[690] In addition, Dr. Lally's analysis is based on a model by Professor Dobbs that we considered using as the basis for our loss analysis. Our final decision was based on the loss analysis model that Oxera created for us that was specifically calibrated to electricity distribution.

6.217 We further note that neither Dr. Lally nor Professor Vogelsang considered directly whether we should use the same percentile for gas and electricity.[691] Their arguments for applying the same uplift (or not) to specific industries were made in-principle, rather than with respect to the facts of specific industries.

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[688] Professor Ingo Vogelsang "Review of Oxera's Report, 'Input Methodologies - Review of the '75th percentile' approach'" (10 July 2014), para 9.

[689] Professor Ingo Vogelsang, "Review of New Zealand Commerce Commission 'Amendment to the WACC percentile for electricity lines services and gas pipeline services', Reasons paper published on October 30, 2014" (24 October 2014), paras 5(d) and 27.

[690] Dr Martin Lally "The Appropriate Percentile for the WACC Estimate" (Report prepared for the Commerce Commission, 19 June 2014), p. 3. We note that Dr. Lally specifically raised as an example 'dual-till' operations.

[691] Dr Lally appeared to be writing with the expectation of a blanket uplift, with no consideration to industry specifics. Possibly this was before we had attempted to calibrate a model using electricity outage costs. I will follow up on the timing of Dr Lally's report relative to the rest of the work that we did in 2014.

6.218 After considering the evidence on gas reliability, which we did not explicitly do in 2014, we consider that the 50th percentile is appropriate and best reflects our methodology.

6.219 Estimating an optimal percentile for gas: In our reasons for our draft decision, we did not estimate an optimal percentile for gas because we did not consider that there was sufficient evidence to do so and because our model cannot accommodate the reliability differences between gas and electricity. In response:

6.219.1 Oxera estimates an optimal percentile for gas using our loss analysis model and an estimate of outage costs of $266 million. The estimate of outage costs is based on an MBIE report into the Maui gas outage, inflated to 2022 dollars. Oxera solve for an optimal percentile of the 79th percentile at the 1% threshold and the 90th percentile at the 0.5% threshold.[692]

6.219.2 Oxera further use our loss analysis model to estimate that outage costs of $110 million would justify an uplift of the 67th percentile.[693]

6.220 We do not consider that these results can be relied upon:

6.220.1 Oxera's use of $266 million as an estimate of the cost of outages is based on a single event. By contrast with this, the estimates of the cost of electricity outages are based on a range of academic and industry-body studies. It is impossible to know whether the costs of the Maui outage are in any way representative.

6.220.2 Further, there have been no clear problems with investment at the 67th percentile, and so we are cautious of arguments for a materially higher uplift.

6.220.3 Oxera uses our loss analysis model to estimate the optimal percentile, effectively treating GPBs as EDBs but with lower outage costs and a smaller total RAB. Its calculation ignores the reliability differences that were central to our draft decision not to apply the uplift to gas.

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[692] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023)

[693] Specifically, they estimate that outage costs of $110 million yield an optimal percentile of the 75th at the 0.5% threshold and 58th at the 1% threshold. As Oxera note, they do not include a tax adjustment. As a consequence, correctly calculated, outage costs of $110 million would produce an optimal percentile materially lower than the 67th.

6.220.4 In addition, we remain in the situation of not having a basis for judging whether $110 million (or any other figure) is a reasonable estimate of the costs that consumers of gas would incur on an annual basis from a network that has degraded as a result of underinvestment in reliability.

6.221 First Gas and Oxera raise factors that they consider should be accounted for as part of the costs and benefits of an uplift for gas: First Gas and Oxera highlight gas leaks as cost of an undermaintained gas network; First Gas raises the time that it takes to relight gas pipelines.[694]

6.221.1 We agree with First Gas and Oxera that both of these points would be valid considerations in determining an optimal percentile. Maintaining gas leakages at the level that they occur in a well-maintained network are clearly benefits of a well-maintained network. Similarly, the length of time that it takes to relight a gas network would be a direct part of the cost of outages.

6.221.2 However, we remain in the position of not having a reliable basis for estimating the costs of outages. These issues would warrant consideration against baseline costs of outages, but they do not in themselves provide a basis for estimating the cost of outages. The benefit of avoiding these costs would then need to be balanced against the costs to consumers of a higher WACC.

6.222 We note that suppliers disagree with our argument in the reasons for our draft decision that because gas is a secondary fuel, the cost of gas outages is lower for consumers of gas than the cost of electricity outages for consumers of electricity. A specific point that we made that submitters have not responded to is that gas users rely on electricity to use gas, while electricity users do not rely on gas to use electricity.

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694 First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.18; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023)

Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023)

6.223 We acknowledge the examples of the estimated costs of outages supplied by Oxera and First Gas. We also note MGUG's observation that these are not good examples of outages caused by underinvestment.[695] In addition, as noted above, MGUG would prefer to bear these types of risks rather than mitigate them through an uplift.

6.224 However, we would need more comprehensive data, of the type provided by Oxera for electricity, to be certain about the relative costs of outages. At this stage, neither we nor interested parties have been able to identify any such data.

6.225 First Gas considers that we have understated the impact of gas outages on consumers. First Gas claims that:[696]

6.225.1 The existence of more studies for electricity reflects greater public interest in electricity.

6.225.2 SAIDI and SAIFI have limited application to gas, and other regulators use additional measures of customer satisfaction to evaluate the performance of gas networks relative to electricity networks.

6.225.3 The use of SAIDI and SAIFI data does not reflect the consequences of low frequency, high consequence events.

6.225.4 SAIDI and SAIFI data are unpersuasive because GTBs do not report SAIDI and SAIFI data.

6.226 While we accept that SAIDI and SAIFI measures were developed for electricity distribution rather than for GPBs and that gas transmission is not included in the reported data, as we reported in the draft decisions, the differences in reliability are very large. First Gas acknowledges this point when they note the adjustments made to apply the EDB formulae for SAIDI and SAIFI to gas.[697]

6.227 We therefore consider that SAIDI and SAIFI data are relevant to our conclusion that there are significant differences in reliability between gas and electricity.

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[695] Major Gas Users Group (MGUG) "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 9.

[696] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 17.

[697] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 16.

6.228 First Gas appears to accept the claim that gas is more reliable when they point to gas being supplied continuously and interruptions being relatively rare, and the fact that gas pipelines being less exposed to weather events because they are underground, what they describe as "fundamental differences between the two types of network."[698]

6.229 While Gasnet disagrees with our draft decision to use the 50th percentile for gas, it agrees that gas is more reliable than electricity.[699]

6.230 First Gas points specifically to SAIDI and SAIFI being poor measures of low frequency, high consequence events. We agree with the importance of this observation - in our 2014 review of the percentile, Professor Vogelsang noted that the clearest justification for the uplift is low frequency, high consequence events.[700]

6.231 However, we did not rely on SAIDI and SAIFI alone in concluding that there was no basis for estimating the expected cost of outages for gas, as an input to estimating an appropriate percentile. Our view formed by an overall view of gas as a secondary fuel where electricity is a primary fuel, large differences in reliability as evidenced by SAIDI and SAIFI data, and the absence of comprehensive data on the costs of gas outages.

6.232 Overall, we consider that there is clear evidence that gas is more reliable than electricity and that there is no sound basis for estimating the cost of outages in a way that is comparable to the way that we estimate the cost of outages for electricity.

6.233 Systematic risk: First Gas argues that GPBs face higher systematic risk than EDBs and Transpower, and so should have a higher WACC.[701]

6.234 Our mid-point WACC for GPBs is higher than our mid-point WACC for EDBs and Transpower. Our decision to provide an uplift to the 65th percentile for EDBs and Transpower is not related to considerations of differences in systematic risk or our estimate of the mid-point WACC.

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698 First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 17.

699 GasNet Ltd "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 26.

700 Professor Ingo Vogelsang, "Review of New Zealand Commerce Commission 'Amendment to the WACC percentile for electricity lines services and gas pipeline services', Reasons paper published on October 30, 2014" (24 October 2014), para 5.30.2.

701 First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 2; First Gas "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), 4.

6.235 Vector argues in its submission and cross-submission on our draft decision that reducing the percentile for GPBs may slow the transition to renewable gas.[702]

6.236 As we explained in the reasons for our draft decisions, we are not able to incentivise investments in unregulated activities, including the transportation of renewable gas.

6.237 First Gas argues that we should apply s 5ZN of the CCRA in considering the percentile for gas, and that doing so would support retaining the 67th percentile, as it would help facilitate the transition to renewable gases.[703]

6.238 As noted, we are not able to incentivise investment in unregulated activities. Further, as we explained in the above and in our reasons for our draft decisions, our first consideration is the s 52A purpose. While we may consider s 5ZN of the CCRA, any such consideration may not be at the expense of our consideration of the s 52A purpose. We consider that the s 52A purpose is best met by using the 50th percentile for gas.

6.239 Powerco writes that: "(T)here are few, if any, financial incentives in place for gas distribution companies that reward maintaining, or improving, the quality of service and reliability of their networks."[704]

6.240 Our overall regime balances incentives to invest with costs to consumers and the quality of the service. In the case of gas, we consider that the midpoint of the WACC provides adequate incentives to invest as required by s 52A (a) and (b).

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[702] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 43; Vector "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 46.

[703] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 24.

[704] PowerCo "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 11.

Submissions directed at the percentile which we consider are not relevant to the uplift issue

6.241 A number of parties submitted around current and expected increasing costs, including of debt financing. Energy Trusts of New Zealand writes that: "the IMs will quickly be overtaken by the need for a major investment surge, at a time when a number of sectors will be competing for funds, labour, and other resources."[705] PowerNet argues that we should retain the 67th percentile because the rising cost of debt and "strain on resourcing."[706] Similarly, Orion argues as reason to retain the 67th percentile, that reducing the uplift "leaves EDBs undercompensated for the challenges of increased expenditure incurred DPP3 going forward" and that "Covid impacts has meant increased costs to do the same work." In its cross-submission Orion writes that: "we have not had the opportunity to recover costs since 2020." [707]

6.242 We do not consider that these issues have any bearing on the appropriate percentile. In determining the WACC, we are estimating the opportunity cost of capital of the businesses that we regulate. We check our updated parameters against broker estimates in our reasonableness checks. These checks give us confidence that our WACCs are commercially realistic. Provided that our WACCs are commercially realistic, we expect that suppliers of regulated services will be able to fund new investment and have incentives to do so. The issue of appropriate forecasts for opex and capex are a matter for price path resets.

6.243 Energy Trusts of New Zealand writes that: "(A)ny resultant drop in distribution income from that move [reduction in the percentile] would be likely to be absorbed in retail margins."[708]

6.244 Consideration of the competitive aspects of the energy retailing market are beyond the scope of what we may consider. However, we note that Energy Trusts of New Zealand does not offer any analysis to support their assertion.

6.245 Vector argues that setting the percentile at the 50th for gas and 65th for electricity will make gas cheaper relative to electricity, and so slow the transition from gas to electricity.[709]

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[705] Energy Trusts of New Zealand Inc (ETNZ) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp. 1-2.

[706] PowerNet "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 12.

[707] Orion "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 16; Orion "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), para 9.

[708] Energy Trusts of New Zealand Inc (ETNZ) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p. 1.

[709] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 32.

6.246 We consider that the question of relative prices is beyond the scope of consideration of the percentile. Our determination of the percentiles for EDBs, Transpower, GDBs, and GTBs are independent of each other and dominated by consideration of the s 52A purpose. While we may consider climate change, such considerations may not be at the expense of consideration of the s 52A purpose.

6.247 Vector raises financeability in the context of the percentile, writing that "it is impossible to come to any robust conclusions about whether the draft decision would cause financeability problems without first modelling the impacts upon EDBs' cashflows and key financial metrics."[710]

6.248 Financeability is addressed in the Financing and incentivising efficient expenditure during the energy transition topic paper. The point made by Vector does not relate to the level of the WACC.

Four-year regulatory period

Final decision

6.249 Our final decision is to allow for the estimation of a WACC for a four-year regulatory period for EDBs' DPPs, and Transpower's IPPs. The change will affect:

6.249.1 the risk-free rate; and

6.249.2 debt issuance and associated costs.

Context

6.250 We amended the GPB IMs to allow for the estimation of a WACC for a four-year regulatory period as part of DPP3.[711] In the Process and issues paper we raised the possibility of making similar changes for EDBs, Transpower, and airports.[712]

6.251 While the Act allows for a regulatory period shorter than five-years (but not less than four-years), the current cost of capital IMs for EDBs, Transpower, and airports only provide for WACC estimates that reflect a five-year regulatory period. In our original IM decisions, we discussed that the WACC should align with the term of the regulatory period. However, the IMs as drafted only provided for a WACC estimate that reflected the usual five-year regulatory period.

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[710] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), para 34.

[711] Commerce Commission "Amendments to input methodologies for gas pipeline businesses related to the 2022 default price-quality paths – weighted average cost of capital: Reasons paper" (March 2022).

[712] Commerce Commission "Part 4 Input Methodologies Review 2023: Process and issues paper" (May 2022), p. 106.

Draft decision

6.252 We considered that we should make the same change to the cost of capital IMs for EDBs and Transpower to ensure we can determine an appropriate WACC in the event we apply a four-year regulatory period to a DPP for EDBs or an IPP for Transpower. Accordingly, we proposed to amend the methodology for estimating the risk-free rate, and the estimate for debt issuance costs, as follows:

6.252.1 aligning the risk-free rate with the regulatory period (ie, calculated against a four-year or a five-year bond); and

6.252.2 debt issuance costs are for 0.20% for a five-year regulatory period, and 0.25% for a four-year regulatory period.

6.253 We proposed to allow for the estimation of a WACC for a four-year regulatory period for EDBs DPPs, and Transpower's IPPs. The proposed change will affect:

6.253.1 the risk-free rate; and

6.253.2 debt issuance costs.

6.254 As airports are only subject to ID regulation, they do not have a regulatory period like EDBs, Transpower, and GPBs that we can adjust. We did not propose to make amendments for airports as we can account for the term of the risk-free rate when undertaking analysis of PSEs, and the approach to other sectors will offer clear guidance to airports about our approach.

Submitters' views on four-year regulatory period that informed the draft decision (energy)

6.255 We received no objections to the proposed changes to calculating a cost of capital where a four-year regulatory period applies for EDBs and Transpower.

6.256 For example, Transpower considered that it makes sense to adjust the WACC calculation for a shorter regulatory period:[713]

> Finally, we note that the Commission adjusted the WACC calculation for the gas DPP reset to reflect the shorted regulatory period adopted (4 years rather than 5). The Commission did the same for the initial Fibre price-quality path which was set at 3 years. It may make sense to amend the WACC IM to automatically provide that the WACC calculation mirrors the duration of the regulatory period.

[713] Transpower NZ Ltd "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022), p. 29.

6.257 Aurora Energy submitted that:[714]

> We note the Commission's proposal to adjust the IMs to allow for a four-year regulatory period, as occurred for GPBs earlier this year. Aurora considers that very different futures face GPBs and EDBs, and that there is probably not the same imperative to make this change for EDBs. Having said that, the required modifications seem, on the face of it, to be relatively mechanical and uncontroversial.

6.258 First Gas submitted that they support the amendments made in the cost of capital IMs to allow for a four-year regulatory period when determining the risk-free rate as part of gas DPP determination, they also submit that:[715]

> Given the interaction between parameters used to estimate the cost of capital, it is important to ensure that all parameters are estimated consistently. The Commission recognised this when amending the cost of capital IMs by adjusting the TAMRP to reflect the shorter regulatory period adopted then.

6.259 As discussed in paragraph 4.358, we considered that the TAMRP estimate does not vary between four- and five-year regulatory period when rounded to the nearest 0.5%. Therefore, we considered a single rate for TAMRP of 7.0% is appropriate for all WACC determinations for Part 4.

Submitters' views on four-year regulatory period that informed our draft decision (airports)

6.260 Airports and airlines preferred current five-year regulatory periods and did not support a change.

6.261 For example, BARNZ considered that there is:[716]

> some merit in reducing to four years the IM review process to better reflect the fast-changing macro-economic environment. However we agree with the points raised by TDB that consistency and lower transaction costs are benefits of keeping it at the current 5 years

[714] Aurora Energy "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022), p. 14.

[715] First Gas "Submission on IM Review Process and issues paper and draft Framework paper" (13 July 2022), p.26.

[716] Board of Airline Representatives New Zealand Inc. "Submission on IM Review Process and Issues and draft Framework paper" (11 July 2022), para 10.

6.262 NZAA submitted that: [717]

> We are not convinced that the Commission needs to explore this topic for airports. On the one hand, it makes sense for the WACC IM to be consistent across all regulated sectors in this respect, and airports do have flexibility to choose a pricing period of less than five years. It may therefore appear desirable for the WACC IM to include flexibility so that the Commission's assessment of target returns using the WACC IM is matched to the pricing period. On the other hand, it is rare for airports to adopt a pricing period that is less than five years. If any airport chose to do so, the impact of that shorter period could be factored into the pricing WACC and subsequent review by the Commission, without amending the WACC IM as part of this review.

6.263 We agreed with NZAA that airports are able to adopt a short pricing period if they choose to and the impact can be reviewed at PSEs.

Stakeholder views on draft decision

6.264 Submitters generally agree with our draft decision. For example, Vector, PowerNet, and MEUG all support our draft decision of allowing for a WACC for a four-year regulatory period.[718] MEUG submit that this is another tool that enables EDBs and us to deal with uncertainty and has been applied to the last gas DPP reset.[719] They also agree with Aurora (who submitted on the Process and Issues paper) that the modifications would be mechanical and uncontroversial.

6.265 However, Orion submit that they prefer keeping the regulatory period at five years as:[720]

6.265.1 It provides better planning and mirrors the current DPP period providing for more certainty and alignment;

6.265.2 a four-year regulatory period could limit the windows and timeframes for CPP applications.

[717] NZ Airports Association Inc. "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022), pp.10-11.

[718] Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.10; PowerNet "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.9; Major Electricity Users Group (MEUG) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.7.

