Response to the New Zealand Commerce Commission's draft decision for Part 4 Input Methodologies Review 2023 on the cost of capital

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Prepared for the New Zealand electricity distribution businesses

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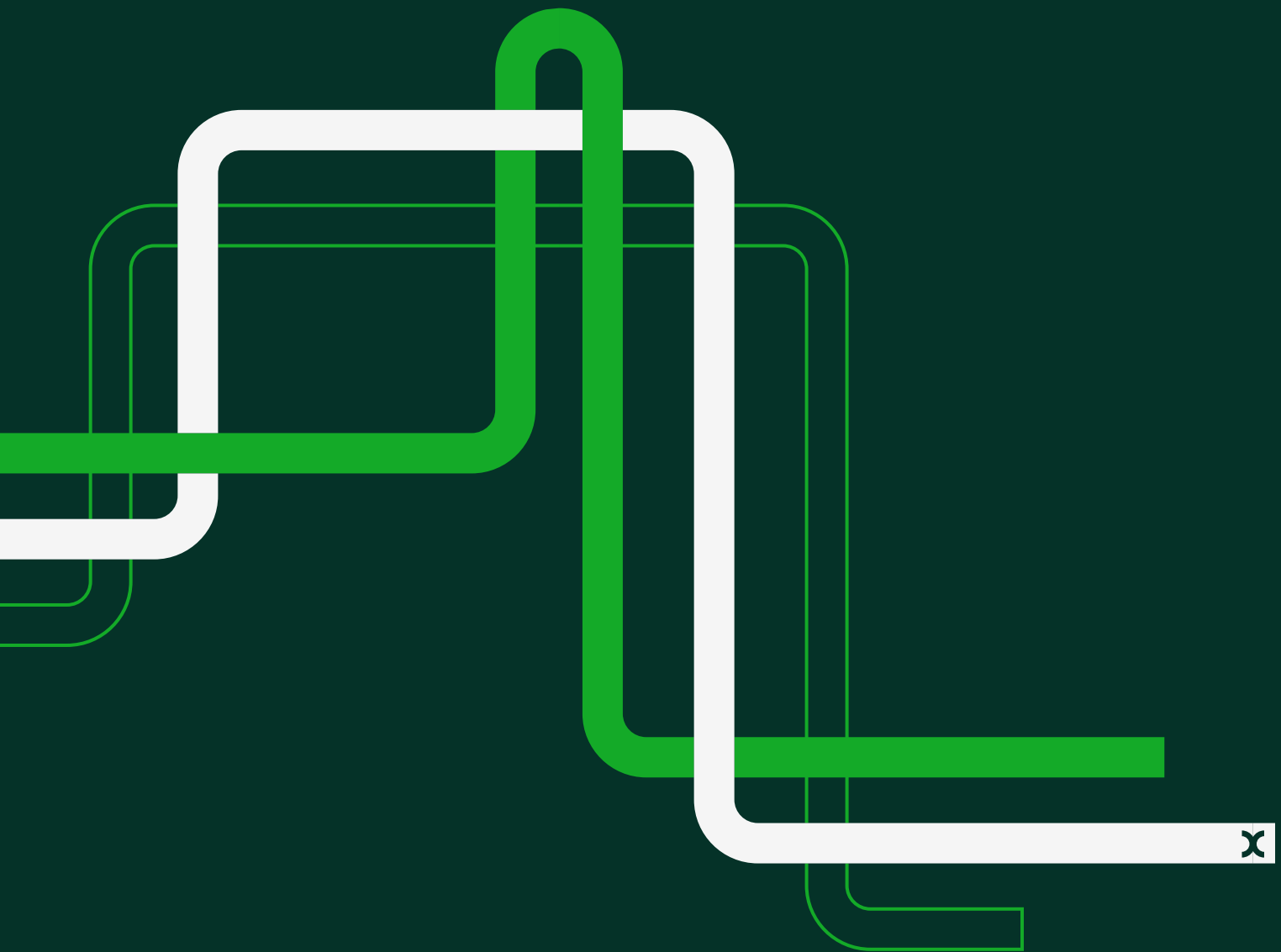


Contents

Figures and Tables

Executive summary

The New Zealand Commerce Commission (NZCC) has recently published its draft decision (DD) on the Part 4 Input Methodologies (IMs). This includes its preliminary decisions in relation to the weighted average cost of capital (WACC) and the WACC percentile.[1] In this report, which has been commissioned by the 'Big Six' electricity distribution businesses (EDBs)—Aurora, Orion, Powerco, Unison, Vector, and Wellington Electricity—we analyse selected aspects of the NZCC's WACC allowance methodologies.

We cover aspects of the methodologies for estimating the risk-free rate (RFR), debt premium, term credit spread differential (TCSD), tax-adjusted market risk premium (TAMRP), and asset beta. We also assess the NZCC's reasonableness checks of the WACC allowance, comment on the need for the financeability test and equity issuance allowance, and analyse the NZCC's decision to lower the WACC percentile for EDBs from the 67th to the 65th percentile.

For each of these areas of the DD, the NZCC has proposed either changing the approach or maintaining it relative to the previous IMs. To support these proposed approaches, the NZCC has published a significant amount of new evidence that was not available before the DD. In this report, we primarily focus on that new evidence.

The NZCC's approach to the risk-free rate is not supported by the evidence

We have assessed the following aspects of the NZCC's IMs that relate to setting the RFR allowance.

- **Adding a convenience yield premium to government bond yields.** We have assessed Dr Lally's dismissal of the academic evidence, based on which the NZCC has provisionally decided not to add a convenience yield premium to the government bond yields when estimating the RFR, and shown that the theoretical case for the convenience yield remains strong.[2] A convenience yield of any magnitude would imply a higher RFR allowance.

[1] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).
[2] See Dr Lally's advice at Lally, M. (2023), 'Review of submissions on the risk-free rate and the cost of debt', 17 March.

- **The term of the government bonds used to estimate the RFR.** We have reviewed Dr Lally's modelling and concluded that it does not prove that the term has to match the length of the regulatory period. We recommend considering longer tenors, such as five to 20 years.

The NZCC's approach to the debt premium exposes networks to uncertainty, and a higher term credit spread differential is supported by the evidence

Among the topics relating to the cost of debt allowance, we have assessed the case for the trailing average approach to the debt premium and the level of the TCSD.

- **The trailing average approach to the debt premium.** Based on Dr Lally's assessment, the NZCC has provisionally decided not to introduce any mechanisms that address the uncertainty in relation to the level of credit spreads that networks face during the regulatory period. We have evaluated Dr Lally's assessment and found that bringing the assumptions of his modelling more into line with market conditions makes the case for the trailing average significantly stronger. We also note that the trailing average is not the only approach that could be used to address the credit spread uncertainty faced by the networks.
- **The term credit spread differential.** We find that the NZCC's own evidence supports a higher TCSD at **10.2bps** instead of **7.5bps** if the NZCC does not subjectively exclude the COVID-19 period from the estimation window, and if it avoids double-counting a category of the bonds within its sample. In addition, we do not find the ten-year term cap to be well justified.

More robust approaches to assessing the tax-adjusted market risk premium support higher estimates

We have assessed the evidence that the NZCC relied on when it concluded on the TAMRP level of 7.0%, and found that some of it is not sufficiently reliable.

- **Dividend growth model (DGM) and survey data.** We have undertaken modelling that demonstrates why we do not find DGM to be a robust approach to estimating the TAMRP. We have also previously explained the limitations of using survey-based evidence to assess the reasonable level of the TAMRP.[3]

[3] For more details, see Oxera (2023), 'Review of the NZCC's WACC-setting methodology', 31 January, p. 27.

Therefore, we recommend that the NZCC does not put weight on the results from the DGM, and the survey-based results, in its estimation of the TAMRP.

- **The Siegel models.** We recommend placing more weight on the evidence from the Siegel II model and less on the evidence from the Siegel I model, due to the former's more reliable assumptions about the relationship between the RFR and the MRP. This means that a more reliable TAMRP estimate would be anchored on the evidence from the Ibbotson model and a weighted Siegel model that reduces reliance on the Siegel I specification.
- **Broker estimates.** Based on the evidence that we have collated from the public domain, we have found that the TAMRP estimates by investment banks selected by the NZCC do not fully represent the view of these institutions. As a result, the data relied upon by the NZCC does not appear to be robust.

The more robust estimation methodologies that underpin the TAMRP range point to an estimate that is closer to **7.5%** than to the **7.0%** proposed by the NZCC. The figure of 7.5% is also consistent with the broker estimates that we have collected.

The NZCC's asset beta allowance underfunds the networks and is a deviation from the NZCC's principles-based approach to the review

We comment on two aspects of the NZCC's asset beta estimation, as follows.

- **Frequency of returns data.** We recommend that the NZCC adds daily beta estimates to the set of evidence that it uses to set the allowed asset beta. The key concern typically associated with daily beta estimates is stock illiquidity, which is mitigated in this instance given that the NZCC applies liquidity filters. We also show that the average standard errors of individual comparators' asset betas are the lowest for daily asset betas, which shows that from the point of view of statistical significance, there is no reason to exclude daily betas from the NZCC's assessment.
- **Treatment of the COVID-19 period.** We consider that the beta estimates affected by the COVID-19 pandemic provide valuable information about the companies' risks, in the same way as any other event causing market volatility would. Accordingly, we see no reason for the COVID-19 pandemic period to be treated differently (from, for example, the period of the global financial crisis) and for it to lead to the change in the NZCC's approach as part of this IMs review. 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.

Compared with the NZCC's preferred asset beta estimate of **0.35** for energy networks, an average of daily, weekly and four-weekly estimates for the last two five-year periods is **0.37**, while the 75th percentile of the range (which is consistent with the percentile that the NZCC chooses for asset betas in its DD within its proposed range) of these estimates is **0.39**.

The evidence does not support a reduction in the WACC percentile from the 67th to the 65th

We analyse the NZCC's reasoning for reducing the WACC percentile for EDBs from the 67th to the 65th percentile, and find that the 67th percentile was already a conservative estimate with evidence supporting an even higher uplift. The main reasons why we consider the estimates by the NZCC to be low are as follows.

- The NZCC uses an Oxera estimate based on outage costs of NZ$1bn, which actually represents the lower bound of the range that we considered in our previous report. As this lower bound is then used to form a new range, this might underestimate the impact of our derived figures. Using the mid-point of the range that we considered (NZ$1.45bn) results in an optimal estimate of between 61% and 78%, which suggests a mid-point above the 67th percentile (even without removing the tax uplift—see the next bullet).
- The NZCC's WACC uplift model adjusts the regulated asset base (RAB) by 1 minus the corporate tax rate. We consider that taxes are actually redistributed to society, resulting in a welfare benefit. We therefore consider that a full tax uplift is not appropriate. Removing the tax adjustments results in a range of 60% to 77%, i.e. a mid-point above the 67th percentile under the NZCC's and Oxera's most conservative cost of outages assumption of NZ$1bn.