[719] Major Electricity Users Group (MEUG) "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.7.

[720] Orion "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.7.

6.266 Unison (in its cross-submission) support Orion's views.[721]

Our consideration and final decision

6.267 The current IMs as drafted only provided for a WACC estimate reflecting the usual five-year period. Under s 53M of the Act, a regulatory period must be five years, however, we may set a shorter period if doing so better meets the purpose of the Act (and the period must not be shorter than four years).

6.268 The default regulatory period should always be five years, but if we set a four-year regulatory period, this amendment will allow us to apply the appropriate WACC estimates to reflect the length of the regulatory period.

6.269 Therefore, we confirm that our final decision is to allow for the estimation of a WACC for a four-year regulatory period for EDBs DPPs, and Transpower's IPPs.

Split cost of capital

Final decision

6.270 Our final decision is not to introduce a split of cost of capital.

Context

6.271 A split cost of capital would involve applying different WACC values to existing 'sunk' assets and capital on new assets (for example, during construction and commissioning). In theory, this can reflect that expenditures on new major projects can carry greater risk than allowed for in the rate of return applying to the return on existing assets already in the RAB.

Stakeholder views and our consideration

Submitters' views on split cost of capital

6.272 MGUG submitted that they would like us to consider a split cost of capital because: "(I)t is possible that some new investments may require incentives. For example, we can see arguments in favour of investments for repurposing gas pipelines. An incentive could be a split cost of capital."[722]

6.273 Transpower, Aurora Energy and Wellington Electricity submitted that we should not give further consideration to the use of a split cost of capital.[723]

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[721] Unison Networks "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p.3.

[722] Major Gas Users Group "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022), para 18.

[723] Transpower NZ Ltd "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022), pp. 23-25; Transpower New Zealand Ltd "Cross-submission on IM Review Process and issues

Our view

6.274 In our draft decision we proposed to maintain the current approach of a single cost of capital. Given that no new evidence has been provided and that the impacts of a change to a split of cost of capital are ambiguous, we did not consider that this change would outweigh the potential costs.

6.275 We assessed the possibility of a split cost of capital in our 2016 IM Review and decided not to apply a split cost of capital approach due to the implementation difficulties and increased regulatory risk.[724]

6.276 Our approach to setting the cost of capital applies at an industry level, and setting parameters that reflect what would effectively be project level risk would be very difficult to estimate and implement in practice.

6.277 We considered that our approach to maintaining ex-ante FCM and our methodology for setting the WACC overall provides suppliers with incentives to invest without providing for a different WACC. Non-systematic risks can be more appropriately dealt with through measures outside of the WACC.

Final decision

6.278 We received no submission on this topic in the draft decision consultation phases therefore our final decision is to confirm our draft decision to not introduce a split cost of capital for the reasons given above.

paper, and draft framework paper" (3 August 2022), p. 2; Aurora Energy "Submission on IM Review Process and issues paper and draft Framework paper" (11 July 2022), para 59; Wellington Electricity "Cross-submission on IM Review Process and issues paper, and draft framework paper" (10 August 2022), p. 4.

[724] Commerce Commission "Input methodologies review decisions – Topic paper 4: Cost of capital issues" (20 December 2016), pp. 172-175.

Chapter 7 Reasonableness checks

Purpose of this chapter

7.1 The purpose of the reasonableness checks is to test whether application of the IMs will produce commercially realistic estimates of the cost of capital. The reasonableness checks are intended to help identify any potential oddities in our estimates, which would suggest modifications should be made to the cost of capital IMs. The reasonableness checks we have undertaken are very similar to those used in the 2016 IM Review reasons paper,[725] and the 2020 Fibre IMs reasons paper.[726]

7.2 Unless otherwise indicated, all relevant calculations and reasonableness checks discussed in this chapter use the revised cost of capital IMs, updated to reflect the final decisions discussed in this topic paper (which we refer to in this section as the 'amended cost of capital IM').

7.3 Based on the analysis we have undertaken we consider that our WACC estimates using the amended cost of capital IMs are reasonable. In particular:

7.3.1 Our 65th percentile post-tax WACC estimate of 6.54% for EDBs and Transpower, and mid-point post-tax WACC estimate of 6.43% for GPBs (as at 1 March 2023) are within the range of independent post-tax WACC estimates for regulated energy businesses in New Zealand. They are also above the WACC estimates from Australia, and below the WACC estimates from the UK (after normalising for differences in risk-free rates); and

7.3.2 our mid-point post-tax WACC for airports of 8.02% is within the range of alternative New Zealand-sourced post-tax WACC estimates for airports, and below the overseas WACC estimates from the UK and Ireland (after normalising for differences in risk-free rates).

7.4 The rest of this section:

7.4.1 explains our approach to undertaking reasonableness checks of our WACC estimates, and the adjustments we have made to help make alternative WACC estimates more comparable to our estimates;

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[725] Commerce Commission "Input methodologies review decisions - Topic paper 4: Cost of capital issues" (December 2016).

[726] Commerce Commission "Fibre input methodologies: Main final decisions - reasons paper" (October 2020).

7.4.2 summarises why we consider our WACC estimates for EDBs and Transpower, GPBs, and airports (as at 1 March 2023) are reasonable based on the information assessed;

7.4.3 describes in detail the comparative information used when undertaking reasonableness checks for EDBs and Transpower, GPBs, and airports, respectively; and

7.4.4 outlines the RAB multiples analysis we have undertaken, as an additional reasonableness check.

Approach to undertaking reasonableness checks of our WACC estimates

7.5 This section explains the approach we have used when undertaking reasonableness checks of our WACC estimates, including:

7.5.1 the available comparative information we have considered;

7.5.2 the weight placed on WACC estimates from different sources; and

7.5.3 our approach to adjusting WACC estimates from other sources, to ensure they are comparable with our estimates.

We have used available WACC estimates

7.6 When undertaking our reasonableness checks, we have used available information on:

7.6.1 the current New Zealand returns on government bonds (proxy for the risk-free rate) and corporate bonds;

7.6.2 historic average and expected returns achieved on the New Zealand stock and bond markets;

7.6.3 independent estimates of the post-tax WACC for suppliers of regulated services in New Zealand, including estimates from PricewaterhouseCoopers (**PwC**) and New Zealand investment banks; and

7.6.4 the WACC estimates from some regulators in Australia, Ireland, and UK.

7.7 Our WACC estimates for EDBs and Transpower, GPBs, and airports, as at 1 March 2023, are compared to the available information listed above. If the IMs produce reasonable WACC estimates as at 1 March 2023, we consider they will also produce reasonable estimates at other dates since the risk-free rate will be linked to prevailing market rates.

We have placed most weight on New Zealand-sourced WACC estimates for regulated services

7.8 We have followed the 2016 hierarchy of available sources of information when assessing the reasonableness of our WACC estimates. In the following order of importance:

7.8.1 *the plausible range*: we compared our WACC estimates with a plausible range of returns on the New Zealand stock and bond market. The upper bound of the plausible range is the long-term historical average returns and expected future returns on the New Zealand market overall (assuming a hypothetical firm of average risk). The lower bound is the returns on five-year government bond (that is the returns on investment with no default risk) and the returns on BBB+/A- rated corporate bonds (ie, investments with some default risk but still comfortably considered investment grade);[727]

7.8.2 *New Zealand-sourced estimates of the cost of capital for regulated suppliers*: we compared our WACC estimates with available information on the cost of capital for New Zealand regulated suppliers sourced from brokers and practitioners; and

7.8.3 *Overseas estimates of the regulatory allowed returns on capital*:[728]we compared our WACC estimates with regulatory allowed returns on capital estimates from overseas regulatory decisions (primarily from Australia, Ireland, and UK) for electricity lines services, gas pipelines services, and airports.

7.9 We consider that New Zealand sourced WACC estimates should be given more weight than overseas estimates. International WACC estimates can be affected, among other things, by country-specific factors such as differences in tax regimes, monetary conditions, regulatory objectives and regimes (and WACC methodologies). In its judgement on the IMs merits appeals, the High Court agreed that "…the most helpful comparative material for cross-checking purposes comprises independent assessments of WACC in the New Zealand context".[729]

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[727] The upper limit of the range is based on the fact that regulated businesses are typically low risk, so equity investors would expect to earn a lower return for these businesses than when investing in a New Zealand company of average risk. For the lower limit of the range, the returns on BBB+ rated corporate bonds are used for EDBs/Transpower/GPBs, and the returns on A- rated corporate bonds are used for airports, reflecting the benchmark long-term credit ratings we have used when estimating the cost of debt.

[728] Regulatory allowed returns on capital include adjustments (such as an uplift, or adjustment for expected out-performance) made by regulators to the WACC estimated using the standard WACC formulas in finance literature.

[729] *Wellington Airport & others v Commerce Commission* [2013] NZHC 3289, at [1213].

We have made adjustments to WACC estimates from other sources to ensure they are comparable

7.10 Different regulators and analysts may use different methods when determining their WACC estimates. They may also report their WACC in different forms, such as pre-tax, vanilla, or post-tax WACC, and in real or nominal terms. We therefore made adjustments to ensure they are comparable with our nominal, post-tax WACC.

7.11 We convert the other WACC estimates into a comparable nominal, post-tax WACC by:

7.11.1 converting Sharpe-Lintner CAPM (SL-CAPM)[730] estimates of the cost of equity to a SBL-CAPM[731] estimate; and

7.11.2 by normalising the adjusted WACC based on the prevailing risk-free rate and corporate tax rate used in our current WACC estimates.

Normalising the risk-free rate

7.12 We normalise the risk-free rate in our approach because the other WACC estimates used the risk-free rates available at the time of their estimation, and we do not consider the difference in risk-free rates as an input into the WACC estimates should be a factor that affects our reasonableness checks.

7.13 In addition, compared to regulators that use a trailing average cost of debt (under which the risk-free rate is also a trailing average of historical rates), during periods where domestic interest rates are relatively low in New Zealand, our WACC estimates are likely to appear low. Conversely, during periods where New Zealand interest rates are high, our WACC estimates will appear relatively high. Over time, these approaches should tend to balance out, but in the short term the comparability of the WACC estimates is affected.

7.14 To normalise for the difference between risk-free rates used in the WACC estimates, we have adjusted comparative WACC estimates to reflect the prevailing risk-free rate as at the 1st of March 2023 (which was 4.31%).

[730] This is the CAPM most widely used by regulators and practitioners in countries other than New Zealand.

[731] When converting the MRP in other regulators' WACC estimates to TAMRP, in principle we should use the investors' tax rate specific to that country. Lacking that information, we use a country's corporate tax rate, assuming that it is the same as the investors' tax rate.

We have considered RAB multiples, as an additional reasonableness check

7.15 As part of our reasonableness check, we have considered RAB multiples for regulated energy and airports businesses in New Zealand. The RAB multiple of a regulated business is the ratio of its enterprise value to its RAB. RAB multiples can provide a useful secondary indicator of whether the allowed rate of return has been set at a sufficient level to adequately compensate investors for putting their capital at risk.[732]

Summary of why we consider our WACC estimates are reasonable

Energy businesses

7.16 We consider that our WACC estimates are reasonable based on the comparative information we have assessed. Our findings for EDBs/Transpower/GPBs and airports are summarised in Figure 7.1 and Figure 7.2, respectively.

7.17 Our analysis for EDBs and Transpower focusses on the 65th percentile WACC estimate and our analysis for GPBs focusses on the mid-point WACC estimate, respectively, given that these are the estimates that will be used for PQ path regulation of these businesses under the proposed IM. We consider that our 65th percentile post-tax WACC estimate of 6.54% for EDBs and Transpower and mid-point post-tax WACC estimate of 6.43% for GPBs (as at 1st March 2023) are reasonable given they are:

7.17.1 below the long-term historical average returns of the New Zealand market overall (8.72%) and the New Zealand expected market returns (8.37%), but above the post-tax returns on five-year government bonds (3.10%) and five-year BBB+ bonds (4.19%). This is consistent with our expectations that businesses such as EDBs, Transpower, and GPBs are less risky than the average New Zealand businesses, but riskier than corporate bonds and government bonds;

7.17.2 within the range of independent post-tax WACC estimates in New Zealand, after normalising for differences in risk-free rates. For example, our estimates are above the average brokers' estimates for Vector (6.27%), but below PwC's estimates for Vector (7.50%) and for Utilities (8.60%); and

[732] See from paragraphs 7.44 for further discussion on RAB multiples.

7.17.3 within the range of recent overseas WACC decisions for energy businesses, after adjusting to the nominal, post-tax WACC forms and normalising for differences in risk-free rates. For example:

7.17.3.1 our estimates are above a recent decision made by the AER in Australia (5.56%); and

7.17.3.2 above a recent decision made by Ofgem in UK (5.96% for electricity distribution), but below a recent decision made by Ofgem in UK (7.46% for gas distribution, gas transmission and electricity transmission) The comparison with Ofgem's WACC estimates particularly weak because Ofgem uses a TMR approach to the TAMRP. This means that their TAMRP depends on the risk-free rate at the time that the determination is made.[733]

Airports

7.18 We have assessed the reasonableness of our airports WACC estimates based on our mid-point estimate. This is because we publish a mid-point WACC estimate for airports (along with the standard error of the WACC). We consider that the mid-point post-tax WACC estimate for airports of 8.02% (as at 1st March 2023) is reasonable given it is:

7.18.1 below the long-term historical average return of New Zealand market overall (8.72%) and the New Zealand expected market returns (8.37%), but above the post-tax returns on five-year government bonds (3.10%) and five-year A- corporate bonds (3.95%). This is consistent with our expectations that regulated airports services face lower risks than the average New Zealand firms, but greater risks relative to corporate bonds and government bonds;

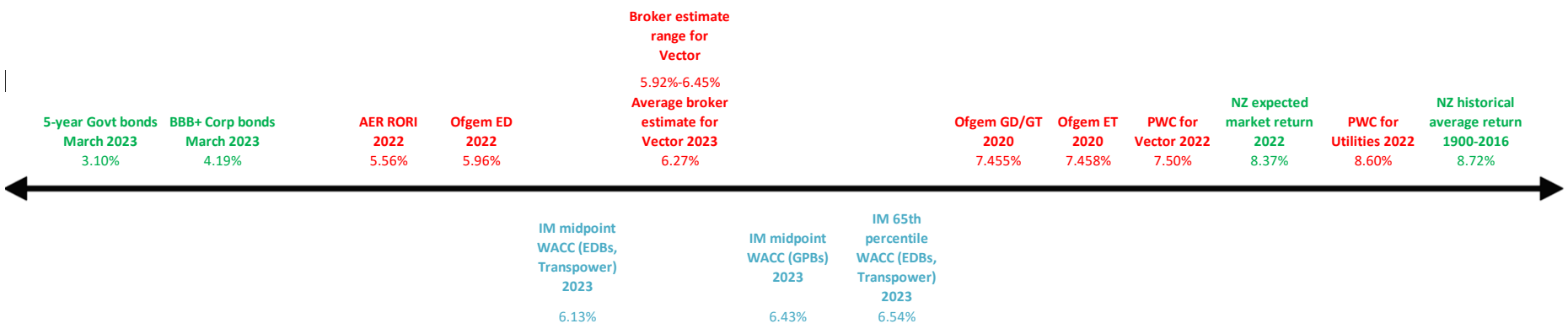
7.18.2 within the range of New Zealand sourced post-tax WACC estimates for airports. For example, after normalising for differences in risk-free rates, our estimates are within the range of broker estimates for Auckland International Airport Limited (**AIAL**)'s WACC (ranged from 6.26% to 8.8%, with an average of 7.43%), but below PwC's estimate for AIAL's WACC (9.4%); and

[733] We note the limitations for comparing the WACC estimates with Ofgem, therefore, we also compare our energy asset beta estimates with Ofgem, see Figure 4.2 in Chapter 4.

7.18.3 below the recent overseas WACC decisions for airports (after adjusting to nominal, post-tax WACC forms and normalising for differences in risk-free rates), made by the UK CAA (8.47% for Heathrow) and the Commission for Aviation Regulation (**CAR**) in Ireland (8.37% for Dublin Airport). The comparisons with CAA and CAR's estimates are particularly weak because both regulators use a TMR approach to the TAMRP. This means that their TAMRP depend on the risk-free rate at the time that the determination is made. [734]

[734] We note the limitations for comparing the WACC estimates with CAA and CAR, therefore, we also compare our airport asset beta estimate with CAA and CAR, see Figure 4.1 in Chapter 4.

Figure 7.1 Summary of WACC reasonableness checks for EDBs, Transpower, and GPBs (using normalised risk-free rates)

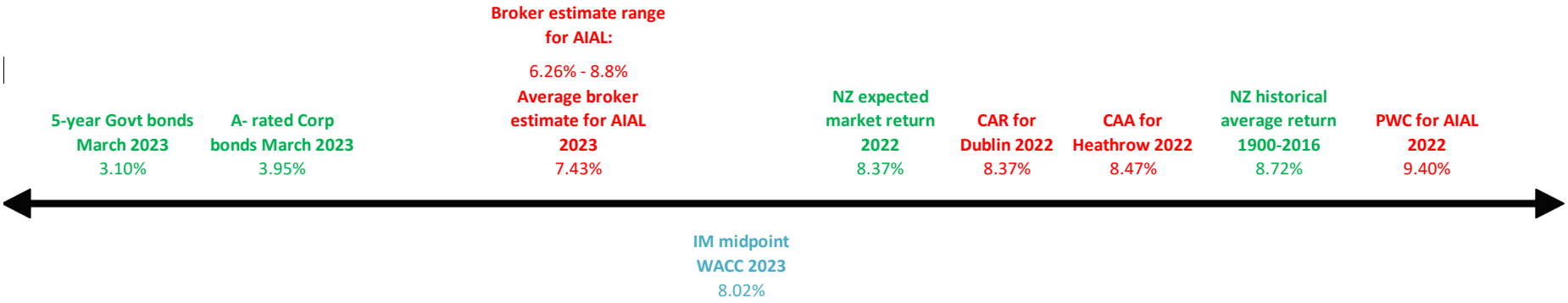


Our WACC estimates (as at 1 March 2023) are shown in blue, market information is shown in green, and estimates made by other parties (normalised to reflect the prevailing risk-free rate used in our own WACC estimates) are shown in red.

We note that Ofgem uses a TMR approach to the TAMRP, meaning that their TAMRP-equivalent depended on the risk-free rate at the time that the determination was made. Accordingly, it is not appropriate to combine it with a different risk-free rate for the purposes of estimating a WACC.

As noted in paragraph 7.9 above, we consider that New Zealand sourced WACC estimates should be given more weight than overseas estimates, given that international WACC estimates can be affected by country-specific factors (such as differences in tax regimes, monetary conditions, regulatory objectives and regimes, and investors' relative risk aversion).

Figure 7.2 Summary of WACC reasonableness checks for airports (using normalised risk-free rates)



Our WACC estimates (as at 1 March 2023) are shown in blue, market information is shown in green, and estimates made by other parties (normalised to reflect our estimate of the risk-free rate) are shown in red.

We note that both CAA and CAR use a TMR approach to the TAMRP, meaning that their TAMRP-equivalent depended on the risk-free rate at the time that the determination was made. Accordingly, it is not appropriate to combine it with a different risk-free rate for the purposes of estimating a WACC.

As noted in paragraph 7.9 above, we consider that New Zealand sourced WACC estimates should be given more weight than overseas estimates, given that international WACC estimates can be affected by country-specific factors (such as differences in tax regimes, monetary conditions, regulatory objectives and regimes, and investors' relative risk aversion).

Further details on reasonableness checks for EDBs, Transpower and GPBs

7.19 This section explains the comparative information used when assessing the reasonableness of our WACC estimates for EDBs and Transpower and GPBs in more detail. A summary of the information considered is contained in Figure 7.1.

Our WACC estimate for EDBs/Transpower and GPBs as at 1st March 2023

7.20 Our WACC estimates for EDBs, Transpower and GPBs calculated using the amended cost of capital IM are shown in Table 7.1 and Table 7.2. The figures are based on the amended cost of capital IMs contained in this decision. The risk-free rate is calculated as at 1 March 2023.

Table 7.1 WACC estimate for EDBs and Transpower as at 1 March 2023

Parameter	Estimate	Standard error
Risk-free rate (as at 1 March 2023)	4.31%	
Debt premium[735]	1.51%	0.0015
Leverage	41%	
Asset beta	0.36	0.13
Debt beta	0	
TAMRP	7.00%	0.015
Corporate tax rate	28%	
Investor tax rate	28%	
Debt issuance costs	0.20%	
Equity beta	0.61	
Cost of equity	7.37%	
Cost of debt	6.02%	
Vanilla WACC (mid-point)	6.82%	0.0108
Vanilla WACC (65th percentile)	7.23%	
Post-tax WACC (mid-point)	6.13%	0.0108
Post-tax WACC (65th percentile)	6.54%	

[735] The debt premium for EDBs and Transpower is from our recent cost of capital determination: Commerce Commission " Cost of capital determination for disclosure year 2023 for information disclosure regulation - For Transpower, gas pipeline businesses and suppliers of specified airport services (with a June year-end)" (02 August 2022).

Table 7.2 WACC estimate for GPBs as at 1 March 2023

Parameter	Estimate	Standard error
Risk-free rate (as at 1 March 2023)	4.31%	
Debt premium[736]	1.43%	0.0015
Leverage	41%	
Asset beta	0.41	0.13
Debt beta	0	
TAMRP	7.00%	0.015
Corporate tax rate	28%	
Investor tax rate	28%	
Debt issuance costs	0.20%	
Equity beta	0.69	
Cost of equity	7.93%	
Cost of debt	5.94%	
Vanilla WACC (mid-point)	7.12%	0.0112
Post-tax WACC (mid-point)	6.43%	0.0112

7.21 As noted in paragraph 7.17 above, our reasonableness checks analysis focusses on our 65th percentile post-tax WACC estimate of 6.54% for EDBs and Transpower and mid-point post-tax WACC estimate of 6.43% for GPBs. We consider it is appropriate to focus on the 65th percentile estimate for EDBs and Transpower and mid-point WACC estimate for GPBs, given that these are the WACC estimates used when setting PQ paths for EDBs, Transpower and GPBs.

[736] Debt premium for GPBs is from our recent cost of capital determination: Commerce Commission "Cost of capital determination for disclosure year 2023 for information disclosure regulation - For Transpower, gas pipeline businesses and suppliers of specified airport services (with a June year-end)" (02 August 2022).

The plausible range

7.22 Our 65th percentile post-tax WACC estimate of 6.54% for EDBs/Transpower and mid-point post-tax WACC estimate of 6.43% for GPBs are within the plausible range we have considered, which is bounded:

7.22.1 at the lower end, by post-tax returns on five-year government bonds of 3.10% and five-year BBB+ rated corporate bond of 4.19%; and

7.22.2 at the upper end, by the future return expected from the New Zealand market for a firm of average risk of 8.37% (which we have estimated using the CAPM) and long-term historical average returns of the New Zealand market overall of 8.72%.

7.23 Our WACC estimates for EDBs and Transpower and GPBs are below estimates of the post-tax WACC for a New Zealand firm of average risk, which is consistent with our expectations. Suppliers of essential services, such as EDBs, Transpower and GPBs are low risk businesses. Therefore, equity investors would expect to earn a lower return on these businesses than a New Zealand company of average risk.

7.24 We have estimated a future return expected from the market (using the SBL-CAPM) of 8.37%, as at the 1st of March. By definition, the market has an average equity beta of 1. Our analysis assumes a TAMRP of 7%, market-wide leverage of 30%, a risk-free rate of 4.31%, a debt premium of 1.51%, debt issuance costs of 0.20% per annum and a corporate and investor tax rate of 28%.[737]

7.25 PwC's most recent nominal post-tax WACC estimate for utilities was 8.30%.[738] This results in an average WACC estimate for utilities and Vector of 8.60%, when adjusting for our risk-free rate of 4.31% (instead of PwC's risk-free rate of 3.9%).

[737] For simplicity, we have used our BBB+ debt premium estimate for EDBs and Transpower of 1.51% when estimating the future return expected from the market.

[738] PwC New Zealand "Cost of Capital Report 2022" (June 2022).

7.26 We have estimated the historical average return for the New Zealand market from 1900-2016 as 8.72%, based on data from Dimson, Marsh and Staunton (2017).[739, 740] Dimson, Marsh and Staunton are generally regarded as having produced the most authoritative source of historical returns to investors, and their data for New Zealand covers over 100 years. The advantage of looking at historical returns is that they can be calculated without the need for an analytical tool such as CAPM.

New Zealand-sourced estimates of the cost of capital for regulated suppliers

7.27 As part of our reasonableness checks, we have considered independent post-tax WACC estimates for New Zealand electricity lines and gas pipeline businesses. We have surveyed New Zealand investment banks including Forsyth Barr, Jarden, and UBS in early 2023 regarding their estimates for Vector.

7.28 After normalising the differences in risk-free rates, we consider that our 65th percentile post-tax WACC estimate of 6.54% for EDBs and Transpower and mid-point post-tax WACC estimate of 6.43% for GPBs are reasonable given:

7.28.1 our 65th percentile post-tax WACC estimate of 6.54% for EDBs is above the range of brokers estimates for Vector's regulated business (ranged from 5.92% to 6.45%), and above the average broker estimate of 6.27% for Vector's regulated business;

7.28.2 our mid-point post-tax WACC estimate of 6.43% for GPBs is within the range of brokers estimates for Vector's regulated business (ranged from 5.92% to 6.45%), and above the average broker estimate of 6.27% for Vector's regulated business; but

7.28.3 both of them are below the PwC WACC estimate for Vector of 7.50%.

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[739] Dimson, Marsh and Staunton estimate an average real (pre-tax) return to New Zealand equity investors of 6.2%, and a return on Government bonds of 2.1%, over the period from 1900-2016. The return on corporate debt is not calculated by Dimson, Marsh and Staunton, but for the purposes of this analysis we have assumed it falls midway between the return on government debt and the average for NZ equities (4.15%). Assuming an average inflation rate of 3.6%, a corporate tax rate of 28%, market-wide leverage of 30%, and no investor taxes on equity returns, this implies a post-tax WACC estimate of around 8.72% for an investment of average risk.

[740] Dimson, Marsh and Staunton, "Credit Suisse Global Investment Returns Yearbook 2017" (February 2017).

Overseas estimates of the regulated cost of capital

7.29 We have also considered recent regulatory decisions regarding the cost of capital made by the AER in Australia, and Ofgem in UK. To enable comparison with our post-tax WACC estimates, we have converted:

7.29.1 the AER's MRP to TAMRP (assuming investor tax rate is the same as the corporate tax rate of 30%), then converted AER's WACC estimates to nominal post-tax WACC, and finally substituted in our risk-free rate estimate of 4.31%[741]; and

7.29.2 Ofgem's real vanilla WACC estimates to nominal post-tax WACC estimates (assuming an inflation rate of 2% for electricity distribution and 2.02% for electricity transmission, gas distribution and transmission, and a tax rate of 25%), and then substituted in our risk-free rate estimate of 4.31%.[742]

Table 7.3 Overseas WACC estimates for energy businesses

Determination	Year	Normalised WACC estimate (nominal, post-tax)
AER 2022 RORI WACC	2023	5.56%
RIIO-ED2 – electricity distribution (2023-2028)	2022	5.96%
RIIO-T2 – electricity transmission (2021-2026)	2020	7.46%
RIIO-GD/T2 – gas transmission and distribution (2021-2026)	2020	7.46%

7.30 As shown in Table 7.3, the recent AER WACC estimate of 5.56% for energy businesses is below our 65th percentile post-tax WACC estimate of 6.54% for EDBs/Transpower and mid-point post-tax WACC estimate of 6.43% for GPBs.

7.31 As shown in Table 7.3, our 65th percentile post-tax WACC estimate of 6.54% for EDBs/Transpower and mid-point post-tax WACC estimate of 6.43% for GPBs are within the range of recent Ofgem WACC estimates for electricity distribution, electricity transmission, gas distribution, and gas transmission (after normalising for differences in risk-free rates).

[741] Orion "Submission on IM Review Options to maintain investment incentives in the context of declining demand paper" (10 February 2023)

[742] First Gas Group "Submission on IM Review Options to maintain investment incentives in the context of declining demand paper" (10 February 2023)

Further details on reasonableness checks for airports

7.32 This section explains the comparative information used when assessing the reasonableness of our WACC estimate for airports in more detail. A summary of the information considered is contained in Figure 7.2.

Our WACC estimate for specified airport services as at 1 March 2023

7.33 Our WACC estimate for airports is shown in Table 7.4. The figures are based on the amended cost of capital IMs contained in this decision. The risk-free rate is calculated as at 1 of March 2023.

Table 7.4 WACC estimate for airport as at 1 March 2023

Parameter	Estimate	Standard error
Risk-free rate (as at 1 March 2023)	4.31%	
Debt premium[743]	1.17%	0.0015
Leverage	23%	
Asset beta	0.67	0.19
Debt beta	0	
TAMRP	7.00%	0.015
Corporate tax rate	28%	
Investor tax rate	28%	
Debt issuance costs	0.20%	
Equity beta	0.87	
Cost of equity	9.19%	
Cost of debt	5.68%	
Vanilla WACC (mid-point)	8.39%	0.0169
Post-tax WACC (mid-point)	8.02%	0.0169

7.34 As noted in paragraph 7.18 above, our reasonableness checks analysis focusses on our mid-point post-tax WACC estimate for airport of 8.02%. This is because we publish a mid-point WACC estimate for airports (along with the standard error of the WACC, which can be used to calculate different percentile estimates).

[743] Debt premium for airports is from our recent Cost of capital determination: Commerce Commission "Cost of capital determination for disclosure year 2023 for information disclosure regulation" (2 August 2022).

The plausible range

7.35 Our mid-point post-tax WACC estimate for airports of 8.02% is within the plausible range we have considered, which is bounded:

7.35.1 at the lower end, by post-tax returns on five-year government bonds of 3.10% and five-year A- rated corporate bond of 3.95%; and

7.35.2 at the upper end, by the future return expected from the New Zealand market for a firm of average risk of 8.37% (which we have estimated using the CAPM) and long-term historical average returns of the New Zealand market overall of 8.72%.

7.36 Our WACC estimate for airports is below estimates of the post-tax WACC for a New Zealand firm of average risk, which is consistent with our expectations. Regulated airport services have below average risk, given that they have considerable pricing power, and have users with limited alternatives (although we also note they are exposed to a number of demand risks which are a function of systematic factors).

7.37 We have estimated a future return expected from the market (using the SBL-CAPM) of 8.37%, as at 1 March. By definition, the market has an average equity beta of 1. Our analysis assumes a TAMRP of 7%, market-wide leverage of 30%, a risk-free rate of 4.31%, a debt premium of 1.51%, debt issuance costs of 0.20% per annum and a corporate and investor tax rate of 28%.[744]

7.38 We have estimated the historical average return for the New Zealand market from 1900-2016 as 8.72%, based on data from Dimson, Marsh and Staunton (2017).[745] [746] Dimson, Marsh and Staunton are generally regarded as having produced the most authoritative source of historical returns to investors, and their data for New Zealand covers over 100 years. The advantage of looking at historical returns is that they can be calculated without the need for an analytical tool such as the CAPM.

New Zealand-sourced estimates of the cost of capital for regulated suppliers

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[744] For simplicity, we have used our BBB+ debt premium estimate for EDBs and Transpower of 1.51% when estimating the future return expected from the market.

[745] Dimson, Marsh and Staunton estimate an average real (pre-tax) return to New Zealand equity investors of 6.2%, and a return on Government bonds of 2.1%, over the period from 1900-2016. The return on corporate debt is not calculated by Dimson, Marsh and Staunton, but for the purposes of this analysis we have assumed it falls midway between the return on government debt and the average for NZ equities (4.15%). Assuming an average inflation rate of 3.6%, a corporate tax rate of 28%, market-wide leverage of 30%, and no investor taxes on equity returns, this implies a post-tax WACC estimate of around 8.72% for an investment of average risk.

[746] Dimson, Marsh and Staunton, "Credit Suisse Global Investment Returns Yearbook 2017" (February 2017).

7.39 As part of our reasonableness checks, we have considered alternative post-tax WACC estimates for New Zealand airports. We have surveyed New Zealand investment banks including Craigs Investment Partners, Forsyth Barr, Jarden, Macquarie, and UBS in early 2023 regarding their estimates for AIAL.

7.40 After normalising for differences in risk-free rates, we consider that our mid-point post-tax WACC estimate for airports of 8.02% is reasonable given it is:

7.40.1 above the average broker estimate of 7.43% for AIAL's aeronautical services and within the range of brokers estimates for AIAL's aeronautical services (which range from 6.26% to 8.80%); but

7.40.2 below PwC's estimate for AIAL of 9.40%.

Overseas estimates of the regulated cost of capital

7.41 We have also considered recent regulatory decisions regarding the cost of capital for airports made by the UK CAA, and the CAR in Ireland. To enable comparison with our mid-point post-tax WACC estimate, we have converted:

7.41.1 the CAA's real vanilla WACC estimate to a nominal post-tax WACC estimate (assuming an inflation rate of 4.56% and a tax rate of 23.5%), and then substituted in our risk-free rate estimate of 4.31%;[747] and

7.41.2 the CAR's real pre-tax WACC estimate to a nominal post-tax WACC estimate (assuming an inflation rate of 2.67% and a tax rate of 12.5%), and then substituted in our risk-free rate estimate of 4.31%.[748]

7.42 We noted that both regulators use a TMR approach to the TAMRP, meaning that their TAMRP-equivalent depended on the risk-free rate at that time that the determination was made. Accordingly, it is not appropriate to combine it with a different risk-free rate for the purposes of estimating a WACC.

7.43 As shown in 0, our mid-point WACC estimate for airports of 8.02% is below the CAA and the CAR estimates (after normalising for differences in risk-free rates).

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[747] CAA "Economic regulation of Heathrow Airport Limited: H7 Final Proposals Section 3: Financial issues and implementation" (June 2022); and CAA "Economic regulation of Heathrow Airport Limited: H7 Initial Proposals Section 2: Financial issues" (October 2021).

[748] Swiss Economics "Dublin Airport Cost of Capital for 2022 Interim Review Final report: A report for the Commission for Aviation Regulation" (December 2022).

Table 7.5 Overseas WACC estimates for airports

Determination	Year	Normalised WACC estimate
CAA estimate for Heathrow	2022	8.47%
CAR estimate for Dublin	2022	8.37%

We have also considered RAB multiples evidence, as a secondary reasonableness check

7.44 As part of our reasonableness checks, we have considered RAB multiples for regulated energy and airport businesses in New Zealand. RAB multiples can provide a useful indicator of whether the allowed rate of return has been set at a sufficient level to adequately compensate investors for putting their capital at risk.

7.45 The RAB multiple of a regulated business is the ratio of its enterprise value to its RAB. The ratio tells us the market value for each dollar of the utility's RAB. At its simplest, the concept is whether (in absence of other factors) a regulated business will deliver returns close to its 'true' cost of capital. That is, the net present value of expected cash-flows should, if the regulator's assumptions hold, equal the value of the RAB (ie, the RAB multiple should be 1).

7.46 However, in an incentive-based regulatory regime, the RAB multiple will not only reflect the relationship between the regulatory allowed rate of return and investors' views of WACC, but also the market's expectations of the company's ability to over or under-perform relative to the regulator's cash-flow allowance and other modelling assumptions. On this basis, a RAB multiple greater than 1.0 could imply either:

7.46.1 the regulatory allowed rate of return was too high; or

7.46.2 the market expected the company to outperform relative to the allowed cash-flow or other model assumptions used in the regulatory determination.