A number of additional factors suggest that the 67th percentile is likely to be more appropriate than the 65th percentile. For instance, insufficient investment incentives might risk delaying the energy transition, which would have significant asymmetric effects in terms of social outcomes that are additional to those captured in the loss analysis framework.

Overall, our analysis suggests that the 67th percentile is already conservative, and therefore a reduction to the 65th percentile is not appropriate—especially given the value of regulatory stability.

The NZCC's choice of the WACC allowance reasonableness checks could be improved

In terms of the reasonableness checks, we assess the NZCC's check using RAB multiples and propose an alternative one.

- **RAB multiples.** In this report, we explain that many factors need to be accounted for when interpreting RAB multiples, and that conclusions are sensitive to the assumptions. Therefore, we do not consider RAB multiples to be a reliable check of the reasonableness of the WACC allowance.
- **Asset risk premium–debt risk premium (ARP–DRP) framework.** We introduce an alternative approach of cross-checking the cost of equity allowance with reference to the cost of debt estimate. The cross-check shows that the risk premium, embedded in the cost of equity, if adjusted for the effect of leverage (ARP), is not sufficiently high relative to the DRP, which suggests that the overall allowance for the cost of equity should be higher.

Alternative approaches to financeability and equity issuance costs could be considered

Finally, we consider financeability and equity issuance costs.

- **Financeability.** We explain that financeability is affected by the cost of capital allowance. We find that it would be practical for the NZCC either to undertake a provisional financeability assessment at the IMs review stage, when the methodologies for the cost of capital allowance are set, or to specify the financeability test principles in the IMs and carry out the test when setting default price–quality paths (DPPs), customised price–quality paths (CPPs) or individual price–quality paths (IPPs). As for the form of the test, in addition to the NZCC's present focus on actual networks' financeability, the NZCC could assess the financeability of a benchmark (efficiently run) company.
- **Equity issuance costs.** We explain that retained profits may not always be sufficient to finance growth, while not paying dividends for a long period of time is not sustainable, and at times new equity financing may be needed and the allowance for equity issuance costs would be justified. An allowance for equity issuance costs, combined with a regulatory assumption

that dividend payments will be made, is aligned with regulatory precedent in other jurisdictions. Practically, financial modelling required for the financeability test would show whether networks need to issue equity within the price control period, to finance their investment programmes.

1 Introduction

1.1 On 14 June 2023 the New Zealand Commerce Commission (NZCC) published its draft decision (DD) on the Input Methodologies (IMs). This report, on behalf of the 'Big Six' electricity distribution businesses (EDBs)—Aurora, Orion, Powerco, Unison, Vector, and Wellington Electricity—responds to the NZCC's cost of capital topic paper, which was published as part of the DD.[4]

1.2 We do not undertake a comprehensive (re)assessment of the weighted average cost of capital (WACC) within the limited available time for submissions, but instead focus on selected aspects of the NZCC's methodology, especially where new evidence has been introduced or parameters have changed, in the NZCC's estimate of the WACC allowance. In addition to the WACC-related issues, we touch on the need for financeability assessments.

1.3 The structure of the report is as follows.

- In **section 2**, we focus on the risk-free rate (RFR) estimation. This section covers the topic of the convenience yield and whether a premium is required on top of government bond yields if those are used as a proxy for the RFR. We also assess whether the term of the government bonds chosen for the RFR estimation has to match the length of the regulatory period. Finally, we review the NZCC's proposed adjustments to the cost of debt wash-up mechanism.
- In **section 3**, we discuss the debt premium, and the benefits of introducing annual updates to the allowance, and the term credit spread differential (TCSD).
- In **section 4**, we assess the NZCC's approach to the tax-adjusted market risk premium (TAMRP). In particular, we assess the robustness of a dividend growth model (DGM), the comparative strength of Siegel models, and the cross-checks that the NZCC has undertaken against broker estimates.

[4] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).

- In **section 5**, we cover topics relating to the estimation of the asset beta, including the frequency of returns data and the treatment of the period affected by the COVID-19 pandemic.
- In **section 6**, we respond to the NZCC's decision to change the WACC percentile for EDBs from the 67th to the 65th.
- In **section 7**, we assess the robustness of regulated asset base (RAB) multiples as a check of the reasonableness of the WACC allowance. We also introduce an alternative approach of cross-checking the cost of equity allowance with reference to cost of debt estimates.
- In **section 8**, we comment on the NZCC's decision to not introduce a financeability test in the IMs and to not provide an equity issuance allowance.

2 Risk-free rate

2.1 In this section, we assess the following aspects of the RFR allowance.

- **The NZCC's decision not to add a convenience yield premium to government bond yields**—we have assessed Dr Lally's comments and concluded that the theoretical case for the convenience yield remains strong.
- **The term of government bonds used to estimate the RFR**—we have reviewed Dr Lally's modelling and concluded that it does not prove that the term has to match the length of the regulatory period.

2B Convenience yield

2.2 In our previous report for the EDBs, we explained that, compared with the highest-quality non-government bonds, government bonds have special properties that create additional demand for these instruments. These demands push the rate of return on government bonds below a 'true' RFR based on a zero-beta asset.[5] As set out in the report for the EDBs, the existence of a convenience yield is supported by a wide body of academic evidence and regulatory precedents in other jurisdictions.

2.3 Accordingly, we recommended that the NZCC 'performs further assessment of 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.'[6]

2.4 The NZCC disagreed with this recommendation to account for the convenience yield, citing three main reasons:

- it is not aware of any practitioners in New Zealand that use bonds other than government bonds to estimate the RFR;
- it will not always be possible to find sufficiently liquid corporate bonds;
- according to Dr Lally, the academic evidence presented by Oxera does not offer support to Oxera's recommendation,

[5] Oxera (2023), 'Review of the NZCC's WACC-setting methodology', 31 January, p. 13.
[6] Ibid., p. 11.

specifically the recommendation to use the highest-quality non-government bonds as inputs to the RFR estimation.

2.5 In the rest of this section we discuss each of these reasons in turn, to show that adjustments for the convenience yield warrant further consideration from the NZCC.

2B.1 Methodologies adopted by practitioners are not always transparent and reliable

2.6 In the context of seeking precedents for the use of non-government bonds for estimating the RFR, it is unlikely that practitioners will disclose the full details of how they build up their estimates of each of the parameters. The NZCC is therefore not able to robustly dismiss the use of high-quality corporate bonds with reference to the disclosed details of the methodology adopted by practitioners in New Zealand.

2.7 On many occasions, market practitioners adopt unsubstantiated assumptions that may or may not be consistent with the regulators' estimates of the parameters of the capital asset pricing model (CAPM). For example, in a 2023 equity report on Auckland International Airport (AIA) published by Forsyth Barr (a broker that was referred to by the NZCC in its cross-checks for TAMRP estimates), an equity beta of 0.93 was used for the valuation of AIA. This estimate is significantly higher than the NZCC's estimate for airports, which was set at 0.74.[7] Similarly, in another report on Vector published in June 2023, Forsyth Barr used an equity beta of 0.74, which is significantly higher than the NZCC's 0.59 for EDBs and 0.68 for GPBs.[8]

2.8 In both of these instances, the NZCC does not interrogate the full details of the methodologies underpinning the market participant's parameter estimation, or place weights on Forsyth Barr's (unsubstantiated) estimates for its assumption of the regulatory equity beta. By the same logic, the NZCC should also be cautious of relying on the practitioners' approach to the RFR, particularly considering that practitioners rarely disclose the full methodology and reasoning behind the estimate of WACC components.

[7] Forsyth Barr (2023), 'Auckland Airport – Inflation Tends to Make Things More Expensive', 8 February, p. 3.
[8] Forsyth Barr (2023), 'Vector – Capex Funding No Easier', 15 June, p. 2.

2B.2 The NZCC has not acknowledged that the pool of non-sovereign AAA bonds is large

2.9 Without any detailed assessments, the NZCC appears to dismiss the existence of sufficiently liquid corporate bonds as another reason to exclude an allowance for the convenience yield. To examine whether the NZCC has a significantly sized pool of outstanding AAA bonds to potentially include in an assessment of the convenience yield, we have performed a high-level bond filtering analysis using the data provider Dealogic. Specifically, we have selected bonds that are:

- NZD-denominated;
- issued by non-sovereign issuers;
- not asset-backed securities or mortgage-backed securities;
- rated AAA by S&P and/or Aaa by Moody's at launch; and
- issued during or after 2015 and not expired as of July 2023.

2.10 Applying the filters above has yielded 104 outstanding AAA bonds, with issuers ranging from:

- sub-sovereign entities such as the New Zealand Local Government Funding Agency Ltd; to
- government agencies such as Housing New Zealand Ltd; and to
- supranational organisations such as the International Finance Corp, the World Bank, the Asian Development Bank, the Nordic Investment Bank, and the Inter-American Development Bank.

2.11 While these issuers are not commercial corporations, the issuances were priced by the market and therefore reflect the investors' perception of the required returns for the highest-quality non-sovereign bonds. A priori, therefore, it does not appear to be reasonable to dismiss any allowance for a convenience yield on the basis of practical implementation issues around data availability; instead, it appears that there is a fairly large sample of highest-rated non-government bonds. It therefore appears unreasonable for the NZCC to dismiss this large pool of AAA rated bonds without further assessing their suitability (such as liquidity) as proxies for the RFR. We further note that, as set out in our first report for the EDBs, the yield spread between bonds issued by Housing New Zealand Ltd and sovereign bonds was around 50–100bps, with only a small liquidity premium of c. 7bps attached to the yield on the Housing

New Zealand bonds (over and above the liquidity premium of the sovereign bonds).[9] This finding shows that the convenience yield attached to New Zealand government bonds is likely to be significant even after adjusting for the relative illiquidity of non-sovereign bonds.

2B.3 Dr Lally's critiques focus only on implementation concerns about Oxera's recommended approach to the RFR

2.12 In this sub-section, we show that Dr Lally's critiques of Oxera's recommended approach in relation to the convenience yield adjustment within the RFR are partial—he appears to focus on concerns with the implementation approach, and not necessarily the principle of allowing for this. As we have already shown, issues of concern in relation to implementation can be explored further with capital markets data; implementation concerns alone should not prevent the NZCC from making this adjustment. We discuss each of our responses to Dr Lally's critiques in turn.

2.13 First, by reviewing each of the academic studies cited in our first report for the EDBs, Dr Lally alleges that 'Oxera cite authors in support of their proposal who are instead advocating something different.'[10] This statement is based on Dr Lally's misrepresentation that the academic studies we cited were positioned to support the use of AAA bonds.[11] Instead, in our first report for the EDBs, it was clearly stated that 'the concept of a convenience premium has been widely studied in academic literature and via empirical analysis.'[12] The academic studies cited were therefore used to support the existence of a convenience premium (i.e. the principle), not the use of AAA bonds as proxies for the RFR (i.e. one potential approach, in practice). We note that Dr Lally does not appear to dispute that the academic papers cited by Oxera support the concept of a convenience yield. 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.