Summary of RAB multiples evidence we have considered

7.47 We have considered recent evidence regarding RAB multiples for businesses subject to regulation under Part 4 of the Act. In particular, RAB multiples are able to be calculated for:

7.47.1 the sale of Eastland Network to First Gas Group, which was announced in November 2022 and completed in March 2023; and

7.47.2 regulated businesses that are publicly listed, specifically Vector and AIAL.

7.48 Given that Vector and AIAL are publicly listed, we have simply reported RAB multiples estimated by research analysts at the New Zealand investment banks. For Eastland Network, we have estimated RAB multiple ourselves based on publicly available information regarding the recent transaction affecting the company.

7.49 The RAB multiples evidence we have considered is summarised in Table 7.6:

Table 7.6 Summary of RAB multiples for regulated energy businesses and airports[749]

	RAB multiple
Energy businesses	
Eastland Group sale of Eastland Network to First Gas - Commerce Commission estimate	1.24x
Vector – Jarden estimates	1.23x for EDBs 1.00x for GDBs
Vector – UBS estimate	1.3x
Airports	
AIAL – Forsyth Barr estimate	1.9x
AIAL – UBS estimate	1.3x

7.50 We note that Forsyth Barr's estimated RAB multiple for Auckland International Airport is high. However, the UBS estimate is similar to the RAB multiple estimates for energy businesses.

[749] We have surveyed research analysts at the New Zealand investment banks in early 2023 regarding their RAB multiples for Vector and AIAL.

7.51 We consider that the available RAB multiples for EDBs and airports (as shown in Table 7.6 above) do not raise concerns about the reasonableness of our WACC estimates for these sectors. The observed multiples, which are generally significantly in excess of one, suggest the current regulatory settings are more than sufficient to compensate investors for putting their capital at risk. This conclusion is likely to hold under our draft amended cost of capital IMs, given that we are not proposing to make material changes to our approach to estimating WACC for these sectors.

7.52 Jarden's estimate of a RAB multiple of 1.00 for Vector's gas assets reflects uncertainty around the long-term outlook for the sector and the regulatory settings leading up to switch-off. As such, their estimate of a RAB multiple of 1.00 is due to factors other than our current WACC parameters.

7.53 We acknowledge that there are limitations of our RAB multiples analysis. For example, as noted in our 2014 WACC percentile decision:[750]

7.53.1 there are only a limited number of data points available;

7.53.2 there are a range of factors which could potentially influence RAB multiples (in addition to the allowed rate of return), including outperformance of opex and capex benchmarks; and

7.53.3 it can be difficult to isolate the enterprise value of the regulated activities of a business, due to uncertainty over the value of unregulated activities.

7.54 However, despite these limitations, we consider that the observed RAB multiples provide a useful indicator regarding the overall reasonableness of the regulatory settings (including the allowed WACC).

How we estimated the RAB multiples for Eastland Network

7.55 We have estimated the RAB multiple for Eastland Network based on publicly available information regarding the recent transaction. 0 summarises our updated RAB multiples calculations for Eastland Network.

[750] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services – Reasons paper" (30 October 2014), para 6.35.

Table 7.7 Eastland Network RAB multiple

	Measurement dates	RAB multiple
Enterprise value of regulated utility ($m)		
Enterprise value based on sale price	March 2023	$260 m
Less: capital work in progress	March 2023	$0.4 m
Total		$259.6 m
RAB ($m)	March 2023	$209.4 m
EV/RAB		1.24x

Source: Publicly available information and Commerce Commission analysis

7.56 The RAB multiple we have estimated for Eastland Network sale is based on the assumptions set out below:

7.56.1 The sale price of $260 million is used as the enterprise value for the regulated business.[751,752] We have assumed there are no unregulated businesses to be subtracted.

7.56.2 We have removed capital works in progress of $0.4 million from the enterprise value, given that RAB values do not include capital work in progress (ie, assets are only included in RAB once they are commissioned).

7.56.3 Eastland Network's closing RAB as at 31 March 2023 was $209.4 million.[753]

[751] In November 2022 it was announced that First Gas Group, owned by Igneo Infrastructure Partners, would buy Eastland Network for $260 million: Eastland Group "Eastland Group and shareholder Trust Tairāwhiti announce sale of Eastland Network to First Gas Group, owned by Igneo Infrastructure Partners, for $260 million" (22 November 2022).

[752] We also assume that the regulated business does not include any material non-RAB assets/liabilities such as deferred tax assets/liabilities, fair value adjustments for derivatives, debt/other liabilities taken over.

[753] Eastland Network "Annual disclosures for the disclosure year ending 31st March 2022" (March 2022).

Stakeholder views on reasonableness checks

7.57 We have received a number of submissions on our approaches to the reasonableness checks. We summarise the main points from submitters and will address the substantive points they raise in the following sections.

Energy businesses

7.58 Oxera reports (prepared for 'Big six' EDBs and GPBs) submit that the RAB multiples are not reliable checks of reasonableness of the WACC allowance.[754] Oxera also suggests an alternative check called Asset Risk Premium-Debt Risk Premium (ARP-DRP) differential to assess the cost of equity allowance.[755]

7.59 Wellington Electricity and Vector cite Oxera report and support the use of ARP-DRP differential as an alternative cross-check.[756] Unison (in its cross-submission) supports Wellington Electricity's views on reasonableness checks.[757]

7.60 First Gas states that our approach does not result in a commercially reasonable WACC as the GPBs have a lower vanilla WACC than EDBs, which is implausible.[758]

Aeronautical services

7.61 Airlines and their advisors support our approach to reasonableness checks. TDB Advisory (prepared for BARNZ) and Qantas (in its cross-submission) both consider the RAB multiple is the most appropriate financial valuation metric to cross-check reasonableness of an airport's return.[759] Castalia report (prepared for Air NZ) also supports our use of RAB multiples as a reasonableness check.[760]

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[754] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 7; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), section 2A.5.

[755] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 7B.

[756] Wellington Electricity "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.33; Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.21.

[757] Unison Networks "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p.3.

[758] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.11.

[759] TDB Advisory "Report on IM Review 2023 Draft Decisions cost of capital paper" (report prepared for BARNZ, 19 July 2023), p.7; Qantas "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p.14.

[760] Castalia "Comments on Cost of Capital" (report prepared for Air New Zealand, 19 July 2023), p.7.

7.62 BARNZ (in its cross-submission) further submits that the high RAB multiple indicates the airport is generating returns in excess of what is intended in a well-regulated market.[761]

7.63 However, airports do not consider that the RAB multiples are reliable indicators of the reasonableness of our proposed WACC for regulated airport services. For example, CEG on behalf of NZAA (in its cross-submission) argues that the RAB multiple analysis for airports is not very informative of the reasonableness of the regulatory WACC.[762]

7.64 HoustonKemp report (prepared for WIAL) also states that there is limited value of analysing RAB multiples.[763]

7.65 Both WIAL and CIAL (in their cross-submissions) argue that there are limited data points available for RAB multiple analysis.[764]

Issue #1: GPBs WACC estimates

7.66 First Gas suggests that the relativity between the WACCs for GPBs and EDBs in the draft decision provides a better cross-check of the reasonableness of the GPBs WACC.[765] It notes that because gas pipeline services face more systematic risk, it is implausible that the WACC for GPBs is lower than EDBs and suggest this outcome undermines the purposes of the Act:[766]

> "…it is difficult to understand how the Commission has arrived at a GPB WACC that results in less compensation for investors than for electricity lines services… This operates to disincentivise investment in gas pipeline services, contrary to s 52A(1)."

7.67 We disagree with First Gas that the WACC estimate of GPBs is implausible compared to EDBs:

7.67.1 as illustrated in our draft topic paper, both vanilla WACC (mid-point) and post-tax WACC (mid-point) for GPBs are higher than those for EDBs and Transpower.

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[761] Board of Airline Representatives New Zealand (BARNZ) "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), pp.2-3.

[762] CEG "Review of submissions on asset beta estimates for airports" (report prepared for NZ Airports Association, 9 August 2023), section 8.

[763] HoustonKemp - Comment on asset beta methodology" (report prepared for Wellington International Airport (WIAL), 9 August 2023), section 2.3.

[764] Wellington International Airport (WIAL) "Cross submission on IM Review 2023 Draft Decisions" (9 August 2023), pp.11-12; Christchurch International Airport (CIAL) "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p.3.

[765] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.11.

[766] Ibid, p.11.

7.67.2 First Gas said the GPBs WACC is lower than EDBs WACC because they compared the mid-point WACC for GPBs with the 65th percentile WACC for EDBs and Transpower. . This is due to the different decisions on WACC uplift for EDBs/Transpower and GPBs. We have outlined the reasons for different WACC uplift decisions in Chapter 6.

7.68 Therefore, we do not consider that our WACC estimates for GPBs is unreasonable.

Issue #2: The reliability of RAB multiples

7.69 We received submissions from both energy sectors and aeronautical services on the use of RAB multiples as an additional reasonableness check.

7.70 There is discrepancy between stakeholder views on the reliability of the RAB multiples. A number of submitters argue that the RAB multiples are unreliable indicators of the reasonableness of the WACC allowance, while others state the RAB multiples we reported could indicate an overestimation of the WACC for airports in our draft decisions.

Energy businesses

7.71 Oxera reports (prepared for Big 6 EDBs and GPBs) submit that many factors need to be accounted for when interpreting the RAB multiples and that conclusions are sensitive to assumptions.[767]

7.72 Oxera argues that there are a number of additional factors other than those identified in our draft topic paper that can explain the observed level of RAB multiples above 1x without assuming that the regulatory WACC allowance is above the investors' required cost of capital (particularly without assuming the regulatory cost of equity allowance is above the required return on equity).[768]

7.73 Oxera discusses that there are a range of conclusions can be drawn from the observed RAB multiples.[769] For example, Oxera argues that the observed takeover price in the Eastland sale, and the RAB multiple, are likely to have reflected strategic and operational considerations beyond the adequacy of the level of the regulated WACC.

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[767] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 7; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), section 2A.5.

[768] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), pp.71-72.

[769] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 7A.3.

7.74 Oxera suggests that when considering the average expected RAB growth for Eastland Network and Vector and an expectation that investors expect some level of outperformance of the regulatory cost allowances, the cost of equity allowance is likely to be below the true required return on equity.[770]

7.75 Vector and Wellington Electricity cite the Oxera report arguing that many factors need to be accounted for when interpreting the RAB multiples, and the conclusions are sensitive to the assumptions.[771] Therefore, they suggest that the RAB multiple analysis is not a reliable check of the reasonableness of the WACC.

7.76 Unison (in its cross-submission) supports Wellington Electricity's views on the Reasonableness checks.[772]

7.77 Contact Energy provides RAB multiples analysis and conclude that the results indicate the 65th percentile remains too high.[773]

7.78 First Gas argues that the RAB multiple in excess of 1x for the Eastland sale might have other underlying contributing factors.[774]

Aeronautical services

7.79 Airlines and their experts support the use of RAB multiples and conclude the high RAB multiples we reported indicate the WACC allowance is generous to airports. TDB Advisory (prepared for BARNZ) view the RAB multiples as providing the most robust test of the reasonableness of our WACC estimates.[775] They point out that the RAB multiples reported in our draft topic paper indicate that the investors are more than adequately compensated for putting their capital at risk.

7.80 BARNZ (in its cross-submission) further submits that a RAB multiple of 2.0x for AIAL indicates that the airport is generating returns in excess of what is intended in a well-regulated market.[776]

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[770] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), pp.75-78.

[771] Wellington Electricity "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.33; Vector "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.21.

[772] Unison Networks "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p.3.

[773] Contact Energy "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp.12-13.

[774] First Gas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.11.

[775] TDB Advisory "Report on IM Review 2023 Draft Decisions cost of capital paper" (report prepared for BARNZ, 19 July 2023), p.7.

[776] Board of Airline Representatives New Zealand (BARNZ) "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), pp.2-3.

7.81 Air NZ submits that the RAB multiples for AIAL suggesting that the market perceives regulatory settings and the resulting cost of capital to be generous to airports.[777] Air NZ also cites the Castalia report (prepared for Air NZ) which noted that Auckland Airport's share price did not materially shift after the publication of the draft decision.[778]

7.82 Qantas recommended we investigate the RAB multiples further because the RAB multiples we reported are well above a reasonable range of 0.9x-1.3x, as detailed in AER 2018 WACC review.[779]

7.83 Airports and their experts express different views with airlines on the use of RAB multiples. A CEG report (cross-submission report prepared for NZ Airport Association) points out that the RAB multiples we reported for Auckland Airport are not reliable.[780] It argues that this is primarily because the regulatory WACC does not apply to the entire airport business, the unregulated operations at airports are too important to overall profits to allow for an accurate observation of the market value of the regulated activity, and the value of regulated operations depend on several non-WACC related factors.

7.84 A HoustonKemp report (prepared for WIAL in its cross-submission) disagrees with TDB advisory's view on RAB multiples.[781] It submits there is limited value of analysing RAB multiples. HoustonKemp points out that the wider RAB multiples range (from 1.3x to 1.9x) indicates the difficulty in estimating RAB multiples for AIAL. It argues that the RAB multiples observed in other regulatory regimes provide no meaningful indication about the appropriateness of our airport WACC estimates. It also considers that the limitations of RAB multiples identified in our draft topic paper apply even more strongly to airports as the substantial non-aeronautical revenues are difficult to isolate.

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777 Air New Zealand "Submission on IM Review 2023 Draft Decisions" (19 July 2023), pp.3-4.

778 Ibid.

779 Qantas "Submission on IM Review 2023 Draft Decisions" (19 July 2023), p.3.

780 CEG "Review of submissions on asset beta estimates for airports" (report prepared for NZ Airports Association, 9 August 2023), section 8.

781 HoustonKemp - Comment on asset beta methodology" (report prepared for Wellington International Airport (WIAL), 9 August 2023), pp.12-13.

7.85 WIAL (in its cross-submission) suggests the limited data points and other factors which could explain a high RAB multiple makes the metric unreliable.[782] It also notes the RAB multiples in the draft decision reflect current regulatory settings, rather than the settings proposed in the draft decision:[783]

> "Evidence of RAB multiples that pre-date the Commission's draft decisions tell us nothing about the financeability of regulated suppliers under the regulatory settings the Commission now proposes."

7.86 CIAL disagrees with TDB Advisory that RAB multiples for energy businesses have been a reasonable cross-check for regulated airports, pointing to evidence that regulated airports have higher asset betas and face different systematic risk.[784] It notes that RAB multiples indicate financeability of regulated suppliers under current regulatory settings, and do not support a conclusion that our proposed WACC for airports will equally enable regulated airports to attract capital. CIAL also notes that there are limited data points available.

Our consideration on RAB multiples

7.87 In the draft topic paper, we outlined a number of limitations of using RAB multiples including the limited data points, the difficulty to isolate the enterprise value of regulated activities of businesses due to the uncertainty over the value of unregulated businesses, and a range of factors can affect RAB multiples. These limitations have been emphasised in the submissions on the draft decisions.

7.88 Given these limitations, we consider that the RAB multiple is only one alternative approach to assess the reasonableness of the WACCs for energy businesses and airports. The primary approach we use to assess the reasonableness of our WACC estimates is to compare our estimates with both New Zealand sourced WACC estimates and overseas regulators WACC estimates. We give the most weight to NZ sourced estimates and the High Court also agreed with this approach in its judgement on the IMs merits appeals.[785]

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[782] Wellington International Airport (WIAL) "Cross submission on IM Review 2023 Draft Decisions" (9 August 2023), pp.11-12.

[783] Ibid.

[784] Christchurch International Airport (CIAL) "Cross-submission on IM Review 2023 Draft Decisions" (9 August 2023), p.3.

[785] *Wellington Airport & others v Commerce Commission* [2013] NZHC 3289, at [1213].

7.89 However, while we acknowledge the limitations of the RAB multiples, we do not agree that RAB multiples are not informative at all for cross-checking. We have used RAB multiples in previous IM and IM reviews including 2010 IM, 2014 Amendment to WACC percentiles, and 2016 IM review. In particular, the RAB multiple analysis suggests that there was 'significant scope to reduce the WACC percentile uplift below the 75th percentile estimate' in the 2014 Amendment to WACC percentiles.[786]

7.90 In addition, we note that brokers also use RAB multiples as one of the useful tools of valuing and sense checking valuations for regulated businesses. Forsyth Barr have prepared a report stating why they consider the RAB multiple is a useful indicator and addressing some key arguments CEG made.[787] We therefore consider that the RAB multiple analysis can assist when assessing the reasonableness of the regulatory settings as an additional cross-check.

Issue #3: Alternative cross-check: ARP-DRP Differential

7.91 ARP-DRP differential has been proposed by Oxera as an alternative cross-check for cost of equity allowance.

7.92 Oxera (prepared for 'Big Six' EDBs and GPBs) submits that we can use an alternative approach called ARP-DRP differential to cross-check the cost of equity allowance with reference to the cost of debt estimate.[788]

General methodology for estimating the ARP-DRP differential proposed by Oxera

7.93 Oxera submits that 'ARP-DRP differential can be estimated using the asset and debt risk premia allowed under regulatory determinations and observed from bonds issued by market participants with comparable credit ratings'.

7.94 The ARP reflects the excess return required by investors in return for providing capital to risky assets. The DRP reflects the excess return required by investors in return for acquiring debt claims on the same assets.

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[786] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services – Reasons paper" (30 October 2014), para X25.3.

[787] Forsyth Barr "Regulated Companies – The Relevance of RAB Multiples" (10 October 2023).

[788] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 7B; Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital relating to gas sector" (report prepared for First Gas, PowerCo & Vector, 19 July 2023), section 2A.5.

7.95 Oxera states that the ARP-DRP differential should be strictly positive as the overall assets of a company, which are financed through a mix of debt and equity, should always be risker than the debt of that company.[789]

7.96 Oxera undertakes the ARP-DRP analysis for EDBs based on our 2023 cost of capital draft decisions and find that the ARP-DRP differential is below the minimum required differential. Therefore, Oxera concludes that there is an insufficiency in equity return allowance which is likely to be driven by the methodological issues with the estimation of asset beta and TAMRP.[790]

Our consideration on ARP-DRP differential

7.97 We do not consider that Oxera has provided sufficient evidence to support the use of the ARP-DRP approach in a regulatory setting for reasonableness check.

7.98 First, we note that the ARP-DRP differential method only checks the reasonableness of the cost of equity allowance, instead of the whole WACC. In particular, Oxera argues that their result suggests that there are methodological issues associated with our estimation of the asset beta and TAMRP.[791] We have provided detailed reasons in Chapter 4 for our approaches of estimating asset beta and TAMRP. We have also compared our asset beta and TAMRP against market estimates in Chapter 4. We therefore do not consider that adopting this alternative cross-check would add additional benefits to our existing approaches when assessing the reasonableness of the overall WACC allowance.

7.99 Second, Oxera states that the ARP-DRP framework has been considered by UK Competition Markets Authority (CMA) during both the PR19 and RIIO-2 appeals. Oxera also cites that the CMA has commented that the ARP-DRP framework is based on 'a logical principle' and 'provide one useful perspective'.[792]

7.100 However, we note that in its Final Determination the CMA did not consider that the ARP-DRP cross-checks have been proven to be superior or to provide sufficiently persuasive insight that would negate other CAPM and cross-check evidence. CMA also commented that:[793]

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[789] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), section 7B.

[790] Ibid, para 7.51.

[791] Ibid, p. 85.

[792] Ibid, para 7.33.

[793] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations. Final report', (17 March 2021), para 9.1386.

> We do not agree that the evidence provided by Oxera is sufficient in itself to justify an adjustment to the cost of equity. The calculation provided is itself based on a particular set of assumptions for ARP, which are different to those used in the CMA's approach … In our view, given the number of assumptions required to estimate the ARP-DRP differential, the measure implied by the CMA's determination is of a sufficiently comparable scale to Oxera's sample that this analysis does not itself suggest that we need to adjust the cost of equity.

7.101 Finally, we note that the ARP-DRP framework is not used by other overseas regulators. Therefore, after reviewing the evidence before us, we decide against adopting ARP-DRP differential as an alternative cross-check for the reasonableness of our WACC allowance.

Attachment A Additional technical information on debt tenor anomaly

A1 This attachment discusses our analysis on a number of technical points raised in CEG's submission related to the debt tenor anomaly. This Attachment should be read in conjunction with the reasons for our final decisions on the debt premium.

CEG's main arguments

A2 There are three parts to CEG's arguments: a 'mathematical proof' of the 'tenor' anomaly based on the MM Theorem and the equivalence to the 'leverage anomaly', an argument about the link between debt tenor and debt beta based on Merton (1974), and an empirical analysis based on a report by Oxera.

A2.1 CEG's 'mathematical proof' of the 'tenor anomaly' uses the WACC formula to show that: If the debt beta is independent of the debt tenor, and the cost of debt increases with the debt tenor, then a higher tenor will lead to a higher WACC. This conclusion contradicts the MM Theorem that the cost of capital is (roughly) invariant to the capital structure.

A2.2 On the Merton model[794], CEG cites Oxera (2020).[795] In particular, CEG states that "Oxera modelling (using the CEPA/UK regulator model) shows that debt beta is only really sensitive to time to maturity of the debt and the underlying asset volatility."[796]

A2.3 CEG develops a model to quantify the impact of the 'tenor anomaly' on the WACC bias. CEG's modelling uses a number of assumptions, in particular, a debt beta of 0.02 for 5-year tenor and 0.12 for 20-year tenor. CEG concludes that because of the 'tenor anomaly', our WACC undercompensates suppliers by 0.29% per annum.

Our assessment of CEG's recommendations

A3 CEG recommends that we adopt one of three options to offset the WACC bias caused by the 'tenor anomaly'. We assess these options below.

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[794] The Merton model treats corporate debt as a put option on the firm's assets (with the strike price equal to the face value of the debt), and applies the option pricing formula to value the option. By rearranging the option pricing formula, debt beta can be written as a function of the following parameters: gearing, asset beta, asset variance, time to maturity of the bond, and credit spread.

[795] Oxera "Estimating debt beta for regulated entities" (report prepared for Energy Networks Association, June 2020).

[796] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), p. 11.

A4 Option 1: to adopt a longer benchmark tenor assumption (eg, 10 years). The adjustment would increase the allowed cost of debt, hence the WACC, without changing the benchmark equity beta.

A4.1 CEG considers that our benchmark debt tenor should be consistent with the average debt tenor in the beta comparator sample, and that maintaining a 10-year average debt tenor is a realistic option for a hypothetical large listed New Zealand EDB to be consistent with the comparator sample.[797]

A4.2 CEG refers to the Commission's solution to the 'leverage anomaly', ie to set the notional leverage equal to the average leverage of the beta comparators, to argue that the benchmark debt tenor should also be consistent with the average tenor of the beta comparators.

A4.3 We agree with Dr Lally that there is a critical difference in the two situations. In the former case, there is no indication that the average leverage of the beta comparators (41%) is unsuitable for the New Zealand businesses, whereas using the average debt tenor for the beta comparators (20 years, or even 10 years in CEG's recommendation), would clearly over-compensate regulated suppliers for their efficient cost of debt based on the tenor of New Zealand suppliers' debt issuances.[798]

A4.4 We use our benchmark debt tenor in the estimation of the debt premium. In our Draft Decision, we provided detailed information on the evidence that supports a benchmark tenor of five years. In particular, our 2022 confidential debt survey found that the value-weighted average original term to maturity of the regulated suppliers that responded was 7.25 years. For half of 23 regulated suppliers, the weighted average original period to maturity was five years or less, and only one was greater than 10 years.

A4.5 We provide the TCSD allowance to qualifying suppliers that have issued debt with an average term longer than five years so that these suppliers will not be under-compensated for incurring the efficient cost of longer-term debt.[799]

A4.6 Given that CEG's option 1 is likely to result in a cost of debt that overcompensates regulated suppliers, we do not consider that option 1 would better promote the purpose statement.

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[797] CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Networks Aotearoa, February 2023), p. 7.

[798] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of CEG's submission on the debt tenor anomaly" (report prepared for Commerce Commission, 6 September 2023), p. 14.

[799] Commerce Commission "Part 4 Input Methodologies Review 2023 – Draft decision: Cost of capital topic paper" (June 2023), pp. 39-41.

A5 Option 2: to make adjustments to the de-levering and re-levering process, ie, de-lever the equity beta estimates using a debt beta for long term debt (around 0.12), but re-lever the equity beta estimates using a debt beta for short term debt (around 0.02). This adjustment would increase the benchmark equity beta, hence the WACC, without changing the allowed cost of debt.

A5.1 We consider that option 2 relies on a speculative relationship between debt tenor and equity beta which lacks sufficient theoretical or empirical support and would be difficult to implement in a regulatory setting. We are not aware of regulatory precedent of the adjustments proposed in option 2.

A5.2 The only theoretical basis for the tenor-beta relationship is based on the Merton model which has a number of strong assumptions not applicable to regulated businesses in practice (in particular the allowed cost of debt assumes staggered debt maturities which is inconsistent with the Merton model assumption). The Merton model is also known for failing the empirical tests (the 'credit spread puzzle'), [800] therefore one must be cautious in using the Merton model when estimating the tenor-beta relationship.

A5.3 Dr Lally points out that when CEG invokes the MM theorem in support of their claim that longer term debt reduces a firm's equity beta, CEG only quotes the first paragraph from Titman (2002),[801] which merely alludes to the possibility that WACC is invariant to debt tenor. But Titman did not claim that a firm's use of longer-term debt lowers its equity beta.[802]

A5.4 We further note that there is no established empirical evidence in finance literature on the tenor-equity beta relationship, and none has been cited by CEG. The only quantitative result on tenor-debt beta is from Oxera (2020) which is a sensitivity test on tenor of 10 vs 12 years. CEG over-extrapolates from the Oxera result from the two points to a relationship above 10 years to be used in their own modelling.

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[800] Feldhütter and Schaefer (2018) note: "The structural approach to credit risk, pioneered by Merton (1974) and others, represents the leading theoretical framework for studying corporate default risk and pricing corporate debt. While the models are intuitive and simple, many studies find that, once calibrated to match historical default and recovery rates and the equity premium, they fail to explain the level of actual investment-grade credit spreads, a result referred to as the 'credit spread puzzle'." See CEPA "Considerations for UK regulators setting the value of debt beta" Report for the UK Regulators Network (December 2019), p. 11.

[801] Titman "The Modigliani and Miller Theorem and the Integration of Financial Markets" (2002) Financial Management, vol. 31, pp. 101-115.

[802] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of CEG's submission on the debt tenor anomaly" (report prepared for Commerce Commission, 6 September 2023), p. 17.

A5.5 Dr Lally's view is that even if we were to use the Merton model despite the identified problems, CEG has made a number of mistakes. Dr Lally applies adjustments to CEG's analysis to correct these and concludes that CEG has significantly over-estimated the WACC bias.[803].

A5.6 Based on our analysis, we consider there are practical difficulties of correctly estimating the tenor-beta relationship. CEG and Dr Lally provide two estimates which differ significantly, and there is a lack of academic findings on the relationship. Therefore, we do not consider that accepting CEG's option 2 based on its untested magnitude of the WACC bias due to the 'tenor anomaly' would better promote the purpose statement.

A6 Option 3: to make adjustments to the WACC standard error or percentile to offset the WACC bias.

A6.1 CEG's first two options aim to directly address the 'tenor anomaly'. This third option is an indirect solution that relies on CEG's estimate of the WACC bias caused by the 'tenor anomaly'. Based on our analysis, we do not agree with CEG's estimate of the 'WACC bias'. CEG has not provided any detail about this option which makes it difficult for us to further assess. The uncertainty of the estimated 'bias' means that we do not consider this option would better promoting the purpose statement.

Our response to CEG's questions for the Commission

A7 CEG poses three questions to the Commission. We address them below.

A8 Question 1: Why the NZCC believes that long term debt has a higher cost than short term debt? That is, why do lenders demand higher returns on long term debt if long term debt is not riskier than short term debt?

A8.1 As Dr Lally explains in his report, the cost of debt includes a liquidity premium[804], and also includes the excess of the promised over the expected return. Neither of these is determined by the debt beta, and they may increase with tenor, and this alone may explain why longer tenor debt (on average) has a higher cost than shorter tenor debt.[805]

A9 Question 2: Why the NZCC believes that businesses rationally borrow at long term rates if the equity holders receive no benefit, in the form of lower equity risks, to offset the higher cost of long-term debt?

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[803] Ibid, p. 12.

[804] Liquidity preference theory is a well-established theory of the term structure.

[805] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of CEG's submission on the debt tenor anomaly" (report prepared for Commerce Commission, 6 September 2023), p. 14.

A9.1 CEG claims that the only reason why a firm issues higher cost long term debt rather than lower cost short term debt is because doing so reduces the cost of equity.[806] Dr Lally provides alternative reasons from the finance literature why firms might issue longer-term debt:[807]

A9.1.1 Issuing longer term debt (coupled with staggered maturity dates) ensures that a smaller proportion of the debt matures (and therefore requires rollover) within any short period, which reduces the refinancing risk to a firm. CEG argues that doing so reduces the firm's equity beta. However, CEG's argument only applies when the refinancing risk is a systematic risk, and this is not necessarily true as firms can be exposed to refinancing risk due to firm specific factors which do not affect their equity betas.

A9.1.2 Firms can also try to "time the market" with the expectation that longer term debt will be cheaper than a succession of shorter term debts and this is not inconsistent with the current term structure being upward sloping.[808] Doing this does not imply that the firm's equity beta would be lower.

A10 Question 3: Why the CEPA model that relates debt beta to tenor, and Oxera's estimate of a 0.02 increase in debt beta for a 2-year increase in tenor, is not informative.

A10.1 We explained previously that the theoretical relationship in the Merton model has a number of caveats. Indeed the CEPA report has reservations about using the Merton model exclusively. Furthermore, there is no empirical evidence in academic literature on the relationship between debt beta and tenor. Oxera's estimate is only a sensitivity result for two points (10 year and 12 year tenor) and cannot be considered a robust empirical relationship.

A11 Below we provide further analysis to CEG's arguments.

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[806] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), para. 14.

[807] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of CEG's submission on the debt tenor anomaly" (report prepared for Commerce Commission, 6 September 2023), p. 16.

[808] Titman "The Modigliani and Miller Theorem and the Integration of Financial Markets" (2002) *Financial Management*, vol. 31, Section IV, E.

On the Modigliani and Miller Capital Structure Theorem and the equivalence between the 'leverage anomaly' and the 'tenor anomaly'

A12 The Modigliani-Miller capital structure theorem (MM Theorem) states that in the absence of taxes, bankruptcy costs, agency costs, and asymmetric information, and assuming an efficient market, the value of a firm is independent of how it is financed. An implication is that the leverage ratio has no impact on the expected return on the firm's assets.

A13 CEG extends the MM Theorem by claiming that the WACC should be (more or less) invariant to the tenor of the bonds that firms issue.[809]

> [The MM Theorem] states that the fundamental risk of a firm cannot be changed by the funding strategy of the firm – it can only be allocated in different ways between funders. In this context, this means issuing low cost short term debt rather than high cost long term debt cannot lower the WACC for a firm.

A14 CEG's key argument in the submission is that the benchmark debt tenor that we use to estimate the debt premium needs to match the average tenor of the comparator firms that we use to estimate the benchmark equity beta. CEG argues that the MM Theorem is violated if we do not match the two tenors, and the violation is due to the increase in the cost of debt (with the increase in tenor) without an offsetting decrease in the cost of equity (resulting in the WACC changing with the debt tenor). The returns on debt and equity are linked via a relationship between debt beta and equity beta, whereas we have assumed that the two betas are independent.

A15 We first note that the MM Theorem holds in perfect markets, and this is seldom true in practice where there are imperfections. Brealey and Myer (2003) "undertake a detailed analysis of the imperfections that are most likely to make a difference, includes taxes, the cost of bankruptcy, and the costs of writing and enforcing complicated debt contracts", and "argue that it is naïve to suppose that investment and financing decisions are completely separated."[810]

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[809] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), (19 July 2023), para. 20.

[810] Brealey and Myer "Principles of corporate finance, 7th ed." (2003), p. 465.

A16 Indeed, CEG acknowledges the conditions for the MM Theorem to hold in their own submissions.[811] The Oxera (2020) report that CEG refers to states that "(I)t is important to note that the MM cross-check does not necessarily lead to the correct estimation of the cost of capital parameters."[812] Therefore, we consider that "the violation of the MM theorem" is not a sufficient reason to support CEG's claim.

A17 CEG writes that the 'tenor anomaly' is identical to the 'leverage anomaly' in the mathematical structure. The basis given for this view is by taking the derivatives of the WACC with respective to the leverage and tenor, and showing that the WACC increases with leverage ('leverage anomaly') and tenor ('tenor anomaly') since both partial derivatives are positive.[813]

$$WACC = \left(r_f + \frac{\beta_a - L * \beta_d}{1 - L} * MRP\right) * (1 - L) + r_d * L \quad (1)$$

$$\frac{\partial WACC}{\partial L} = -r_f + r_d = DRP \quad (2)$$

$$\frac{\partial WACC}{\partial T} = \frac{\partial r_d}{\partial T} * L \quad (3)$$

where: r_f is the risk-free rate, r_d is the cost of debt, β_a is asset beta, β_d is debt beta, L is leverage/gearing ratio, T is debt tenor, MRP is the market risk premium, DRP is the debt risk premium.

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[811] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), footnote 3, para. 75; and CEG "Estimating the WACC under the IMs" 'Appendix C -Submission on IM Review CEPA report on cost of capital' (report prepared for Electricity Networks Aotearoa, February 2023), Section 2.1

[812] Oxera "Estimating debt beta for regulated entities" (report prepared for Energy Networks Association, June 2020). p. 4.

[813] As a technical remark, we note that CEG's partial derivative in equation (2) is incorrect, that it misses a term (although it does not change their conclusion that the partial with respect to leverage is positive).

$$\frac{\partial(-L * \beta_d * MRP)}{\partial L} = -\beta_d * MRP$$

and therefore

$$\frac{\partial WACC}{\partial L} = DRP - \beta_d * MRP$$

A18 We recognized in our previous IMs that the use of the simplified Brennan-Lally CAPM, in conjunction with the simplified beta gearing model (assuming zero debt beta, ie $\beta_a = (1 - L) * \beta_e$), is the source of the 'leverage anomaly' and considered various options to address the issue. We have taken the approach of using a 'notional leverage'.[814] We considered using non-zero debt betas in the beta gearing model (ie $\beta_a = L * \beta_d + (1 - L) * \beta_e$), but decided against it due the lack of support from stakeholders and practical difficulties of accurately estimating debt betas.

A19 We agree with CEG that assuming zero debt beta would result in equity betas being independent of debt betas and parameters that affect debt betas. However, we do not consider the analogy between the 'leverage anomaly' and the 'tenor anomaly' is straightforward as CEG claims.

A19.1 This is because leverage L is a specific parameter in the WACC formula, therefore equation (2) follows directly from equation (1), and the impact of leverage on the WACC is clear from equation (2).

A19.2 However, tenor T is not a parameter in the WACC formula, so equation (3) does not provide a basis to quantify the impact of tenor on the WACC (to do so would require a number of assumptions about the relationship between tenor and the WACC). In other words, while the WACC formula in conjunction with the beta gearing model tells us how leverage affects the WACC, it does not tell us how tenor affects the WACC via debt beta.

A20 Therefore, we do not agree with CEG that the 'leverage anomaly' is identical in mathematical structure to the 'tenor anomaly', or an even stronger claim made by CEG that the 'leverage anomaly' is a direct corollary of the 'tenor anomaly'.[815]

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[814] See detailed description of the “leverage anomaly” and the Commission’s decided approach in Commerce Commission “Input Methodologies (electricity distribution and gas pipeline services) Reasons Paper” (December 2010), section 6.6, Appendix H3.

[815] CEG "Appendix B - Response to 2023 IM draft decision on cost of capital" (report prepared for Electricity Networks Aotearoa (ENA), 19 July 2023), para. 24.