[9] Oxera (2023), 'Review of the NZCC's WACC-setting methodology', 31 January, p. 14.
[10] Lally, M. (2023), 'Review of submissions on the risk-free rate and cot of debt', 17 March, p. 9.
[11] Ibid., p. 6.
[12] Oxera (2023), 'Review of the NZCC's WACC-setting methodology', 31 January, p. 13.

2.14 Second, Dr Lally asserts that:[13]

if government bonds have much higher liquidity than corporate bonds, this would be grounds for preferring government bonds rather than AAA or BBB corporate bonds as a proxy for the risk-free asset.

2.15 This premise is based on a misconception of the rationale for convenience yields. As set out in Feldhütter and Lando (2008), the convenience yield is a premium attached to the yield on sovereign bonds.[14] This premium arises from the elevated demand for the valuable and unique characteristics (such as repo specialness and regulatory requirements for holding)[15] of sovereign bonds, which would otherwise not be present for a risk-free asset as defined in the CAPM.

2.16 Third, Dr Lally raised the concern that accounting for the convenience yield would complicate the estimation of the TAMRP, which is calculated by deducting the RFR from total market returns (TMRs). This concern can be addressed by adopting pragmatic approaches to estimating the convenience yield. For example, a long-term average convenience yield over business cycles can be estimated and added to the historical yield of government bonds. Approaches such as this can help to avoid the use of historic AAA bond data that may not be available dating back to the 1900s.

2C The term of government bonds to estimate the risk-free rate

2.17 To proxy the RFR, the NZCC uses New Zealand government bonds that have a remaining time to maturity that matches the length of the regulatory period (five years in the case of EDBs).[16] 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)).[17]

2.18 In particular, in determining that the term of the RFR should match the length of the regulatory period, Dr Lally draws

[13] Lally, M. (2023), 'Review of submissions on the risk-free rate and cot of debt', 17 March, p. 7.
[14] Feldhütter, P. and Lando, D. (2008), 'Decomposing swap spreads', *Journal of Financial Economics*, **88**:2, p. 379.
[15] For more details, see ibid., p. 378.
[16] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, para. 3.64.
[17] Lally, M. (2023), 'Review of submissions on the risk-free rate and the cost of debt', 17 March. Lally, M. (2021), 'The appropriate term for the allowed cost of capital', 9 April.

conclusions from a theoretical model of an investment in a single asset that depreciates over several regulatory periods.[18] Under that model:

- at the beginning of each regulatory period *t*, the value of the investment equals the sum of the expected cash flows in period *t* and the expected value of that investment by the end of period *t*, discounted at the cost of capital of period *t*;
- the expected cash flows in period *t* are the sum of the return on capital and depreciation allowances for period *t*.

2.19 For the principle of the net present value (NPV) = 0 to apply under this model, the allowed rate of return in each period needs to be set at the level of the cost of capital for that period. Lally (2021) further asserts that the model requires a one-period cost of capital, i.e. the cost of capital of the investment that would be returned in one period. A one-period cost of capital would imply using the matching term of the RFR with would imply that the term of the RFR should match the length of the regulatory period.

2.20 In our previous report for the EDBs,[19] we have highlighted the discussion, in the context of the rate of return instrument setting by the Australian Energy Regulator (AER), about Dr Lally potentially misrepresenting the findings of Schmalensee (1989)[20]—which has indeed been confirmed to be a misrepresentation by Professor Schmalensee himself.[21] Dr Lally's response was that his findings stand irrespective of his previous reference to the Schmalensee (1989) work.[22] Therefore, in this section, we assess Dr Lally's advice, rather than whether his advice is based on Schmalensee (1989).

2.21 Our assessment is that Lally (2021) does not prove that the term of the RFR has to match the length of the regulatory period. In short, this is because:

[18] Lally, M. (2021), 'The appropriate term for the allowed cost of capital', section 2.1.
[19] Oxera (2023), 'Review of the NZCC's WACC-setting methodology', 31 January, section 2.3.
[20] Schmalensee, R. (1989), 'An Expository Note on Depreciation and Profitability Under Rate-of-Return Regulation', *Journal of Regulatory Economics*, **1**, pp. 293–298.
[21] Schmalensee, R. (2022), 'Statement of Richard Schmalensee, Ph.D. To the Australian Energy Regulator', 29 July.
[22] Lally, M. (2023), 'Review of submissions on the risk-free rate and the cost of debt', 17 March.

- the model in Lally (2021) does not require the cost of capital to be a one-period cost of capital;
- it is appropriate to use a cost of capital corresponding to a longer investment horizon to discount the value of an investment in a regulatory asset.

2.22 The Lally (2021) model does not require the cost of capital to be a one-period cost of capital, despite showing the desirable result of NPV = 0 with a one-period cost of capital. Instead, the model would show NPV = 0 with any cost of capital, as long as the allowed rate of return matches it in each period.

2.23 The model is set on a per-regulatory-period basis (which, in the case of the EDBs' regime, is a five-year period), and Lally (2021) concludes that the RFR term should match the length of the regulatory period. However, regulators often estimate allowed revenues on an annual basis rather than estimating the allowed revenue as a single consolidated amount for all years in the regulatory period. The Lally (2021) model would work in the same way if it were set on an annual basis (still with the five-year regulatory periods). In that case, Dr Lally would have to conclude that the RFR term should be one year instead of five years. As a result, there would be two conflicting conclusions based on the same model—showing that the model does not prove, but rather assumes, the appropriate term for the cost of capital.

2.24 Further, 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. As per the setting of the Lally (2021) model, the investment is done for a term that lasts multiple regulatory periods, and the equity investor will continue getting its returns for the period of the asset life (or indefinitely if the investment is in a business rather than in a single asset).

2.25 Indeed, in a sale of a network business, a discounted cash flow (DCF) modelling exercise that is used to assess the equity value of the business will typically include a terminal value that includes a perpetual growth assumption. Accordingly, it is clear that equity investors do not assess the reasonableness of returns solely in fixed regulatory periods (e.g. five-year periods).

2.26 On this topic, Schmalensee (2022) stated that using a one-period interest rate as a period t cost of capital 'is obviously

correct in very abstract theory but **completely irrelevant** for long-term investments in the real world'.[23] [emphasis added]

2.27 In addition to Ofgem's precedent that uses longer-term government bond yields to proxy the RFR, and that the NZCC has acknowledged but dismissed,[24] we present precedents below where the UK CMA uses long-term government bonds for the RFR for the cost of equity. These cover decisions in both regulated and non-regulated sectors, but the same principles apply. As we show in Table 2.1 below, the CMA's justification for using government bonds longer than five years in most of the cases was that equity investment is of indefinite maturity.

[23] Schmalensee, R. (2022), 'Statement of Richard Schmalensee, Ph.D. To the Australian Energy Regulator', 29 July, p. 10.
[24] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, paras 3.67–3.68.

Table 2.1 RFR precedents in selected regulatory price controls and the UK CMA market investigations

Market investigation	Basis of the estimate	Justification
PR19 water price control redetermination (2021)	20-year index-linked government bonds (gilts, together index-linked gilts—ILGs)	No justification given as the term of the RFR was not the focus of discussion (and the established method in the sector is to apply 20-year ILGs)
Funerals market investigation (2020)	Ten-year gilt curves	'Since equities have long (indefinite) maturities'
Private healthcare market investigation (2017)	Mix of evidence favouring long maturities	'We regard long maturities as being most relevant to the RFR in the cost of equity since equities also have long (indefinite) maturity'
Energy market investigation (2016)	15–25-year gilt curves	'Since equities also have long (indefinite) maturity'
PR14 water price control redetermination (2015)	Regulatory precedent, as well as both longer-term and shorter-dated ILGs	'It is unclear to what extent […] distortions [to both longer-dated and shorter-dated ILGs] may still be observable in current market yields'
Payday Lending market investigation (2015)	Medium-term gilt yields (exact tenors not specified)	'Long-dated index-linked gilt yields are in principle the most suitable basis for estimating the RFR as they match the long (indefinite) maturity nature of equities'
RP5 Northern Ireland Electricity price control determination (2014)	25-year index-linked yield curves	'Long maturities appear most relevant to the RFR in the cost of equity since equities also have long (indefinite) maturity.'
Pay TV market investigation (2012)	Five-year gilt index	The estimate was suggested by both parties
Local buses market investigation (2011)	Ten-year ILG curves	'Medium-dated (ten-year) index-linked yields have tended to be more stable and, as a result, we believe provide a better estimate of the long-run RFR'

Source: Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations', 17 March, para. 9.242, https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf (accessed 12 July 2023). Competition and Markets Authority (2020), 'Appendix R: Weighted Average Cost of Capital', Funerals Market Investigation, 18 December, para. 47, https://assets.publishing.service.gov.uk/media/5fdb2450d3bf7f40d1221889/Appendix_R_-_WACC_18.12.20.pdf (accessed 10 July 2023). Competition and Markets Authority (2016), 'Appendix I: Cost of Capital', Private Healthcare Market Investigation, 12 September, para. 15, https://assets.publishing.service.gov.uk/media/57d6c435e5274a34fb000034/private-healthcare-remittal-fr-appendices-and-glossary.pdf (accessed 10 July 2023). Competition and Markets Authority (2016), 'Appendix 9.12: Cost of capital', Energy market investigation, paras 19 and 23,

https://assets.publishing.service.gov.uk/media/576bcc3c40f0b66bda0000b4/appendix-9-12-the-cost-of-capital-fr.pdf (accessed 10 July 2023). Competition and Markets Authority (2015), 'Bristol Water plc A reference under section 12(3)(a) of the Water Industry Act 1991 Appendices 5.1 – 11.1 and glossary', 6 October, para. 151 (p. A10(1)-36), https://assets.publishing.service.gov.uk/media/5627997640f0b60368000001/Appendices_5.1_-_11.1_and_glossary.pdf (accessed 12 July 2023). Competition and Markets Authority (2015), 'Bristol Water plc A reference under section 12(3)(a) of the Water Industry Act 1991. Report', 6 October, para. 10.172, https://assets.publishing.service.gov.uk/media/56279924ed915d194b000001/Bristol_Water_plc_final_determination.pdf (accessed 18 July 2023). Competition and Markets Authority (2015), 'Appendix 4.5: Assessment of Profitability', Payday Lending Market Investigation, 24 February, para. 141, https://assets.publishing.service.gov.uk/media/54ebb75940f0b670f4000026/Appendices___glossary.pdf (accessed 10 July 2023). Competition Commission (2014), 'Northern Ireland Electricity Limited price determination', 26 March, paras 13.120 and 13.127, https://assets.publishing.service.gov.uk/media/535a5768ed915d0fdb000003/NIE_Final_determination.pdf (accessed 12/07/2023). Competition and Markets Authority (2012), 'Appendix 5.4: Profitability of Sky', Movies on pay TV market investigation, 2 August, para. 7.13, https://assets.publishing.service.gov.uk/media/5519492ee5274a142b0001c0/main_report_appendices_and_glossary.pdf (accessed 10 July 2023). Competition and Markets Authority (2011), 'Appendix 10.2: UK local bus industry cost of capital', Local Bus Market Investigation, 20 December, paras 25–26, https://webarchive.nationalarchives.gov.uk/ukgwa/20140403001500mp_/http://www.competition-commission.org.uk/assets/competitioncommission/docs/pdf/inquiry/ref2010/localbus/pdf/appendices_9_1_to_10_4.pdf (accessed 10 July 2023).