On the link between debt betas and debt tenors (the Merton model)

A21 CEG refers to the Merton (1974)[816] model to demonstrate a theoretical relationship between debt beta and tenor. The Merton model was discussed in CEPA (2019)[817] and used by Oxera (2020)[818] to estimate debt betas. The Merton model treats corporate debt as a put option on a firm's asset,[819] and uses the option pricing formula to value the option. Under the Merton model, debt beta is a function of leverage, asset beta, asset volatility/variance, time to maturity of the bond, and credit spread. In particular, debt beta is positively related to time to maturity.

A22 Dr Lally agrees that the Merton model implies a positive relationship between debt beta and time to maturity. However, he points out that the Merton model assumes that all of a firm's debt is zero coupon and matures at the same point in time, which is a poor representation of the default risks faced by a firm in the typical real-world situation in which it staggers its debt maturities. For this reason, Dr Lally considers that the debt beta estimates arising from the Merton model may be poor and that in reality it may not be the case that debt betas increase with debt tenor.[820]

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[816] Merton "On the pricing of corporate debt: The risk structure of interest rates" (1974) *The Journal of Finance*, vol. 29, pp. 449-470.

[817] CEPA "Considerations for UK regulators setting the value of debt beta" Report for the UK Regulators Network (December 2019). https://ukrn.org.uk/app/uploads/2019/12/CEPAReport_UKRN_DebtBeta_Final.pdf

[818] Oxera "Estimating debt beta for regulated entities" (report prepared for Energy Networks Association, June 2020).

[819] An option is a contract between two parties giving the buyer the right, but not the obligation, to buy or sell a particular commodity or service at a set price (called a strike price) on or before a given date. A call option gives the buyer the right, but not the obligation, to buy the shares at a fixed price before an agreed date. A put option gives the buyer the right, but not the obligation, to sell the shares at a fixed price before an agreed date. Equity can be viewed as a call option on the firm's assets (for "limited liability" firm), and debt a put option, with a strike price equal to the face value of debt.

[820] Dr Martin Lally "Review of CEG's submission on the debt tenor anomaly" (report prepared for Commerce Commission, 6 September 2023), p. 12.

A23 The Merton model is a foundation model for the 'structural methods' approach to estimate debt betas. CEPA (2019) discussed the advantages and disadvantages of the structural methods, which is one among four methods commonly used to estimate debt betas.[821] CEPA noted the theoretically sound foundation of the structural methods, but also noted the lack of regulatory precedent, and the known problem of 'credit spread puzzle'. That is, the Merton model fails to explain the level of actual investment-grade credit spreads. CEPA concluded that "the concern then is that if structural approaches are poor at explaining (expected) debt returns, then there may be bias in the calculations of debt betas based on them."[822]

A24 After reviewing four approaches to estimating debt betas, the overall conclusion in CEPA (2019) is that "there is no one approach to estimating debt betas that dominates all others. Rather than a single source of truth, there is instead a body of evidence that regulators should draw upon." Indeed, the estimates of debt betas in Oxera (2020) have a large range using different methods: 0.10 from direct method, 0.01-0.04 from indirect regression-based methods, and 0.03-0.07 from the structural method. [823]

A25 The caveats in the Merton model identified by Dr Lally and CEPA, as well as the wide range of estimates reported by Oxera, highlight the practical difficulties of accurately estimating debt betas, which undermines the reliability of the relationship between debt beta and tenor.

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[821] The other three methods are: The Direct (or CAPM based) method: regresses observed excess bond returns on the Market Risk Premium (same approach as estimating equity beta). The Indirect methods: one being advocated in Oxera (2019) estimates how sensitive excess debt returns are to excess equity returns, and then multiplies equity betas by this elasticity to derive debt betas. The Decomposition method: various deductions are made from the observed market debt premium to leave the component of the premium attributable to systematic market risk; the debt beta is then this component divided by (an estimate of) the Market Risk Premium.

[822] CEPA "Considerations for UK regulators setting the value of debt beta" Report for the UK Regulators Network (December 2019), p. 11. https://ukrn.org.uk/app/uploads/2019/12/CEPAReport_UKRN_DebtBeta_Final.pdf

[823] Oxera "Estimating debt beta for regulated entities" (report prepared for Energy Networks Association, June 2020).Figure 1, 2.1, 2.2, 2.4.

On CEG's quantification of the magnitude of the WACC bias

A26 CEG quantifies the impact of the 'tenor anomaly' on the WACC bias. In their modelling, CEG makes a number of assumptions, including a key assumption about the magnitude of the debt beta. Specifically, CEG assumes a debt beta of 0.02 for a bond with a five-year tenor, and a debt beta of 0.12 for a bond with a 20-year tenor. CEG arrives at the 0.12 debt beta by extrapolating from Oxera's estimate of a debt beta of 0.05 for a bond with a 10-year tenor and 0.07 for a bond with a 12-year tenor. That is, Oxera estimated a 0.02 increase in debt beta when tenor increases from 10 to 12 years. CEG therefore assumes a 0.01 increase in debt beta for every year above 10 years. Their estimated debt beta for a bond with a 20-year tenor is then 0.05+0.01*10=0.15, which CEG reduces to 0.12 as a conservative estimate of the average debt beta for our beta comparators.

A27 CEG then uses its estimate of the debt beta to makes adjustments to our process of de-levering and re-levering in estimating the benchmark equity beta. In our process, we use the simple beta gearing model which assumes a zero debt beta.

$$\beta_a = (1 - L) * \beta_e \quad (4)$$

A28 We follow a six-step process in estimating equity betas using the estimated equity betas from the comparator sample. In step 3, we de-lever each comparator firm's equity beta using each firm's actual gearing (both equity beta and gearing can be observed from historical data) based on equation (4). In step 6, we re-lever the sample average asset beta (calculated from step 3 and applied ad hoc adjustments) using a notional leverage (which we set equal to the sample average leverage), again using equation (4), to arrive at the benchmark equity beta.[824]

A29 CEG considers that we are wrong in using the observed equity beta in step 3, as the observed equity beta reflects the firms' average debt tenor of 20 years, whereas the correct tenor should be equal to our benchmark tenor, 5 years. CEG therefore adjusts the equity beta used in de-levering by applying the following formula that accounts for debt beta.

$$\beta_a = L * \beta_d + (1 - L) * \beta_e \quad (5)$$

[824] Commerce Commission "Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision" (June 2023), para. 4.26, p. 63.

A30 Let β_d^T, β_e^T denote debt beta with T-year tenor and equity beta that reflects T-year tenor, respectively. Then CEG's adjustment is:

$$\beta_e^5 = \frac{\beta_a - L * \beta_d^5}{1 - L} = \frac{L * \beta_d^{20} + (1 - L) * \beta_e^{20} - L * \beta_d^5}{1 - L} \quad (6)$$

A31 Therefore, the difference between CEG's estimate and our estimate of the benchmark equity beta is:

$$\frac{L}{1 - L} * (\beta_d^{20} - \beta_d^5) \quad (7)$$

A32 Using CEG's assumptions, this difference amounts to $\frac{0.41}{1-0.41} * (0.12 - 0.02) = 0.069$. CEG concludes that our underestimate of the WACC is $0.069 * TAMRP * (1 - L) = 0.069 * 7\% * 0.59 = 0.29\%$ per annum.

A33 Dr Lally examines CEG's modelling and points out a number of problems which result in CEG significantly overestimating the WACC bias. Dr Lally shows that if CEG has used the Merton model correctly, then i) the debt term should be the remaining term to maturity of the bonds rather than their tenor; ii) terms to maturity for both the beginning and end of the regulatory period should be used, and iii) terms should be further corrected for duration. Correcting these errors in the CEG modelling, [825] the estimated WACC bias from our approach falls from 0.29% claimed by CEG to 0.08% calculated by Dr Lally.[826]

A34 We consider that Lally's analysis is reasonable, and his result of the WACC bias at 0.08% is much smaller in magnitude compared to CEG's claim. Previously we noted the practical difficulties of accurately estimating debt betas, which means that the net benefit from introducing debt betas to correct the untested WACC bias arising from the use of the simplified beta gearing model may be negligible. We note that in other areas we over-compensate regulated businesses using the promised yield on debt, which is higher than the expected return on debt, to determine the WACC.[827]

[825] Dr Lally has also identified other problems in the CEG modelling that are conceptually incorrect but do not materially affect the results.

[826] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of CEG's submission on the debt tenor anomaly" (report prepared for Commerce Commission, 6 September 2023).

[827] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of submissions on the risk-free rate and the cost of debt" (report prepared for Commerce Commission, 17 March 2023), Appendix 2.

Attachment B Additional information supporting our decision on the 10-year cap for the TCSD

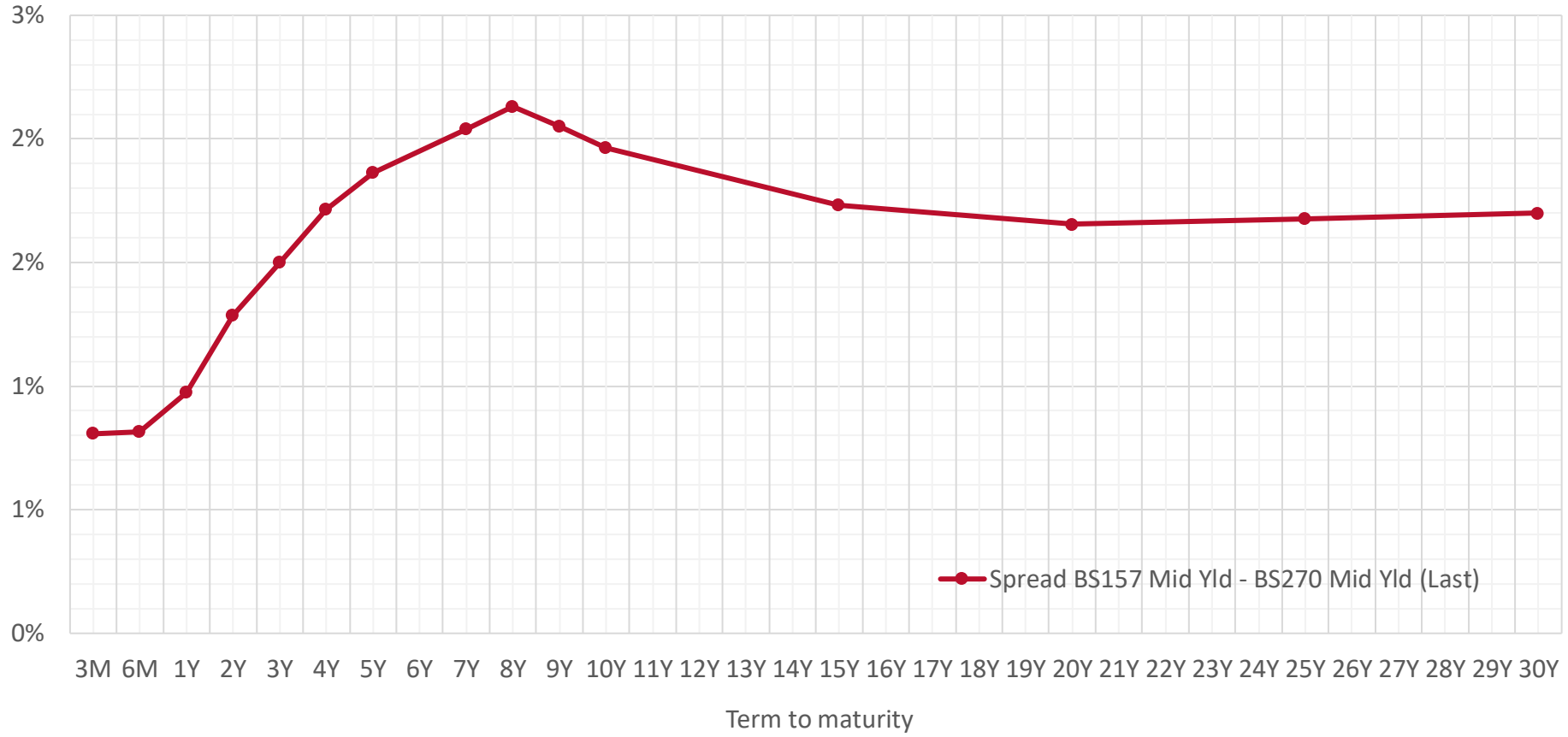
B1 We can look at the spread between the yields on bonds and the risk-free rate for different terms to maturity to get a sense of the credit spread (or debt premium). Figure B1 shows the credit spread of Australian corporate bonds for the BBB+, BBB and BBB- BVAL curve against the Australian government bond BVAL curve.[828] We can see that the spread for the corporate bonds with the same rating as our benchmark (BBB+) peaks at 8 years term to maturity and then decreases.

B2 We use Australian data to illustrate the shape of long-term credit spreads with a credit rating reflective of our benchmark because there is no equivalent curve for New Zealand corporate bonds. Relevant suppliers in New Zealand do not have bonds with terms to maturity long enough to observe the long-term credit spread.[829]

[828] Bloomberg does not publish an equivalent BVAL curve for the New Zealand corporate bond market, so we use the Australian market to demonstrate the shape of yield curve for relevant bonds.

[829] In the ID WACC determination for GPBs in July 2023, the bond in our debt premium sample with the longest tenor has a remaining term to maturity of 8.7 years. Transpower is not included in the sample as its credit rating is too high relative to our benchmark credit rating.

Figure B1 Australia Corporate BBB+, BBB, BBB- BVAL credit spread[830]



Source: Bloomberg

[830] Spread of AUD Australia Corporate BBB+, BBB, BBB- Bloomberg BVAL Yield Curve (mid yield) over AUD Australia Bills & Bonds Bloomberg BVAL Yield Curve (mid yield). Data as at 11 September 2023.

Attachment C Additional information on the convenience yield

C1 In considering Oxera's arguments, we first explain what Oxera meant by a convenience yield and how it affects our estimation of the WACC.

C1.1 According to Oxera, a convenience yield (or a convenience premium) is a wedge between returns on government bonds, [831] which we use as the proxy for the risk-free rate used in our WACC estimation, and a 'true' risk-free rate based on a zero-beta asset.

C1.2 Oxera does not provide details on this 'true' risk-free rate but refers to the highest-quality non-government bonds as a proxy. Oxera considers that the convenience yield was due to special properties of government bonds, including safety and liquidity.[832] These properties can create additional demand for government bonds and consequently drive down the yields on government bonds.

C1.3 Including the convenience yield in the risk-free rate will affect our estimation of the cost of equity (for both the risk-free rate term and the TAMRP in the SLB-CAPM formula), but not the cost of debt (the convenience yield in the risk-free rate for the cost of debt, and in the calculation of the debt premium, will cancel out).

C2 We address Oxera's three main points in further details below.

On Oxera's first point:

C3 We do not fully rely on practitioners in forming our own estimates. In the examples of Forsyth Barr's equity beta estimates, we only include those estimates as a reference together with beta estimates from other sources including other regulators in our cross check.

C4 Dr Lally confirms that he is not aware of any New Zealand practitioners using anything other than government bonds to proxy for the risk-free rate, and that the only public documents he could find on the matter are from PwC (2022) and Forsyth Barr (2010), [833],[834] and both firms use government bonds to proxy for the risk-free asset.

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[831] Oxera use these two terms interchangeably. For consistency we use the term 'convenience yield' in this memo.

[832] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), pp. 3, 13.

[833] PwC New Zealand "Cost of Capital Report 2022" (2022), p. 2.

[834] Forsyth Barr "Valuation Report 2010 – Transpower" (2010), Table 1, p. 3.

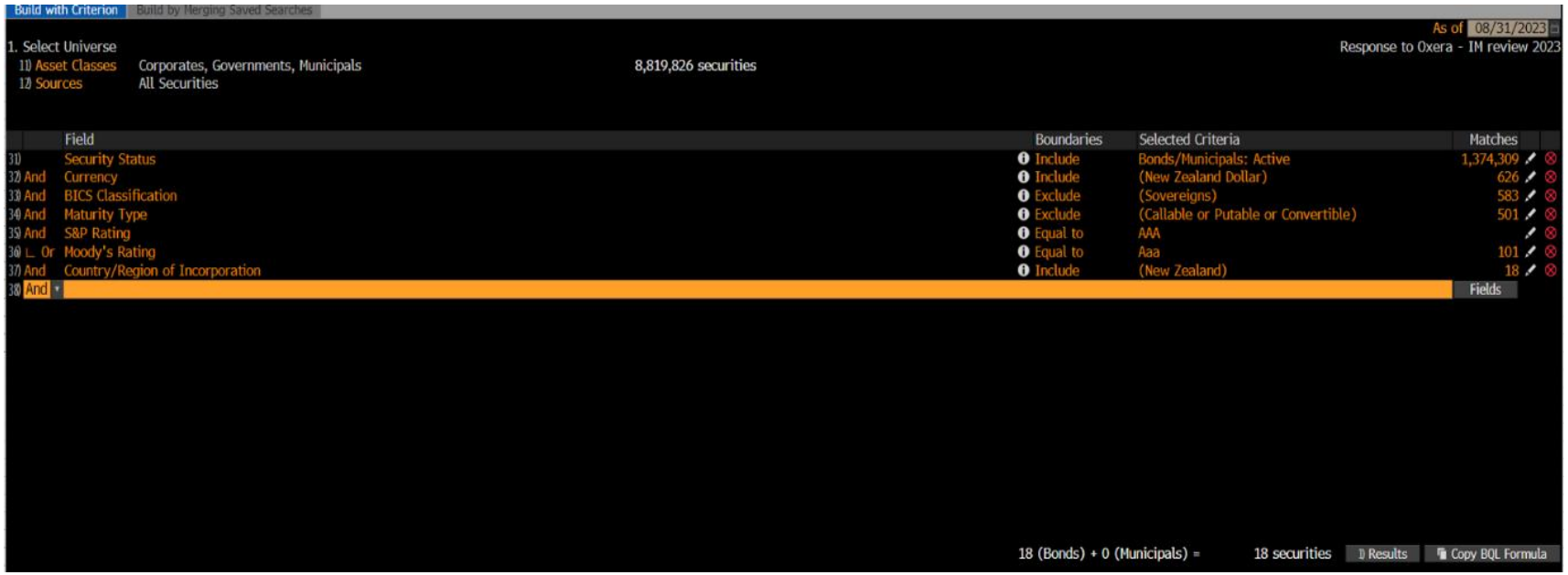
On Oxera's second point:

C5 Oxera claims that we should look at other bonds with the same credit rating and that there are 104 bonds so it would be practical to do so. We apply Oxera's filters but adding country of risk being New Zealand (one criteria for our corporate bond selection for estimating the debt premium) and find only 18 bonds instead of 104 bonds identified by Oxera.[835] Dr Lally notes that none of the 104 bonds identified by Oxera are New Zealand corporate bonds.[836]

[835] The 18 bonds are issued by New Zealand Local Government Funding Agency and Housing New Zealand Ltd.

[836] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of further submissions" (report prepared for Commerce Commission, 23 September 2023), p. 5.

Figure C1 Search criteria for AAA bonds



Source: data via Bloomberg

On Oxera's third point:

Theoretical ground

C6 We consider that for regulatory purposes, the key question is not about the existence of the convenience yield in principle (that is, it is not an academic debate), but whether government bond yields are a suitable proxy for the risk-free rate to be used for our WACC estimation.

C7 Oxera defines the convenience yield as the wedge between government bond yields and the 'true' risk-free rate, but does not explain what the 'true' risk-free rate is, nor explain why Oxera's preferred proxy, ie, the highest quality non-government bond yields represents the 'true' risk-free rate.

C8 Oxera simply cites academic papers to argue for the existence of the convenience yield. But the existence of the convenience yield simply means that, in some cases, there is a difference between yields on government bond and highly rated (AAA) corporate bonds. It does not say anything about which one is a better proxy for the risk-free rate.

C9 The academic papers cited by Oxera all use different proxies for the risk-free rate[837] (and none uses Oxera's preferred proxy) which indicates that the literature has not settled on the 'correct' proxy. Furthermore, yields of government bonds/bills are still the mainstream proxy for the risk-free rate in standard finance texts.[838] The lack of consensus among academics and the minority use of proxies other than government bond yields indicate that these alternative proxies may not be suitable for the regulatory use.

C10 Our view is aligned with the mainstream academics and majority of regulators to use government bond yields as the proxy for the risk-free rate. We consider that the 'safety and liquidity' features of government bonds are compatible with the risk-free asset in the standard Sharpe Lintner CAPM (SL-CAPM). Below we summarize the key assumptions of the SL-CAPM and the properties of the risk-free rate in the SL-CAPM.

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[837] The proxies used in these papers include Baa bond yields, swap rates, put and call prices on the S&P index, or REFCORP bond yields.

[838] See for example, Armitage "The Cost of Capital Intermediate Theory" (2005) Cambridge, pp. 278-281. Brealey, Myers and Allen "Principles of Corporate Finance" (2017) 12th Edition, McGraw-Hill, pp. 206, 228. Cochrane "Asset Pricing" (2005) Revised Edition, Princeton University Press, pp. 21, 456-457. Damodaran "Investment Valuation University Edition Tools and Techniques for Determining the Value of Any Asset" (2012) Wiley, pp. 154-157. Danthine and Donaldson "Intermediate Financial Theory: Third Edition" (2015), pp. 470, 485. Jones "Financial Economics" (2008) Routledge, pp. 57, 104. Porras "The Cost of Capital" (2011) Palgrave, pp. 19, 74. Pratt and Grabowski "Cost of Capital: Applications and Examples" (2014) Wiley, Chapter 7.

C10.1 The SL-CAPM is a theoretical asset pricing model developed by Sharpe (1964) and Lintner (1965),[839],[840] extending Markowitz's portfolio choice theory. The SL-CAPM has three key assumptions.

C10.1.1 Investors choose mean-variance efficient portfolios.

C10.1.2 There is borrowing and lending at the risk-free rate.

C10.1.3 Investors have complete agreement about distributions of returns ("homogeneous expectations").

C10.2 Sharpe (1964) defines the risk-free rate as the 'price of time', which is exogenous in the SL-CAPM. The risk-free rate has the following properties.

C10.2.1 It has zero variance.

C10.2.2 It has zero covariance with any risky asset or the market portfolio, ie, it has zero beta.

C11 The 'safety' feature of the risk-free asset is clear from C10.2. We note that underlying the second and third assumption is the assumption of perfect and frictionless capital markets with no transaction costs. This implies that liquidity is also a desirable feature of the risk-free asset, as illiquidity will raise the transaction cost and violates the assumption of perfect and frictionless markets.

C12 Oxera does not explain what 'safety' means. We find a reference in Krishnamurthy and Vissing-Jorgensen's (2012) definition of the convenience yield (the paper was cited by Oxera):[841], [842]

> Money is a medium of exchange for buying goods and services, has high liquidity, and has extremely high safety in the sense of offering absolute security of nominal repayment. Investors value these attributes of money and drive down the yield on money relative to other assets.
>
> We argue that a similar phenomenon affects the prices of Treasury bonds. The high liquidity and safety of Treasuries drive down the yield on Treasuries relative to assets that do not to the same extent share these attributes.

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[839] Sharpe "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk" (1964) Journal of Finance, vol. 19(3), pp. 425-442.

[840] Lintner "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets" (1965) The Review of Economics and Statistics, vol. 47(1), pp. 13-37.

[841] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), p. 63.

[842] Krishnamurthy and Vissing-Jorgensen "The Aggregate Demand for Treasury Debt" (2012) *Journal of Political Economy*, vol. 120(2), p. 234.

C13 The 'safety' feature in in Krishnamurthy and Vissing-Jorgensen's paper suggests that government bonds have guaranteed expected (nominal) returns. This fits exactly into a risk-free asset in the SL-CAPM. Indeed, the highest quality non-government bonds lack this feature (which Oxera recognized in their previous submission[843]) and should not be used as a proxy for the risk-free rate.

C14 Similarly, the 'liquidity' feature of government bonds makes them a more suitable proxy for the risk-free rate than the highest quality non-government bonds which lack this feature.[844]

C15 Oxera cites Feldhütter and Lando (2008) for a number of features of government bonds other than 'safety and liquidity' that give rise to the convenience yield.[845] We note that the return on the risk-free asset is exogenous in the SL-CAPM and any factors that affect this return are irrelevant to the model. Therefore, government bonds possessing those special features (and having lower returns compared to highly rated corporate bonds) is not grounds for disqualifying them as the proxy for the risk-free asset. Dr Lally further points out that Oxera offers no evidence that these features of US Treasury rates apply to New Zealand government bonds.[846]

Empirical evidence and implementation issues

C16 Oxera attributes the convenience yield to a demand-supply condition in the market (excess demand of government bonds driving down their yields). But demand-supply conditions can vary over time. For example, the Australian Energy Regulator (AER)'s research finds that:[847]

> the estimated convenience yield is highly time varying and as observed may have switched sign since 2015. An estimate of the convenience or inconvenience yield may therefore not be robust to different sample periods chosen.

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[843] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), p. 14.

[844] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), p. 14.

[845] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), p. 63.

[846] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of further submissions" (report prepared for Commerce Commission, 23 September 2023), p. 6.

[847] AER "Term of the rate of return & Rate of return and cashflows in a low interest rate environment. Final working paper" (September 2021), Table A.1, pp. 170-173.

C17 Obtaining an accurate and robust estimate of the magnitude of convenience yield is difficult in practice.

C17.1 The estimate of the convenience yield depends on the choice of the alternative proxy for the 'true' risk-free rate, but there is no consensus on the 'correct' proxy in academic literature. This means that not only the accuracy of the convenience yield estimate is in doubt, but the estimates based on different alternative proxies may not even be comparable as a reference.

C17.2 The size of the estimated convenience yield is highly time varying, which is reported in Binsbergen et al. (2019)[848] and the AER's research on the convenience yield.[849] Indeed, Oxera in its own submission cited empirical findings which has a wide range of estimated values.[850]

C17.3 The AER noted:[851]

> The potential non-stationarity of the estimated convenience yield, including its potential to switch sign, may present particular challenges for its forward-looking estimation if conditions which give rise to the time variation are expected to change relative to the sample period used for its historical estimate.

C18 Dr Lally highlights serious data issues with Oxera's proposal of using the AAA corporate bond yields as a proxy for the risk-free rate, as the data is not available over the entire period for which the TAMRP has been estimated. Dr Lally also examines academic papers cited by Oxera and found similar practical issues of applying alternative proxies advocated in those papers in the New Zealand regulatory context, for example, the results have no relevance to New Zealand or New Zealand data are not available.[852]

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[848] Binsbergen, Diamond and Grotteria "Risk-Free Interest Rates" (2019) NBER Working Paper 26138, p. 1.

[849] AER "Term of the rate of return & Rate of return and cashflows in a low interest rate environment. Final working paper" (September 2021), p. 163.

[850] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), pp. 63-64.

[851] AER "Term of the rate of return & Rate of return and cashflows in a low interest rate environment. Final working paper" (September 2021), p. 181.

[852] Dr Martin Lally "Review of submissions on the risk-free rate and the cost of debt" (report prepared for Commerce Commission, 17 March 2023), pp. 7-11.

C19 Oxera does not dispute the implementation issues raised by Dr Lally but proposes "adopting pragmatic approaches to estimating the convenience yield".[853] Dr Lally notes that Oxera's proposal lacks implementation details and does not address the concerns raised in Lally (2023)[854]. We consider that the practical difficulty of obtaining an accurate and robust estimate of the convenience yield makes Oxera's proposal unsuitable for regulatory purposes.

Regulatory precedents

C20 Oxera cites two regulators in Europe that adopt the convenience yield in estimating the risk-free rate, ARERA[855] and BNetzA, and notes that "The logic behind looking into the convenience yield is … the special safety and liquidity characteristics of government bonds—which may be heightened when there is macroeconomic stability."[856] We have explained that we do not agree with Oxera on this reasoning.

C21 Oxera also cites the UK Competition and Markets Authority (CMA) on the use of the AAA bonds:[857]

> Indeed, the use of AAA bonds was proposed as a pragmatic implementation to account for the convenience yield, which was adopted by the Competition and Markets Authority (CMA) in the PR19 appeals in the UK.

[853] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), p. 13.

[854] Commerce Commission "Input methodologies review 2023 -Dr Martin Lally "Review of submissions on the risk-free rate and the cost of debt" (report prepared for Commerce Commission, 17 March 2023).

[855] Oxera was the consultant that ARERA used on the methodology in which Oxera recommended a convenience yield.

[856] Oxera "Review of the NZ Commission's WACC setting methodology" 'Submission on IM Review CEPA report on cost of capital' (report prepared for 'Big Six' EDBs, 3 February 2023), p. 4.

[857] Oxera "Response to Commission's draft decision for IM Review 2023 on the cost of capital" (report prepared for 'Big 6' EDBs', 19 July 2023), p. 12.

C22 We note that following the CMA's decision to allow for AAA-rated bonds to be used for PR19, some stakeholders argued against the use of AAA-rated corporate bonds which was raised in a review of the cost of equity for the UK Gas and Electricity Markets Authority (GEMA). The CMA concluded:[858]

> On balance, we do not consider that either the CMA's PR19 approach or GEMA's approach of just using ILG [government bond] yields, can be said to be the clearly 'superior' one. In our view, these are two approaches which have a logical theoretical underpinning and are consistent with good regulatory principles. We note that GEMA's analysis shows that, under certain assumptions, the difference between the two may have a negligible effect on the cost of equity.

C23 We have explained that we do not consider the AAA corporate bonds is a better proxy for the risk-free asset than government bonds with respect to the safety and liquidity features.

C24 In Australia, Commonwealth Government Security (CGS) bonds are also commonly used by other Australian regulators and market practitioners to determine the risk-free rate. The Economic Regulation Authority (ERA), in discussing the risk-free rate for the cost of equity for its recent final gas rate of return instrument, stated:[859]

> Regarding the most appropriate proxy instrument for the risk free rate for equity, the ERA considers that observed yields from Commonwealth Government Security bonds are the best proxy for risk free assets in Australia as they are:
>
> • essentially free from default risk
>
> • relatively liquid
>
> • transparently and regularly reported.

C25 The AER also explicitly rejected the use of the convenience yield based on reasons similar to ours in this Final Decision.[860]

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[858] Competition & Markets Authority "Cadent Gas Limited, National Grid Electricity Transmission plc, National Grid Gas plc, Northern Gas Networks Limited, Scottish Hydro Electric Transmission plc, Southern Gas Networks plc and Scotland Gas Networks plc, SP Transmission plc, Wales & West Utilities Limited vs the Gas and Electricity Markets Authority – Final determination Volume 2A: Joined Grounds: Cost of equity" (28 October 2021), para 5.106.

[859] Economic Regulation Authority "Explanatory statement for the 2022 final gas rate of return instrument" (16 December 2022), paras 682-683.

[860] AER "Term of the rate of return & Rate of return and cashflows in a low interest rate environment. Final working paper" (September 2021), p. 77.

Attachment D Airport comparator sample (Cost of capital Equity beta)

Table D1 Indicators for selecting firms in the airport comparator sample[861, 862]

Ticker	Name	Asset beta variability		Bid-ask spread	Free float %	Leverage (2007-20)	Leverage (2012-17, 2017-22)	Country classification
		2012-2017	2017-2022					
Companies INCLUDED in our comparator sample								
357 HK Equity	Hainan Meilan International Airport	0.02	0.00	0.63	77.31	0.03	0.20	Developed
694 HK Equity	Beijing Capital International Airport	0.14	0.01	0.33	100.00	0.27	0.21	Developed
ADP FP Equity	Aeroports de Paris	0.02	0.02	0.10	36.06	0.25	0.28	Developed
AENA SM Equity	AENA	NA	0.05	0.08	46.06	0.04	0.24	Developed
AIA NZ Equity	Auckland International Airport	0.07	0.08	0.11	81.89	0.23	0.18	Developed
AOT TB Equity	Airports of Thailand	0.02	0.10	0.36	28.35	0.15	-0.01	Advanced emerging
FHZN SW Equity	Flughafen Zurich	0.09	0.00	0.12	61.49	0.21	0.16	Developed
FRA GR Equity	Fraport	0.01	0.01	0.15	39.85	0.38	0.46	Developed
SYD AU Equity	Sydney Airport	0.09	0.03	NA	NA	0.43	0.37	Developed

[861] The original asset beta comparator sample was recommended by CEPA. We have subsequently assessed and taken into account views from submissions in reaching our final comparator sample for estimating the asset beta and leverage.

[862] Leverage is the average pre-Covid leverage, beta estimate variation is the difference between the maximum and minimum asset beta across the weekly and four-weekly frequencies, bid-ask spread and free float are from Bloomberg.

Ticker	Name	Asset beta variability		Bid-ask spread	Free float %	Leverage (2007-20)	Leverage (2012-17, 2017-22)	Country classification
		2012-2017	2017-2022					
Companies EXCLUDED in our comparator sample								
000089 CH Equity	Shenzen Airport	0.06	0.19	0.14	42.17	-0.04	0.01	Secondary emerging
600004 CH Equity	Guangzhou Baiyun International	0.02	0.12	0.09	42.43	-0.04	-0.05	Secondary emerging
600009 CH Equity	Shanghai International Airport	0.08	0.31	0.03	32.17	-0.06	-0.09	Secondary emerging
600897 CH Equity	Xiamen International Airport	0.02	0.21	0.10	28.86	-0.12	-0.21	Secondary emerging
ACV VN Equity	Airports Corporation of Vietnam	NA	0.05	0.63	4.59	-0.01	-0.09	Frontier
ADB IM Equity	Aeroporto Guglielmo Marconi di Bologna	NA	0.19	1.17	21.52	0.00	0.03	Developed
ASURB MM Equity	Grup Aeroportuario del Sureste	0.07	0.06	0.15	40.90	-0.01	0.05	Advanced emerging
FLU AV Equity	Flughafen Wien	0.08	0.05	0.77	10.00	0.29	0.18	Developed
GAPB MM Equity	Grupo Aeroportuario del Pacifico	0.03	0.03	0.14	87.60	0.00	0.04	Advanced emerging
GMRI IN Equity	GMR Infrastructure	0.06	0.06	0.11	35.37	0.60	0.71	Secondary emerging
KBHL DC Equity	Kobenhavns Lufthavne	0.07	0.04	1.14	1.40	0.16	0.15	Developed

Ticker	Name	Asset beta variability		Bid-ask spread	Free float %	Leverage (2007-20)	Leverage (2012-17, 2017-22)	Country classification
		2012-2017	2017-2022					
MAHB MK Equity	Malaysia Airports	0.27	0.23	0.18	37.55	0.15	0.27	Advanced emerging
MIA MV Equity	Malta International Airport	0.52	0.27	NA	69.90	0.10	0.04	Frontier
OMAB MM Equity	Grup Aeroportuario del Norte	0.26	0.13	0.14	80.59	0.04	0.05	Advanced emerging
TYA IM Equity	Toscana Aeroporti	0.19	0.10	2.64	26.90	0.08	0.14	Developed

Table D2 Asset betas for airport comparator sample by period and frequency

	2007-2012	2012-2017	2017-2022	2018-2020	2020-2022
Daily	0.57	0.6	0.78	0.67	0.82
Weekly	0.64	0.6	0.86	0.68	0.94
Four-weekly	0.74	0.61	0.85	0.62	0.91
Average (weekly and 4 weekly)	0.69	0.6	0.85	0.65	0.92

Table D3

Table D4 Asset betas for airport comparator sample by firm, period and frequency

Airport sample	Name	2007-2012			2012-2017			2017-2022		
		Daily	Weekly	4-Weekly	Daily	Weekly	4-Weekly	Daily	Weekly	4-Weekly
357 HK Equity	Hainan Meilan International Airport	0.74	0.96	1.51	0.52	0.51	0.49	0.91	1.01	1.02
694 HK Equity	Beijing Capital International Airport	0.63	0.68	0.62	0.48	0.50	0.64	0.65	0.83	0.82
ADP FP Equity	Aeroports de Paris	0.58	0.62	0.57	0.40	0.41	0.43	0.70	0.85	0.83
AENA SM Equity	AENA	NA	NA	NA	NA	NA	NA	0.78	0.79	0.84

AIA NZ Equity	Auckland International Airport	0.76	0.69	0.67	1.00	0.97	0.90	1.01	1.06	0.99
AOT TB Equity	Airports of Thailand	0.55	0.63	0.75	1.21	1.22	1.20	1.26	1.11	1.00
FHZN SW Equity	Flughafen Zurich	0.35	0.53	0.65	0.51	0.54	0.62	0.70	0.86	0.86
FRA GR Equity	Fraport	0.51	0.59	0.60	0.32	0.34	0.33	0.46	0.57	0.58
SYD AU Equity	Sydney Airport	0.44	0.41	0.50	0.40	0.33	0.24	0.52	0.70	0.67
Average		0.57	0.64	0.74	0.60	0.60	0.61	0.78	0.86	0.85

Attachment E Energy comparator sample (Cost of capital Equity beta)

Table E1 Indicators for selecting firms in the energy comparator sample[863,864]

Ticker	Name	Asset beta variability		Bid-ask spread	Free float %	Leverage	
		2012-2017	2017-2022			2007-2020	Average 2012-17,2017-22
AEE US Equity	Ameren Corporation	0.02	0.05	0.04%	99.36	0.44	0.38
AEP US Equity	American Electric Power	0.04	0.04	0.03%	99.86	0.45	0.42
AES US Equity	AES Corp	0.04	0.01	0.04%	97.90	0.66	0.65
ALE US Equity	Allete Inc	0.02	0.04	0.16%	99.57	0.32	0.33
APA AU Equity	APA Group	0.04	0.03	NA	NA	0.51	0.45
AST AU Equity	Ausnet Services Ltd	0.05	0.06	NA	NA	0.58	0.54
ATO US Equity	Atmos Energy Corp	0.04	0.04	0.08%	99.65	0.37	0.31
AVA US Equity	Avista Corp	0.02	0.02	0.08%	98.97	0.44	0.42

[863] The original asset beta comparator sample was recommended by CEPA. We have subsequently assessed and taken into account views from submissions in reaching our final comparator sample for estimating the asset beta and leverage.