2.28 Finally, in its 2023 explanatory statement, the AER decided to return to the use of ten-year government bonds as a proxy for the RFR—i.e. it now does not match the term of the RFR with the length of the regulatory period. This ultimate decision was based on the lack of demonstrated evidence indicating a definite improvement from matching the term of the RFR to the regulatory period.[25]

2.29 To conclude, irrespective of whether Lally (2021) relies on the findings of Schmalensee (1989), we do not consider that Lally (2021) has proved that the term of the RFR has to match the length of the regulatory period. The term of the RFR needs to be consistent with the assumed maturity of financing. Equity financing is indefinite, or is at least as long as asset lives are. Therefore, we retain the recommendation that using government bonds of maturities longer than five years (for

[25] Australian Energy Regulator (2023), 'Rate of Return Instrument Explanatory Statement', February, section 6.3.1.7.

example, from five to 20 years) would be appropriate for NZCC's cost of equity allowance.[26]

[26] Oxera (2023), 'Review of the NZCC's WACC setting methodology', 31 January, p. 1.

3 Debt premium and term credit spread differential

3.1 In this section, we consider the components of the NZCC's cost of debt allowance.

3.2 In section 3A, we review the NZCC's assessment of whether to introduce annual indexation for the debt premium allowance as a potential remedy for a mismatch between the regulatory allowance and the actual costs faced by the EDBs due to market volatility in credit spreads. We find that bringing the assumptions of Dr Lally's modelling more in line with market conditions makes the case for the annual indexation significantly stronger.[27]

3.3 In section 3B, we consider the NZCC's methodology for estimating the TCSD allowance. We find that the NZCC's evidence supports an estimate of 10.2bps instead of 7.5bps if the NZCC does not subjectively exclude the COVID-19 period from the estimation window, and if it avoids double-counting a category of the bonds within its sample. We also do not find the ten-year term cap to be well justified.

3A Stability of debt premium

3.4 In the DD, the NZCC has considered whether the volatility of the debt premium observed in the market is compatible with the fixed debt premium allowance. As a key alternative to the fixed allowance re-set for each price control (which so far has been every five years for EDBs), the NZCC has assessed the merits of an annual update to the debt premium allowance (sometimes referred to as a trailing average). The NZCC has acknowledged that, in theory, annual updating of the debt premium allowance is more aligned with the actual cost of debt at a given point in time. However, it has decided against the change in the regulatory allowance mechanism—or indeed any other adjustment for uncertainty in relation to the sufficiency of the

[27] We further note that the annual indexation is just one of the ways to address uncertainty.

allowed debt premium—due to the argument that this brings insufficient benefits and operational complexity.[28]

3.5 We note at the outset that networks are exposed to (corporate) debt interest rate volatility. While the NZCC has incorporated a small allowance for the costs of hedging interest rate risks in relation to movements in the RFR over the five-year period, it makes no allowances for risk exposure via changes in corporate debt spreads.

3.6 In coming to the decision to not adjust allowances for uncertainty in relation to changes in debt premia, the NZCC has relied on analysis in Lally (2023).[29] Dr Lally has modelled the actual debt premia of a benchmark company,[30] based on hypothetical modelling of market movements, and compared how the benchmark company would perform against the annually updated and fixed allowances in this model. Lally (2023) finds that the annually updated allowance better matches the actual debt premium and that there is therefore benefit in introducing it. However, he finds that the benefit is limited in this hypothetical model.

3.7 We have reviewed Lally's model and find that it relies on a number of strong assumptions that make it unrepresentative of the actual debt financing conditions faced by the EDBs and other firms in the market. Its key assumptions are the following:

- mean-reversion of interest rates and debt premia;
- 10% annual refinancing instead of the 20% annual refinancing assumed in the DD;
- a lack of shocks in the model;
- a 30-year estimation window.

We discuss our concerns relating to each of these assumptions, in turn, below.

[28] New Zealand Commerce Commission (2023), 'Financing and incentivising efficient expenditure during the energy transition topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', paras 3.105–3.106.
[29] Lally, M. (2023), 'Review of submissions on the risk-free rate and the cost of debt', 17 March.
[30] Lally assumes that the company refinances 10% of its debt each year. Therefore, the company's actual debt premium is represented by a ten-year historical trailing average.

3.8 First, Lally assumes that interest rates are mean-reverting processes.[31] However, this notion is not an axiom, and is instead an active part of the academic debate. For example, Rose (1988) found that both nominal interest rate and real interest rate processes have a unit root, and hence are nonstationary (i.e. not mean-reverting).[32] These findings are supported by further research done by Mishkin (1995) and Rapach and Weber (2004), who conclude with a 'strong rejection' of the mean-reversion of real interest rates.[33] The academic debate on the topic is ongoing, and it is clear that the stationarity of interest rates is not a settled matter; this is therefore a strong assumption within Dr Lally's modelling.

3.9 Going a step further, Dr Lally assumes that mean-reversion of an interest rate implies mean-reversion of the debt premium. There is academic literature that finds that debt premia (credit spreads) exhibit strong evidence of non-linearity and that these are closely related to business cycles, hence there may not be any convergence to a steady-state mean.[34]

3.10 Figure 3.1 below shows that historical debt premia have had a significant level of volatility. The data does exhibit some level of cyclicality, but it would be a coincidence if the debt premia reverted to the mean within a regulatory period. The levels in the same phases of the cycle also change significantly—for example, from the peak level of over 3% in early 2010, to the peak level of 1.5% in 2022. In other words, regulated companies are left exposed to significant interest risk.

3.11 On balance, assuming mean reversion of both interest rates and debt premia leads to an underestimation of the volatility, and hence of the resulting mismatch between the fixed regulatory allowance and the actual cost of debt faced by the companies. As a result, Lally (2023) underestimates the benefit of updating the allowance annually.

[31] Lally, M. (2023), 'Review of submissions on the risk-free rate and the cost of debt', 17 March, p. 16.
[32] Rose, A. (1988), 'Is the Real Interest Rate Stable?', *The Journal of Finance,* **43**:5, pp. 1095–1112.
[33] Mishkin, F. (1995), 'Nonstationarity of Regressors and Tests on Real-Interest-Rate Behavior', *Journal of Business & Economic statistics*, **13**:1, pp. 47–51. Rapach, D. and Weber, C. (2004), 'Are real interest rates really nonstationary? New evidence from tests with good size and power', *Journal of Macroeconomics*, **26**:3, pp. 409–430.
[34] See Manzoni, K. (2002), 'Modeling credit spreads: An application to the sterling Eurobond market', *International Review of Financial Analysis*, **11**:2, pp 183–218; and Guha, D. and Hiris, L. (2002), 'The aggregate credit spread and the business cycle', *International Review of Financial Analysis*, **11**:2, pp. 219–227.

Figure 3.1 Average debt premium of the outstanding vanilla NZD-denominated bonds issued by the EBDs (%)

Note: The debt premium is calculated by subtracting the maturity-matching RFR from the yields on EDB bonds. The EDB bonds include all outstanding NZD-denominated vanilla fixed-rate bonds (i.e. excluding callable and puttable bonds) issued by Powerco and Vector. This represents a sample of 18 bonds issued between 2000 and 2023. There are no other publicly traded EDB bonds available via Bloomberg. The yield curve for the RFR is linearly interpolated based on the New Zealand government bond benchmark yield curve from Eikon, to match the remaining time to maturity for each of the bonds to estimate the debt premium.
Source: Oxera analysis based on data from Eikon and Bloomberg.

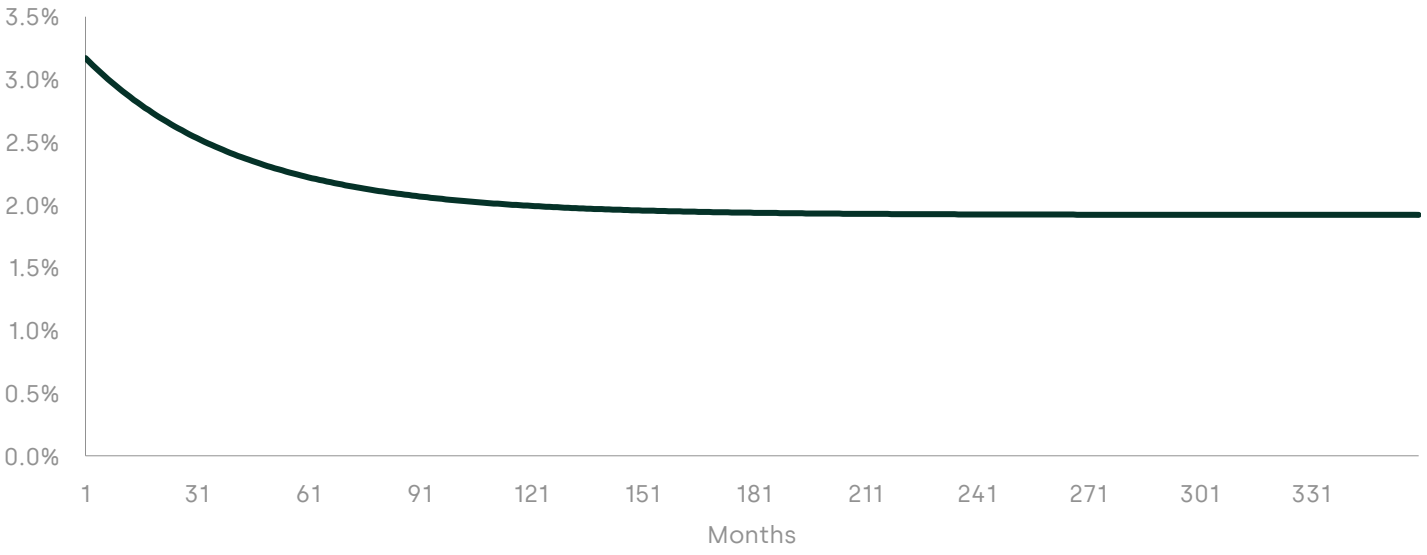
3.12 Second, in his model, Dr Lally relies on debt premium estimates on ten-year bonds, which he justifies by the lack of reliable data for five-year borrowings (which would better match the NZCC's assumption about the debt structure of the benchmark company).[35] While it may be reasonable to assume that a ten-year debt premium follows a roughly similar path to a five-year debt premium, and that they have the same mean-reverting properties, the assumed maturity of the borrowings dictates the refinancing assumption and therefore has a significant impact on the final results. In particular, to make the model internally consistent with the ten-year bonds, Lally (2023) assumes that 10% of total debt is refinanced each year—this is half of the NZCC regulatory assumption that assumes five-year bonds and 20% annual refinancing. Hence, in the Lally (2023) model, the implied difference between the allowed and actual debt premia (which is greater for the five-year than for the annual allowance

[35] Lally, M. (2023), 'Review of submissions on the risk-free rate and the cost of debt', 17 March, p. 15.

re-sets in most considered scenarios) is multiplied by a smaller annual borrowing base. If this error is corrected, the resulting difference between the regulatory allowance and the actual cost of debt, and hence the benefit from annual indexation, will necessarily be higher.

3.13 Third, due to the mean-reversion assumption combined with the lack of shock factors in the model, the assumed debt premium quickly approaches the mean level (see Figure 3.2 below). This assumption is significantly different from the actual market rate paths (see Figure 3.1 above). As a result, in the Lally (2023) model the regulatory allowance converges to the actual cost of debt, and at some point effectively fully corresponds to it, making the benefit of any trailing average (indexation/annual update) methodology asymptotically approach zero.

Figure 3.2 Borrowing rate assumed by Lally (2023) in its mean-reverting debt premium model



Source: Oxera, based on Lally, M. (2023), 'Review of submissions on the risk-free rate and the cost of debt', 17 March.

3.14 Fourth, Lally uses a 30-year estimation window to test his hypothesis. Thirty years is equivalent to six regulatory periods of five years. This approach implies that companies may be underfunded for a significant period of time (e.g. three regulatory periods) and still have sufficient funding on average by the end of the 30-year period. This appears to be internally

inconsistent with Dr Lally's premise that the WACC parameters should be set to allow investors to recover returns within fixed five-year regulatory periods—see, for example, the term of the RFR allowance and the hedging costs allowance for interest rate risks to be recovered over fixed five-year periods. Furthermore, due to the mean-reverting market rate assumption with no shocks, the longer the estimation window, the smaller the differences between allowances and the prevailing rates are. When the allowance is equal to the prevailing rates, companies are not exposed to interest rate risk, and thus there is no benefit in introducing remedies such as annual indexation by construction of the model.

3.15 Overall, the NZCC and Dr Lally agree that the debt premium has significant levels of volatility, and that, theoretically, annual updating of the debt premium allowance is better aligned with the debt financing profile of a benchmark company. Correcting the unrealistic assumptions in the Lally (2023) model would lead to an increase in the implied benefit of annual allowance updates. The increase is likely to be of a noticeable magnitude and may outweigh the additional administration costs that Dr Lally and the NZCC expect to arise with any mechanism that allows for risk reduction, such as annual updates.

3.16 To sum up, the evidence shows that debt premia are volatile and, if the corresponding allowance is fixed, companies are exposed to this uncertainty. An annual update of the debt premium allowance is one of the options for addressing such uncertainty—and after the assumptions are corrected, the Lally (2023) model would show more significant benefits of introducing such a mechanism, compared with keeping the allowance fixed. Alternatively, instead of a process of annual updates, the NZCC could consider other solutions to reduce the risks, such as:

- introducing triggers or re-openers, as used in the energy network controls by the Italian regulator;[36] or
- incorporating an uncertainty allowance by including headroom above the prevailing rates to compensate for

[36] ARERA (2021), 'Criteri per la determinazione e l' aggiornamento del tasso di remunerazione del capitale investito per i servizi infrastrutturali dei settori elettrico e gas per il periodo 2022-2027 (TIWACC 2022-2027), Allegato A', paras 6.1–6.8 and 8.1–8.3, https://www.arera.it/allegati/docs/21/614-21alla.pdf (accessed 6 July 2023).

the risk of debt premium movements within the regulatory period.

3B Term credit spread differential

3.17 The NZCC provides a separate TCSD allowance on the cost of debt to compensate companies for debt issuances with maturities that are longer than the five-year benchmark. The NZCC has maintained the methodology used in the previous IMs, which is based on calculating the additional debt premium associated with longer maturity minus the lower per-annum issuance cost (because longer-term debt is issued less frequently). The allowance amount is proportionate to the original term of the qualifying bond under consideration, but is capped at ten-year maturity.[37] Following an update of the data in the DD, the NZCC is minded to maintain a 7.5bps TCSD for each extra year of the original bond term over the five-year benchmark for EDBs, capped at ten years.

3.18 This estimate of the TCSD allowance under the NZCC's methodology is sensitive to three assumptions:

- the bond sample selection;
- excluding the period of the COVID-19 pandemic from the estimation window, based on which the TCSD is assessed;
- the ten-year maturity cap.

3.19 We discuss each of these issues, in turn, below.

3.20 To estimate the TCSD, the NZCC considers four possible bond samples for the analysis over a seven-year estimation window:[38]

- BBB+ bonds only, including 100% government-owned bonds (i.e. the bonds issued by government-owned companies);
- BBB+ bonds only, excluding 100% government-owned bonds;
- the full sample of investment-grade bonds, including 100% government-owned bonds;[39]

[37] New Zealand Commerce Commission (2023), 'Financing and incentivising efficient expenditure during the energy transition topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', para. 3.109.
[38] Ibid., para. 3.120.
[39] The 'full sample' of bonds includes bonds with a credit rating of BBB+, as well as bonds rated BBB and A-, controlling for the difference in credit ratings in the econometric specification of the model.

- the full sample of investment-grade bonds, excluding 100% government-owned bonds.

3.21 Table 3.1 shows the NZCC's estimates for each of the samples for the seven-year estimation window.[40]

Table 3.1 The NZCC's term spread estimates for each subsample

Bond sample	Spread premium of last seven years (bps)
BBB+ bonds only, including 100% government-owned bonds	11.6
BBB+ bonds only, excluding 100% government-owned bonds	11.0
Full sample, including 100% government-owned bonds	10.2
Full sample, excluding 100% government-owned bonds	3.8

Source: New Zealand Commerce Commission (2023), 'Financing and incentivising efficient expenditure during the energy transition topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', p. 49, table 3.1.

3.22 Of the above options, the NZCC places equal weight on the last two—i.e. the full sample of investment-grade bonds both including and excluding government-owned bonds. We agree that including the full sample of bonds increases the number of observations and statistical robustness of the econometric model used by the NZCC.[41] However, taking the average between the samples that include and exclude government-owned bonds places an arbitrary weight on individual bonds in the final average estimate. In particular, the sample excluding government-owned bonds is a subset of the sample including government-owned bonds. Hence, by taking the average of the two samples, non-government-owned bonds are double-counted in the final estimate. This makes the results dependent on the relative number of government-owned bonds. A more robust and transparent approach would be to rely solely on the full sample including the government-owned bonds.

[40] In addition, the NZCC presents the estimates excluding the COVID-19 pandemic period.
[41] The trade-off is between the increased sample size and the relevance of the bonds. We were not able to replicate the exact sample used by the NZCC, and are therefore not able to assess whether the NZCC has struck the right balance.

3.23 In the estimation window selection, the NZCC has excluded what it defines as the COVID-19-affected period (March 2020–August 2020).[42] As further discussed in section 5B below in relation to the beta allowance, excluding the COVID-19 period from the estimation window is an arbitrary data selection decision and will lead to mis-estimation of the actual costs faced by the companies. Any arbitrary methodological choices lower the predictability and transparency of the regulatory regime.

3.24 The NZCC excludes the COVID-19 period due to 'outliers and abnormal observations'[43]—however, most seven-year estimation periods that could be used by the NZCC would include some periods of high volatility and 'abnormal observations'. For illustration, Figure 3.3 below shows the term spread between five- and ten-year tenors for New Zealand government bonds. While not directly comparable with EDBs' term spreads on corporate bond debt premia, the figure illustrates that government bond term spreads in New Zealand regularly face temporary shocks which are part of a normal business cycle, and there is therefore no a priori reason to treat the COVID-19 period differently.

[42] New Zealand Commerce Commission (2023), 'Financing and incentivising efficient expenditure during the energy transition topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', para. 3.125.
[43] Ibid.

Figure 3.3 The term spread between New Zealand government ten-year and five-year bonds (%)

Note: Term spread is calculated as the difference in yields of ten-year and five-year New Zealand government bonds.
Source: Oxera analysis of Bloomberg data.

3.25 The debt raised during the COVID-19 period is part of the financing structure of the benchmark company. Hence, including this period in the calibration of the TCSD allowance better compensates the EDBs for the actual financing costs that they face.

3.26 Finally, we do not see clear economic justification for setting a cap at a ten-year maturity for the TCSD allowance. The purpose of the TCSD is to compensate companies for longer-term debt, which the NZCC has recognised is an efficient financing decision for businesses with long economic asset lives, such as the EDBs.[44] There is no evidence that debt longer than ten years would be inefficient. There is also a potential circularity problem—the reason why not many companies within the industry issue such debt instruments may be the existing cap on the TCSD rather than because it is optimal for companies not to issue long-term instruments, based on available market rates. Hence, we consider that it is more appropriate for the NZCC to remove the ten-year cap and allow companies access to a

[44] New Zealand Commerce Commission (2016), 'Input methodologies review decisions. Topic paper 4: Cost of capital issues', 20 December, para. 176.

wider choice of debt instruments and tenors (potentially adopting a cap with a longer term, e.g. aligned with the length of asset lives in the sector).

3.27 Based on the estimates presented by the NZCC (see Table 3.1 above), using the full estimation window over the last seven years and a full sample of bonds including the bonds of the companies fully owned by the government raises the TCSD from **7.5bps** (an average of 7.4 across the two samples) to **10.2bps**.[45]

[45] New Zealand Commerce Commission (2023), 'Financing and incentivising efficient expenditure during the energy transition topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', p. 49, Table 3.1.

4 Tax-adjusted market risk premium

4.1 In our previous report for the EDBs, we recommended that the NZCC places less weight on the TAMRP estimate from DGM and survey evidence, due to the unreliability and/or methodological flaws of these forward-looking estimation methods.[46] We also recommended placing less weight on the Siegel I model and more on the Siegel II model, given their respective assumptions on the relationship between the TAMRP and the RFR. Neither the NZCC nor Dr Lally have commented on the merits of these recommendations.

4.2 In the rest of this section, we extend our discussions on these recommendations and show why they merit consideration from the NZCC as regards its derivation of an estimate for the TAMRP (see section 4A for the DGM and section 4B for the Siegel models). We also show that the TAMRP estimates by investment banks selected by the NZCC do not appear to fully represent the views of these institutions, based on the evidence that we have collated from the public domain, such that the data relied upon by the NZCC does not appear to be robust (section 4C). We conclude that a higher estimate of the TAMRP can be obtained by examining alternative publications by these analysts (section 4D).