[864] Leverage is the average pre-Covid leverage (2007-2020), beta estimate variation is the difference between the maximum and minimum asset beta across the weekly and four-weekly frequencies, bid-ask spread and free float are from Bloomberg.

Ticker	Name	Asset beta variability		Bid-ask spread	Free float %	Leverage	
		2012-2017	2017-2022			2007-2020	Average 2012-17,2017-22
BKH US Equity	Black Hills Corp	0.07	0.08	0.13%	99.37	0.45	0.45
CMS US Equity	CMS Energy Corp	0.06	0.06	0.04%	99.50	0.52	0.45
CNA LN Equity	Centrica PLC	0.11	0.10	0.11%	99.99	0.23	0.29
CNP US Equity	Centerpoint Energy Inc	0.05	0.01	0.04%	99.57	0.50	0.45
D US Equity	Dominion Energy Inc	0.06	0.02	0.03%	99.82	0.40	0.39
DTE US Equity	DTE Energy Company	0.06	0.00	0.05%	88.09	0.44	0.40
DUE AU Equity	DUET	0.06	NA	NA	NA	0.54	0.58
DUK US Equity	Duke Energy Corp	0.04	0.03	0.03%	99.81	0.43	0.46
ED US Equity	Consolidated Edison Inc	0.06	0.04	0.03%	99.85	0.42	0.42
EIX US Equity	Edison International	0.00	0.01	0.05%	99.91	0.41	0.42
ES US Equity	Eversource Energy	0.03	0.06	0.03%	99.01	0.43	0.38
ETR US Equity	Entergy Corp	0.00	0.03	0.06%	99.58	0.47	0.51
EVRG US Equity	Evergy Inc	NA	0.04	0.06%	98.59	0.07	0.41
EXC US Equity	Exelon Corp	0.02	0.05	0.03%	98.85	0.38	0.45
FE US Equity	First Energy Corp	0.07	0.05	0.03%	94.88	0.53	0.55

Ticker	Name	Asset beta variability		Bid-ask spread	Free float %	Leverage	
		2012-2017	2017-2022			2007-2020	Average 2012-17,2017-22
HE US Equity	Hawaiiian Electric Inds	0.00	0.07	0.09%	99.23	0.22	0.12
IDA US Equity	IDACorp Inc	0.01	0.01	0.16%	99.25	0.38	0.30
KMI US Equity	Kinder Morgan Inc	0.14	0.02	0.06%	87.39	0.43	0.46
LNT US Equity	Alliant Energy Corp	0.01	0.02	0.04%	99.78	0.35	0.35
NEE US Equity	Nextera Energy Inc	0.04	0.03	0.02%	99.75	0.39	0.33
NFG US Equity	National Fuel Gas Co	0.07	0.01	0.10%	98.59	0.24	0.29
NG/ LN Equity	National Grid PLC	0.01	0.02	0.06%	99.96	0.47	0.45
NI US Equity	NiSource Inc	0.12	0.07	0.04%	99.52	0.53	0.48
NJR US Equity	New Jersey Resources Corp	0.08	0.07	0.11%	99.40	0.27	0.31
NWE US Equity	NorthWestern Energy Group Inc	0.02	0.09	0.13%	98.73	0.44	0.42
OGE US Equity	OGE Energy Corp	0.03	0.04	0.05%	99.58	0.35	0.33
OGS US Equity	One Gas Inc	0.17	0.04	0.13%	98.20	0.18	0.33
OKE US Equity	OneOK Inc	0.14	0.14	0.04%	99.33	0.43	0.39
PCG US Equity	PG&E Corp	0.03	0.02	0.06%	90.40	0.41	0.48
PEG US Equity	Public Service Enterprise Gp	0.04	0.00	0.02%	99.80	0.33	0.34

Ticker	Name	Asset beta variability		Bid-ask spread	Free float %	Leverage	
		2012-2017	2017-2022			2007-2020	Average 2012-17,2017-22
PNM US Equity	PNM Resources Inc	0.07	0.04	0.03%	98.60	0.54	0.48
PNW US Equity	Pinnacle West Capital	0.04	0.10	0.08%	99.68	0.40	0.38
POR US Equity	Portland General Electric Co	0.05	0.03	0.07%	99.37	0.43	0.40
PPL US Equity	PPL Corp	0.04	0.01	0.04%	97.72	0.44	0.45
SJI US Equity	South Jersey Industries	0.00	0.04	NA	99.46	0.36	0.43
SO US Equity	Southern Co	0.07	0.04	0.02%	98.93	0.41	0.42
SR US Equity	Spire Inc	0.04	0.06	0.15%	96.99	0.37	0.41
SRE US Equity	Sempra Energy	0.02	0.05	0.07%	99.96	0.38	0.38
SSE LN Equity	SSE PLC	0.06	0.04	0.06%	99.94	0.31	0.33
SWX US Equity	Southwest Gas Holdings Inc	0.02	0.13	0.14%	96.43	0.39	0.38
VCT NZ Equity	Vector Ltd	0.01	0.03	0.45%	24.89	0.48	0.44
WEC US Equity	WEC Energy Group Inc	0.11	0.06	0.04%	99.84	0.37	0.34
XEL US Equity	Excel Energy Inc	0.04	0.05	0.02%	99.74	0.43	0.41

Ticker	Name	Asset beta variability		Bid-ask spread	Free float %	Leverage	
		2012-2017	2017-2022			2007-2020	Average 2012-17,2017-22
AGR US Equity	Avangrid Inc	0.16	0.02	0.09%	18.30	0.16	0.29
CPK US Equity	Chesepeake Utilities Corp	0.07	0.00	0.50%	96.98	0.28	0.27
MGEE US Equity	MGE Energy Inc	0.11	0.12	0.39%	99.74	0.21	0.17
NWN US Equity	Northwest Natural Holding Co	0.07	0.04	0.21%	98.81	0.36	0.38
RGCO US Equity	RGC Resources Inc	0.02	0.13	2.50%	79.39	0.24	0.29
SKI AU Equity	Spark Infrastructure Group	0.02	0.01	NA	NA	0.33	0.23
UTL US Equity	Unitil Corp	0.03	0.12	0.78%	98.10	0.46	0.41

Table E2 Asset betas for energy comparator sample by period and frequency

	2007-2012	2012-2017	2017-2022	2018-2020	2020-2022
Daily	0.38	0.38	0.41	0.23	0.45
Weekly	0.35	0.35	0.4	0.21	0.46
Four-weekly	0.33	0.31	0.37	0.17	0.35
Average (weekly- and four-weekly)	0.34	0.33	0.38	0.19	0.41

Table E3 Asset betas for energy comparator sample by firm, period and frequency

Ticker	Firm name	2007-2012			2012-2017			2017-2022		
		Daily	Weekly	4-Weekly	Daily	Weekly	4-Weekly	Daily	Weekly	4-Weekly
AEE US Equity	Ameren Corporation	0.37	0.36	0.36	0.33	0.30	0.32	0.40	0.34	0.29
AEP US Equity	American Electric Power	0.32	0.30	0.28	0.32	0.27	0.23	0.30	0.30	0.27
AES US Equity	AES Corp	0.45	0.44	0.47	0.33	0.37	0.33	0.39	0.44	0.44
ALE US Equity	Allete Inc	0.42	0.41	0.45	0.40	0.37	0.35	0.52	0.45	0.41
APA AU Equity	APA Group	0.27	0.22	0.27	0.41	0.37	0.41	0.33	0.34	0.31
AST AU Equity	Ausnet Services Ltd	0.16	0.12	0.10	0.30	0.29	0.34	0.15	0.09	0.04
ATO US Equity	Atmos Energy Corp	0.33	0.32	0.31	0.41	0.37	0.33	0.44	0.39	0.35
AVA US Equity	Avista Corp	0.34	0.34	0.35	0.36	0.31	0.29	0.36	0.27	0.25
BKH US Equity	Black Hills Corp	0.45	0.43	0.50	0.49	0.41	0.47	0.41	0.40	0.33
CMS US Equity	CMS Energy Corp	0.26	0.25	0.22	0.27	0.23	0.17	0.31	0.29	0.22
CNA LN Equity	Centrica PLC	0.53	0.44	0.41	0.61	0.64	0.75	0.67	0.73	0.82
CNP US Equity	Centerpoint Energy Inc	0.28	0.30	0.27	0.43	0.42	0.38	0.47	0.55	0.54

D US Equity	Dominion Energy Inc	0.36	0.33	0.28	0.32	0.30	0.24	0.38	0.31	0.29
DTE US Equity	DTE Energy Company	0.32	0.33	0.32	0.33	0.26	0.21	0.41	0.43	0.43
DUE AU Equity	DUET	0.13	0.12	0.15	0.18	0.16	0.22	NA	NA	NA
DUK US Equity	Duke Energy Corp	0.33	0.30	0.27	0.25	0.19	0.15	0.31	0.29	0.26
ED US Equity	Consolidated Edison Inc	0.27	0.24	0.21	0.21	0.13	0.07	0.27	0.21	0.17
EIX US Equity	Edison International	0.41	0.40	0.36	0.29	0.26	0.26	0.39	0.43	0.42
ES US Equity	Eversource Energy	0.30	0.30	0.28	0.31	0.26	0.22	0.39	0.37	0.32
ETR US Equity	Entergy Corp	0.37	0.32	0.31	0.26	0.23	0.23	0.34	0.36	0.33
EVRG US Equity	Evergy Inc	NA	NA	NA	NA	NA	NA	0.42	0.39	0.34
EXC US Equity	Exelon Corp	0.57	0.52	0.41	0.34	0.26	0.25	0.44	0.43	0.38
FE US Equity	First Energy Corp	0.37	0.33	0.27	0.23	0.20	0.12	0.34	0.31	0.26
HE US Equity	Hawaiiian Electric Inds	0.38	0.44	0.42	0.46	0.40	0.40	0.56	0.40	0.33
IDA US Equity	IDACorp Inc	0.35	0.33	0.30	0.43	0.38	0.39	0.47	0.41	0.41
KMI US Equity	Kinder Morgan Inc	0.40	0.39	0.48	0.64	0.77	0.63	0.49	0.55	0.53
LNT US Equity	Alliant Energy Corp	0.45	0.44	0.40	0.38	0.33	0.31	0.38	0.39	0.36
NEE US Equity	Nextera Energy Inc	0.39	0.37	0.33	0.33	0.29	0.25	0.52	0.55	0.51
NFG US Equity	National Fuel Gas Co	0.81	0.84	0.83	0.66	0.71	0.63	0.43	0.41	0.41
NG/ LN Equity	National Grid PLC	0.28	0.24	0.23	0.37	0.38	0.39	0.32	0.26	0.24
NI US Equity	NiSource Inc	0.31	0.31	0.31	0.36	0.36	0.24	0.34	0.34	0.26
NJR US Equity	New Jersey Resources Corp	0.50	0.43	0.28	0.50	0.43	0.35	0.56	0.50	0.44
NWE US Equity	NorthWestern Energy Group Inc	0.35	0.34	0.33	0.36	0.29	0.27	0.44	0.37	0.28
OGE US Equity	OGE Energy Corp	0.48	0.46	0.47	0.53	0.55	0.52	0.45	0.52	0.48

OGS US Equity	One Gas Inc	NA	NA	NA	0.46	0.37	0.20	0.47	0.37	0.33
OKE US Equity	OneOK Inc	0.49	0.50	0.54	0.74	0.76	0.62	0.84	1.03	1.17
PCG US Equity	PG&E Corp	0.32	0.24	0.24	0.31	0.27	0.30	0.36	0.45	0.47
PEG US Equity	Public Service Enterprise Gp	0.52	0.45	0.37	0.40	0.33	0.30	0.41	0.49	0.49
PNM US Equity	PNM Resources Inc	0.35	0.38	0.40	0.34	0.29	0.22	0.37	0.37	0.33
PNW US Equity	Pinnacle West Capital	0.32	0.33	0.32	0.35	0.34	0.31	0.39	0.39	0.29
POR US Equity	Portland General Electric Co	0.33	0.35	0.33	0.35	0.29	0.23	0.42	0.35	0.38
PPL US Equity	PPL Corp	0.40	0.33	0.29	0.30	0.27	0.23	0.41	0.46	0.46
SJI US Equity	South Jersey Industries	0.48	0.39	0.29	0.42	0.40	0.40	0.37	0.31	0.28
SO US Equity	Southern Co	0.27	0.21	0.20	0.23	0.18	0.11	0.36	0.35	0.31
SR US Equity	Spire Inc	0.45	0.34	0.16	0.32	0.29	0.25	0.38	0.30	0.23
SRE US Equity	Sempra Energy	0.47	0.46	0.43	0.42	0.41	0.43	0.44	0.49	0.45
SSE LN Equity	SSE PLC	0.41	0.37	0.32	0.52	0.53	0.46	0.56	0.54	0.49
SWX US Equity	Southwest Gas Holdings Inc	0.45	0.41	0.41	0.44	0.38	0.36	0.43	0.38	0.25
VCT NZ Equity	Vector Ltd	0.21	0.18	0.26	0.30	0.29	0.28	0.27	0.27	0.30
WEC US Equity	WEC Energy Group Inc	0.29	0.27	0.24	0.33	0.23	0.12	0.36	0.30	0.23
XEL US Equity	Excel Energy Inc	0.29	0.25	0.23	0.28	0.22	0.18	0.36	0.32	0.26
Average		0.38	0.35	0.33	0.38	0.35	0.31	0.41	0.40	0.37

Table E4 Results of test of whether there is a statistically significant difference between the means of the gas and non-gas samples (p-values)[865]

	2007-12	2012-17	2017-22	2018-20	2020-22	2021-22
Daily	0.219	0.019*	0.040*	0.002**	0.182	0.259
Weekly	0.329	0.024*	0.120	0.002**	0.387	0.324
Four-weekly	0.342	0.029*	0.164	0.012*	0.223	0.999

Table E5 Results of test of whether there is a statistically significant difference between the means of the gas and non-gas samples (p-values) excluding ONEOK

	2007-12	2012-17	2017-22	2018-20	2020-22	2021-22
Daily	0.305	0.040*	0.051	0.001**	0.372	0.410
Weekly	0.463	0.051	0.196	0.002**	0.915	0.491
Four-weekly	0.511	0.062	0.313	0.020*	0.443	0.777

[865] The values reported in this table are p-values. A p-value is a measure of evidence against the null hypothesis. In this case, the null hypothesis is that there is no significant difference between the means of the gas and non-gas samples. A single asterisk indicates there is evidence against the null hypothesis at the 0.05 level of significance; two asterisks indicate evidence at the 0.01 level of significance; three asterisks indicate evidence at the 0.001 level of significance. The more asterisks there are, the more confidence can be placed on a conclusion that the gas sample can be separated from the non-gas sample. It is common practice to use at least one asterisk as the level of evidence required to be confident that the means of two samples are statistically different. These results are generated using the t.test function in the package R.

Table E6 **Results of test of whether there is a statistically significant difference between the means of the gas and electricity samples (p-values)**

	2007-12	2012-17	2017-22	2018-20	2020-22	2021-22
Daily	0.276	0.016*	0.132	0.001**	0.694	0.432
Weekly	0.513	0.023*	0.220	0.001**	0.752	0.605
Four-weekly	0.621	0.031*	0.249	0.003**	0.578	0.560

Table E7 **Results of test of whether there is a statistically significant difference between the means of the electricity and non-electricity samples (p-values)**

	2007-12	2012-17	2017-22	2018-20	2020-22	2021-22
Daily	0.732	0.098	0.755	0.027*	0.255	0.794
Weekly	0.743	0.121	0.887	0.006**	0.286	0.522
Four-weekly	0.494	0.219	0.922	0.001**	0.443	0.199