4A Use of DGM and survey data

4.3 In our first report for the EDBs, we explained that both a DGM-based approach and collection of survey data face significant methodological limitations, and neither was used by the AER or Ofgem as direct input to their market return estimates.[47] In this sub-section, we focus on the NZCC's use of the DGM, which, based on Dr Lally's methodology, arrived at significantly lower estimates of the TAMRP than other methods did (i.e. 5.3% for New Zealand and 6.7% for Australia, relative to the NZCC's rounded average allowance of 7.0%).

4.4 One common concern about the DGM is that, unlike approaches based on historical data (e.g. the Ibbotson model and the Siegel models), the DGM is highly sensitive to input assumptions that may be quite subjective, such as future growth rates over a

[46] Oxera (2023), 'Review of the NZCC's WACC-setting methodology', 31 January, p. 27.
[47] Ibid.

perpetual period. Small changes in these assumptions could lead to large swings in the market return estimates, undermining the robustness of such modelling as it is applied to the estimation of this parameter.

4.5 To test whether the NZCC's use of the DGM suffers from these issues, we have replicated Dr Lally's approach to the DGM and performed sensitivity tests on the model.

4.6 In general, Dr Lally's approach to the DGM is heavily dependent on three input assumptions:

- the dividend yield (i.e. *D*);
- the long-term expected growth rate in dividends per share (DPS) (i.e. *g*); and
- the rate at which short-term dividend growth rates converge to the long-term *g*.

4.7 The long-term DPS growth rate *g* also depends on the expected long-run real growth in gross domestic product (GDP), the creation of new shares, and the long-term expected inflation rate. Table 4.1 below outlines Dr Lally's choice for each of the assumptions and his reasoning.

Table 4.1 Dr Lally's configuration of the DGM for New Zealand

	Dr Lally's value/approach	Reasoning
Dividend yield (*D*)	3.3%, 3.6% and 3.9% for FY2023, FY2024 and FY2025	Bloomberg estimates for the NZX50
Expected long-run real growth in GDP	3%	Historical data and academic literature
Creation of new shares	0.01	Academic literature
Long-term expected inflation	2%	Forecasts and the Reserve Bank's inflation target
Long-term expected growth rate in DPS (*g*)	4.6%	Calculation
Convergence from short-term growth to *g*	Linear convergence	Assumption
Resulting TAMRP	**5.3%**	Calculation

Source: Lally, M. (2023), 'Estimation of the TAMRP', 10 April, pp. 19–22.

4.8 Our analysis reveals that the TAMRP output, based on Dr Lally's configuration, is highly sensitive to the input assumptions adopted above. For example, by simply increasing the long-term expected inflation rate from 2% to 3% and holding all other assumptions constant, *g* would increase from 4.6% to 5.1%, increasing the TAMRP estimate from 5.3% to 6.2%. We note that 3% is not an unreasonable assumption, given that inflation in New Zealand was 5.4% between 1960 and 2022.[48]

4.9 Alternative assumptions can also be made on the convergence from short-term dividend growth to *g*. While Dr Lally assumed a linear convergence, this assumption is by no means the definitively correct approach in DGM applications. If we assume that the dividend growth rate from FY2024 to FY2025 (based on Dr Lally's source, i.e. Bloomberg forecasts) stays constant before entering the terminal growth stage, the TAMRP estimate would be 6.6% when combined with the changes to inflation assumption. This is not to say that a flatline dividend growth rate before stepping into the terminal growth phase is unequivocally correct, any more than Dr Lally's linear interpolation between the two growth phases is unequivocally correct. The concern that we have highlighted with this modelling is that the DGM model can be used to obtain results that vary considerably and therefore Dr Lally's estimate of 5.3% is not a robust input for the NZCC to use in its TAMRP estimation. These sensitivity tests are set out in Table 4.2 below.

Table 4.2 Sensitivity tests on the DGM for New Zealand

	Dr Lally	3% inflation	3% inflation + alternative convergence method
Resulting TAMRP	5.3%	6.2%	6.6%

Source: Oxera based on analysis by Dr Lally.

4.10 Similarly, for the DGM for Australia, adjusting the inflation assumption from 2.5% to 3% increases the TAMRP from 6.7% to 7.1%. Also, when alternative dividend yield forecasts for ASX All

[48] The World Bank, 'Inflation, consumer prices (annual %) - New Zealand', https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?end=2022&locations=NZ&start=1960&view=chart (accessed 12 July 2023).

Ordinaries, which contains the 500 largest ASX listed companies, are used instead of those for ASX 200 (i.e. Dr Lally's assumption), the TAMRP further increases to 7.2%. These sensitivity tests are set out in Table 4.3 below.

Table 4.3 Sensitivity tests on the DGM for Australia

	Dr Lally	3% inflation	3% inflation + dividend yield for alternative index
Resulting TAMRP	6.7%	7.1%	7.2%

Source: Oxera based on analysis by Dr Lally.

4.11 While we do not form a view that the alternative input assumptions shown in these sensitivity analyses are better than those adopted by Dr Lally, they are all reasonable alternatives that can lead to significantly different TAMRP estimates. These tests further validate our concern that the DGM is highly sensitive to input assumptions and is therefore less credible than the Ibbotson model and the Siegel models (within the sample of TAMRP estimates used by the NZCC), which rely on historical market returns.

4B The Siegel models

4.12 In our first report for the EDBs, we recommended placing more weight on the Siegel II model specification than the Siegel I model, on the grounds that the Siegel II model assumes that the expected real market return is constant over time.[49]

4.13 As a brief overview of the relevant concerns, note that evaluating the relative merits of the Siegel I and Siegel II models requires one to take a view on the relationship between the historical TMR and the RFR. One view, corroborating the Siegel I model, is that the market risk premium (MRP, i.e. the TAMRP in the New Zealand context) is approximately constant over time and largely independent of the RFR. Another view, corroborating the Siegel II model, suggests that the expected TMR reverts to a

[49] Oxera (2023), 'Review of the NZCC's WACC-setting methodology', 31 January November, p. 25.

long-term average, and that changes in the RFR are largely offset by changes in the MRP over time.

4.14 A large body of past and more recent literature has supported the latter view, linking required returns to economic uncertainty. In this view, changes in the way in which risk is priced affect the risk-free and risky assets simultaneously. When economic uncertainty increases, there tends to be a 'flight to safety' by investors, which raises demand for the risk-free asset and lowers demand for risky assets. This reduces the yield on the risk-free asset and increases the premium required to hold risky assets.

4.15 An example of this linkage is described in the consumption-based asset pricing model developed by the Bank of England, which predicts that consumers and investors will respond to an increase in economic uncertainty by increasing demand for risk-free assets and reducing demand for risky assets.[50] In this model, higher economic uncertainty simultaneously puts downward pressure on the RFR and puts upward pressure on the MRP, meaning that the TMR is roughly constant over time. The Bank of England model also assumes that consumers and investors care about large negative shocks as well as the local volatility of consumption and investment returns. When the distribution of expected consumption and GDP growth is more negatively skewed and has a higher probability of extreme events (kurtosis), the MRP is higher and the RFR is lower.[51]

4.16 Other studies have also voiced support for the negative relationship between the MRP and the RFR. For example:

- evidence previously relied on by Ofgem, from Mason, Miles and Wright (2003), proposed a methodology whereby the TMR should be assumed to be constant (implying a one-for-one offsetting change in the RFR and MRP),[52] and set in the light of realised historical real returns over long samples. The authors noted that there is considerably

[50] Summarised in Vlieghe, G. (2017), 'Real interest rates and risk', Society of Business Economists' Annual conference, 15 September, https://www.bankofengland.co.uk/-/media/boe/files/speech/2017/real-interest-rates-and-risk.pdf (accessed 13 July 2023).
[51] Martin, I. (2013), 'Consumption-Based Asset Pricing with Higher Cumulants', *Review of Economic Studies*, **80**, pp. 750–51.
[52] The constant TMR was reaffirmed as a conclusion of the 2003 paper in a later paper in 2014–15 (cited below).

higher uncertainty about the true historical RFR, and the equity risk premium (ERP, i.e. the MRP), than there is about the TMR;[53]

- related to the preceding point, this academic view was supported in a later paper by Wright and Smithers (c. 2014–15), which concluded that the 'real market cost of capital should be assumed constant, on the basis of data from long-term historic averages of realised stock returns'. The authors implied a negative correlation coefficient of 1: 'It is therefore an application of simple arithmetic to conclude that, applying our methodology, the (assumed) market risk premium and the RFR must move in opposite directions: i.e., must be perfectly negatively correlated';[54]
- a similar conclusion about the relative stability of the TMR over time has been observed in the US market. A study in the USA found that the MRP is inversely related to the RFR—i.e. as the RFR falls, the MRP increases. Specifically, the authors concluded that, for the period 1986–2010, using data from the S&P 500, the coefficient of the relationship between the interest rate and the MRP was -0.79, such that a 1% decline in the RFR would be offset by a 0.79% increase in the MRP.[55]

4.17 Indeed, Dr Lally himself shares similar views to the academic literature set out above. Dr Lally has explained that:[56]

the second version [of the Siegel model] has merit independent of any historical inflation shock because it assumes that **the expected real market return is constant over time and this may be a better assumption than that underlying the historical averaging of excess returns (that the TAMRP is constant over time).** [emphasis added]

4.18 Notwithstanding his belief that the Siegel II model might be superior to the Siegel I model due to its more realistic

[53] Wright, S., Mason, R. and Miles, D. (2003), 'A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.', on behalf of Smithers & Co, 13 February, https://www.ofgem.gov.uk/sites/default/files/docs/2003/02/2198-jointregscoc_0.pdf (accessed 13 July 2023).
[54] Wright, S. and Smithers, A. (undated), 'The Cost of Equity Capital for Regulated Companies: A Review for Ofgem', p. 16, https://www.ofgem.gov.uk/sites/default/files/docs/2014/02/wright_smithers_equity_market_return.pdf (accessed 13 July 2023).
[55] Harris, R. and Marston, F. (2013), 'Changes in the Market Risk Premium and the Cost of Capital: Implications for Practice', *Journal of Applied Finance*, **23**:1, pp. 6–7.
[56] Lally, M. (2023), 'Estimation of the TAMRP', 10 April, p. 18.

assumptions about the stability of the TMR, we observe that Dr Lally has still placed equal weights on both models. This is due to the statistical tests that he has performed on the historical TAMRP in New Zealand, where he was unable to reject the null hypothesis that the time series of the TAMRP have no time trend.[57] However, as he himself explained, distortion effects make it difficult to detect the downward drift in the true TAMRP from the regression tests that he undertook. It is therefore not robust to place equal weights on both of the Siegel models.

4.19 In summary, based on the academic evidence available and Dr Lally's own commentary, it would be reasonable for the NZCC to place less weight on the Siegel I model specification and more on the Siegel II model. This would imply more weight being placed on the TAMRP estimate of 7.7% for New Zealand in Dr Lally's sample (corresponding to the Siegel II model specification), rather than 6.0% (corresponding to the Siegel I model).

4C Broker estimates

4.20 The NZCC has sought to support its estimate of the TAMRP by referring to evidence from brokers and analysts. These estimates are set out in Table 4.4 below. While attributing them to the various investment banks, the NZCC has not disclosed the original source of these estimates.

Table 4.4 TAMRP estimates used by major New Zealand investment banks

	TAMRP estimate
Craigs Investment Partners	6.50%
Forsyth Barr	5.50%
Jarden	7.00% and 7.25%[1]
Macquarie	7.50%
UBS	7.00%

Note: [1] As explained by the NZCC, Jarden uses 7% company-wide and for Vector, but 7.25% for AIA.

[57] Ibid., p. 27.

Source: NZCC (2023), 'Cost of capital topic paper – Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, Table 4.10.

4.21 Our research reveals that, at least in some of the published equity analyst reports, some of these investment banks specify higher TAMRP estimates than those quoted by the NZCC. For example, while Forsyth Barr set out its expected TAMRP estimate at 7.50% in a recent report on Vector dated June 2023,[58] the NZCC has quoted an unreferenced 5.50%. Similarly, while the NZCC cites that UBS estimated the TAMRP to be 7.00%, UBS has stated that its estimate is 7.5% in another equity analyst report on Vector dated June 2023.[59]

4.22 If the TAMRP estimates for Forsyth Barr and UBS are updated in line with the latest figures revealed in their respective analyst reports, the mean TAMRP estimates from brokers increases to 7.25% (assuming 7.25% by Jarden), and the median increases to 7.50% (assuming either 7.00% or 7.25% by Jarden).

4.23 Therefore, based on the evidence available in the public domain, it is inappropriate for the NZCC to assert that the brokers' estimates support a TAMRP of 7.00%.

4D Our updated TAMRP estimate

4.24 In line with the discussions set out in the sub-sections above, we recommend that the NZCC does not give weight to evidence from the DGM and survey-based results[60] in its estimation of the TAMRP. With respect to the Siegel models, we recommend placing more weight on the evidence from the Siegel II model and less on the Siegel I model due to the former's more reliable assumptions about the relationship between the RFR and the MRP. This means that a more reliable TAMRP estimate would be anchored on evidence from the Ibbotson model and a weighted Siegel model. Table 4.5 sets out the average TAMRP for different weight allocations between the Siegel I and II models. These updated estimates support a TAMRP estimate that is closer to 7.50% than to 7.00%. Adopting the NZCC's rounding approach

[58] Forsyth Barr (2023), 'Vector – Capex Funding No Easier', 15 June, p 3.
[59] UBS (2023), 'Vector – Draft ComCom report released', 14 June, p. 1.
[60] While not discussed in this section, our previous report explains the limitations of the use of survey-based evidence in deriving estimates of the TAMRP. In particular, we have explained that the respondents' answers are likely to be subject to a few behavioural biases. For more details, see Oxera (2023), 'Review of the NZCC's WACC-setting methodology', 31 January, p. 27.

would result in a TAMRP of 7.50%, which is also consistent with the broker estimates set out in section 4C.

Table 4.5 Updated estimates of the TAMRP with a five-year RFR for New Zealand

	25:75 for Siegel models	10:90 for Siegel models
Ibbotson estimate	7.40%	7.40%
Weighted Siegel estimate	7.28%	7.53%
Average	**7.34%**	**7.47%**

Source: Oxera analysis based on the NZCC's estimates.

5 Asset beta

5.1 In this section, we assess two aspects of the NZCC's asset beta estimation.

5.2 In section 5A, we discuss the frequency of returns data. We recommend that the NZCC adds daily beta estimates to the set of evidence that it uses to set the allowed asset beta. The key concern typically associated with daily beta estimates is stock illiquidity, which is mitigated by the fact that the NZCC applies liquidity filters. We also show that the average standard errors of individual comparators' asset betas are the lowest for daily asset betas, which shows that, from the point of view of statistical significance, there is no reason to exclude daily betas from the NZCC's assessment.

5.3 In section 5B, we assess the NZCC's treatment of the COVID-19 period. We consider that the beta estimates affected by the COVID-19 pandemic provide valuable information about the companies' risks, as any other event causing market volatility would. Accordingly, we see no reason for the COVID-19 pandemic period to be treated differently and lead to a change in the NZCC's approach as part of this IMs review. We find the NZCC's approach to be concerning as it introduces non-justified non-replicable methodological steps, and by this reduces the stability and predictability of the regulatory regime.

5.4 Compared with the NZCC's preferred asset beta estimate of **0.35** for energy networks, an average of daily, weekly and four-weekly estimates for the last two five-year periods is **0.37**, while the 75th percentile of the range of these estimates (which is consistent with the percentile that the NZCC chooses for its DD within its proposed range) is **0.39**.

5A Frequency of returns data for beta estimation

5.5 The NZCC's decision is to calculate daily, weekly and four-weekly betas, but to place no weight on daily betas and to take an average of the weekly and four-weekly ones instead.[61]

[61] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, para. 4.112. However, where the NZCC calculates betas based on quite short periods, it relies only on weekly betas. See ibid., para. 4.119.2.

5.6 Table 5.1 shows the NZCC's estimates.

Table 5.1 The NZCC's five-year asset beta estimates, 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

Source: New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, Table 4.1.

5.7 The NZCC notes that both daily, on the one hand, and weekly and four-weekly estimates, on the other hand, have their pros and cons:[62]

- daily asset beta estimates can be distorted by low liquidity stocks;
- weekly and monthly asset beta estimates lead to fewer observations and this can affect the statistical significance of the results.

5.8 The NZCC notes, however, that the concern about the lower number of observations in lower-frequency betas is addressed by estimating betas across all possible reference days.[63]

5.9 The NZCC further considers regulatory precedent in Australia and the UK, observes that the standard errors for four-weekly betas are not always the highest, and lastly refers to the Gregory et al. (2015) paper that recommends the use of low-frequency estimates.[64]

[62] Ibid., para. 4.102.
[63] Ibid., para. 4.102. The NZCC estimates weekly and four-weekly betas by estimating regression coefficients for each reference day and then taking an average of the results of all regressions. For example, a weekly beta would be an average of five betas estimated based on individual regressions for each working day of the week.
[64] Gregory, A., Hua, S. and Rajesh, T. (2015), 'In search of beta', April, https://ore.exeter.ac.uk/repository/bitstream/handle/10871/17191/In%20Search%20of%20Beta_ver%2012.pdf?sequence=1&isAllowed=y (accessed 10 July 2023).

5.10 As mentioned in our previous report for the EDBs, which the NZCC has acknowledged,[65] we consider that it would be more appropriate for the NZCC to put weight on daily betas. Given that the key concern in relation to daily betas is distortion due to low liquidity, and the fact that the NZCC carefully selects only liquid stocks to be included in the comparator sample (which the NZCC has once again confirmed to be its preference),[66] we see no reason for the NZCC to ignore the evidence contained in daily beta estimates.

5.11 We provided further evidence on this topic in our report for gas distribution businesses (GDBs) in February this year, which the NZCC has not yet acknowledged.[67] We noted a few more recent UK regulatory precedents where either exclusively daily estimates or a mix of daily, weekly and monthly estimates were used, such that the UK regulators did not limit themselves to the recommendations of the Gregory et al. (2015) study.

5.12 For example, the UK CMA considered whether relying on monthly or quarterly estimates would be preferable but did not pursue this method, noting that five-year monthly estimates were significantly more volatile than the estimates over other time horizons and frequencies.[68] The CMA considered that this may be due to the small number of data points (60 months) used in the estimates.

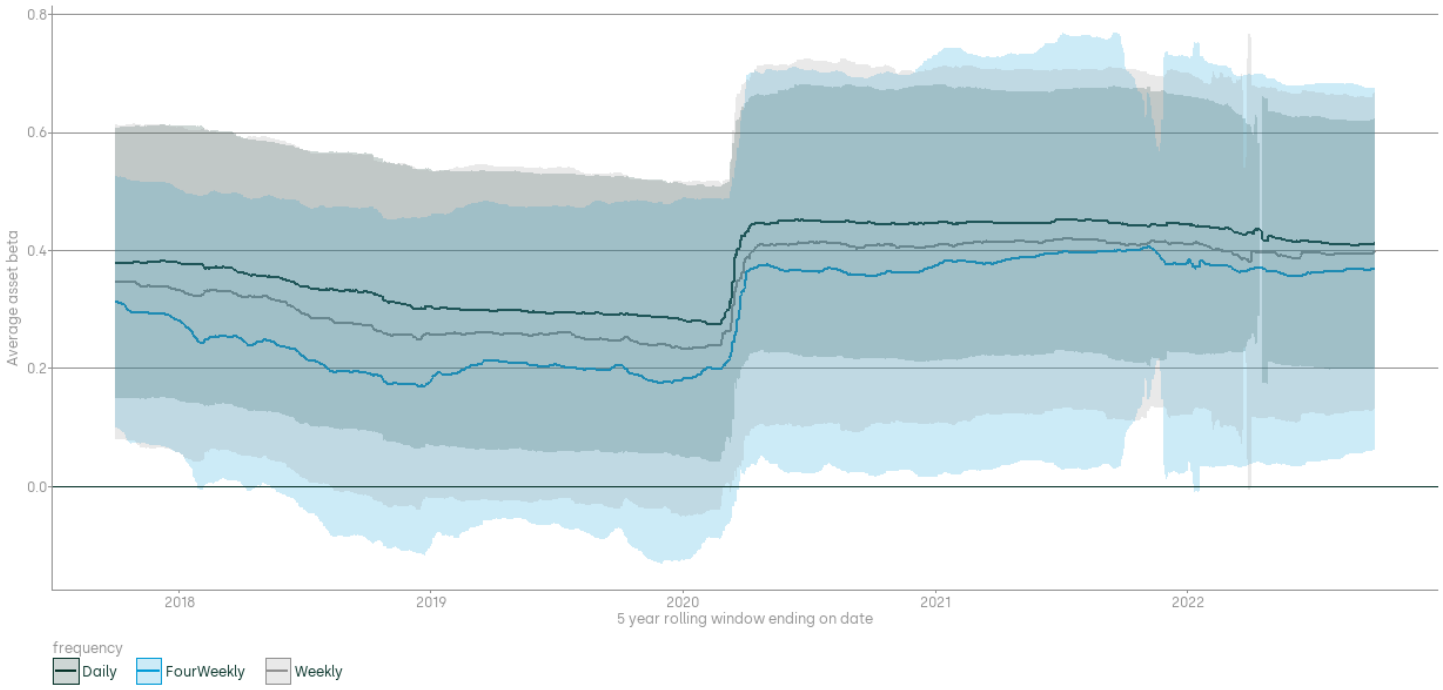
5.13 We note that this consideration by the CMA about the small number of data points is relevant. The CMA has also, as in the case of the NZCC, estimated monthly betas as an average of individual reference days' betas. However, unlike the NZCC, the CMA did not consider that the issue of the small number of observations was resolved by doing so. We consider that this is because each five-year monthly (or four-weekly) regression is

[65] Ibid., para. 4.103.
[66] Ibid., para. 4.111. In particular, the NZCC states the following: 'Further, our preference is to exclude firms that have unreliable beta estimates rather than to include these firms using a lesser frequency estimation method.'
[67] Oxera (2023), 'Asset beta and WACC percentile for New Zealand gas distribution businesses. Prepared for Vector, Firstgas and Powerco', 1 February, section 2.2.2 (paras 2.30–2.38).
[68] 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, para. 9.463, https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf (accessed 9 July 2023).

still estimated based on only 60 observations, which could affect the statistical significance of the results.

5.14 Figure 5.1 shows daily, weekly and monthly rolling five-year asset betas for the NZCC's energy sample with their confidence intervals. Visually, monthly beta means appear to be the most volatile over time, as the UK CMA found for the sample and time period that it was analysing.

Figure 5.1 Five-year asset betas for the NZCC's energy sample



Note: Confidence intervals are defined at the 95th percentile, based on standard errors obtained as per the NZCC's model.
Source: Oxera analysis, based on the NZCC models and sample of comparators reported in New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June.

5.15 In terms of statistical significance, in our previous report commissioned by the GDBs we presented evidence of the average standard errors of individual comparators' beta estimates to see whether the statistical robustness of the individual daily beta estimates differs considerably from lower-frequency estimates.[69] We update this analysis below, based on

[69] Oxera (2023), 'Asset beta and WACC percentile for New Zealand gas distribution businesses. Prepared for Vector, Firstgas and Powerco', 1 February, para. 2.36.

the NZCC's latest beta model. Table 5.2 shows that, in the three most recent five-year periods (2007–12, 2012–17 and 2017–22), daily asset betas on average had lower standard errors than the weekly and four-weekly asset betas, supporting the argument that a higher frequency tends to lead to greater statistical accuracy.

Table 5.2 Average standard errors of individual comparators' five-year asset betas

Specification	2007–12	2012–17	2017–22
For daily asset betas	0.01	0.02	0.02
For weekly asset betas	0.03	0.05	0.04
For four-weekly asset betas	0.06	0.12	0.09

Note: The table shows the averages of standard errors of individual comparators' five-year asset betas, as opposed to the standard errors of the energy sample asset betas. The cut-off dates are 30 September 2012, 30 September 2017, and 30 September 2022.
Source: Oxera estimates, based on the NZCC models and sample of comparators reported in New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June.

5.16 As for the NZCC's own analysis of the sample beta standard errors, in the latest five-year period (2017–22), the standard errors for daily betas were lower than for weekly and four-weekly betas.[70] Our analysis, following the NZCC's methodology, shows that this has been the case since at least February 2018. In 2012–17, standard errors of daily betas were marginally higher than those of four-weekly betas, with standard errors of weekly betas being the highest. In the 2007–12 period, the standard errors of the betas of all three frequencies were the same up to two decimal places.

5.17 As for Gregory et al. (2015),[71] the key finding of the paper is that the differences between beta estimates of different frequencies can be explained by size and liquidity factors—i.e. the larger the

[70] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, Table 4.2.
[71] Gregory, A., Hua, S. and Rajesh, T. (2015), 'In search of beta', April, https://ore.exeter.ac.uk/repository/bitstream/handle/10871/17191/In%20Search%20of%20Beta_ver%2012.pdf?sequence=1&isAllowed=y (accessed 10 July 2023).

firm or more liquid the stock, the smaller the difference between high and low frequency betas, where high-frequency betas are consistently lower than low-frequency betas. Based on this finding, Gregory et al. (2015) concludes:[72]

If we are able to explain large and systematic differences between high and low frequency betas, it implies that high frequency betas are not capturing some potentially important aspects of risk.

5.18 We assume that the authors come to this qualitative conclusion based on the observation that the high-frequency betas were systematically lower than the low-frequency ones, within the sample under consideration. Therefore, we question whether they would draw the same conclusion in cases where high-frequency betas are higher than low-frequency betas—the former are much less likely to be missing 'potentially important aspects of risk'. Also, as noted above, the NZCC already applies liquidity filters, such that concerns about differences in liquidity as differential risk drivers should not drive a preference for using low-frequency estimation intervals in this case.

5.19 Finally, we observe that, in the case of the NZCC's energy sample, daily, weekly and four-weekly betas are not statistically different from each other when using the NZCC's estimates of standard errors for the assessment (see Figure 5.1 above).

5.20 To conclude, we still consider that, by relying exclusively on weekly and four-weekly betas, **the NZCC has been underfunding New Zealand energy networks for their risks**, as weekly and four-weekly betas were lower than daily betas at the time of the 2016 IMs (0.37 and 0.33 vs 0.40 as averages over the latest two five-year periods respectively) and are lower than daily betas now (0.37 and 0.33 vs 0.40 as averages over the latest two five-year periods respectively).[73]

5B Treatment of data during the COVID-19 period

5.21 In the 2010 and 2016 IMs, the NZCC's approach to estimating the asset beta was to rely on the last two periods of five years,

[72] Ibid., p. 15.
[73] For the NZCC's 2016 results, see New Zealand Commerce Commission (2016), 'Input methodologies review decisions; Topic paper 4: Cost of capital issues', 20 December, Table 1.

which for the 2023 IMs would imply that the focal periods are 2012–17 and 2017–22.

5.22 In its DD, the NZCC has suggested deviating from this approach, to account for the impact of the COVID-19 pandemic. In particular, the methodologies underpinning the NZCC's considered range of asset betas from 0.32 to 0.36 appear to be the following:[74]

- **0.32** is a mid-point between 0.31 (the pre-COVID-19 asset beta, estimated as an average of weekly and four-weekly betas for 2007–12, 2012–17 and 2018–February 2020) and 0.33 (the weighted average of the pre-COVID-19 and COVID-19 asset betas, using 92.5% and 7.5% as the weights);
- **0.36** is based on the last two five-year periods (weekly and four-weekly estimates), which also matched the weekly asset beta for the period from 1 October 2021 to 30 September 2022 (a year-long post-COVID-19 period).

5.23 The 7.5% weight for the COVID-19 asset beta in the first approach represents the NZCC's estimated probability of a pandemic-like event during the regulatory period of five years. To estimate the 7.5% weight, the NZCC assumes that an event of this sort occurs every 20 years and lasts for 18 months.[75]

5.24 The NZCC has then chosen a point estimate of 0.35 from the 0.32–0.36 range.[76]

5.25 We agree with the NZCC when it notes that it considers it likely that the COVID-19 pandemic 'provided new information', that 'investors have repriced and reweighted airports [as well as energy networks and other companies] in their efficient portfolio of investments', and that the COVID-19 beta estimates provide the NZCC with valuable information about the companies' risks as any other event causing volatility in the market would do.[77]

[74] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, para. 4.124.
[75] Ibid., para. 4.62.3.
[76] Ibid., para. 4.125.
[77] Ibid., para. 4.67.

5.26 We agree that the beta estimates affected by the COVID-19 pandemic provide valuable information about the companies' risks, as any other event causing market volatility would. Accordingly, we see no reason for the COVID-19 pandemic period to be treated differently and lead to the change in the NZCC's approach, which is estimating betas based on the two latest five-year windows. Instead, we find the NZCC's approach concerning as it introduces non-justified non-replicable methodological steps and, by this, reduces the stability and predictability of the regulatory regime.

5.27 In summary, we note that:

- although the NZCC follows regulatory precedent from the UK aviation sector in its approach to the COVID-19 returns treatment, it is currently under appeal, and it goes against many other regulatory precedents;
- the NZCC's estimate is sensitive to assumptions about the length and frequency of pandemic-like events, which are not well explained;
- the NZCC's estimate is even more sensitive to the choice of the representative pandemic and non-pandemic periods;
- the NZCC double-counts the impact of the pre-pandemic asset beta estimate;
- the NZCC does not explain its choice of the point estimate within the range;
- by treating the COVID-19 data differently (from any other period, including periods of significant market volatility such as that of the global financial crisis), the NZCC deviates from its principles-based approach and introduces a large degree of subjectivity that undermines the robustness of the analysis and increases regulatory risk;
- using the NZCC's standard approach would apply the same treatment to the observations during the COVID-19 pandemic, which is a common approach to outliers that contain important information.

5.28 We explain each of these points below.

5.29 The NZCC relies on the UK Civil Aviation Authority (CAA) precedent for the Heathrow Airport H7 price control. However,

that decision is being appealed at the UK CMA and may yet be overturned.[78]

5.30 In its PR19 determination in the water sector, the CMA decided against giving special treatment to the COVID-19 period when estimating the beta, stating the following:[79]

We observe that events in March 2020 did lead to a sharp move in the prices of the water company shares and the overall market index level. However, as we consider the COVID-19 impact to be predominately an example of systematic risk, we do not think it is automatically appropriate to exclude data from this period.

5.31 Ofwat, the economic regulator of the water industry in England and Wales, follows the same approach in that it does not treat data in the COVID-19 period any differently from the data in other periods.[80] Instead, it acknowledges the volatility and places the most weight on longer (i.e. five- and ten-year) estimation periods.

5.32 In turn, as reported by the NZCC,[81] the AER did not apply special treatment to the COVID-19 pandemic period either. Instead, it used long regression windows as, according to the AER, they are likely to offer the most statistically robust estimates of the beta for energy companies.[82]

5.33 As for the NZCC, to set the lower end of the range at 0.32, the NZCC introduces assumptions about the length and frequency of pandemic-like events. It assumes that these events happen

[78] Heathrow Airport Limited (2023), *Heathrow Airport Limited Vs The Civil Aviation Authority*, Notice of appeal, 18 April, https://assets.publishing.service.gov.uk/media/64411bcb8b86bb0013f1b659/230417_HAL_NoA__Redacted_.pdf (accessed 26 June 2023).
[79] 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, para. 9.468, https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf (accessed 4 July 2023).
[80] Ofwat (2022), 'Creating tomorrow, together: Our final methodology for PR24. Appendix 11 Allowed return on capital', pp. 41 and 46, https://www.ofwat.gov.uk/wp-content/uploads/2022/12/PR24_final_methodology_Appendix_11_Allowed_return.pdf (accessed 10 July 2023).
[81] Ibid., para. 4.123.1.
[82] Australian Energy Regulator (2022), 'Draft Rate of Return Instrument Explanatory Statement', 16 June, p. 176.

every 20 years and last for 18 months, without providing much explanation.

5.34 **The NZCC's results are sensitive to these assumptions**. For example, it mentions that a consultancy undertaking the analysis for the CAA (i.e. the UK aviation regulator, which set the precedent of using a similar methodology) considered ranges of frequencies (from 20 to 50 years) and lengths (from 17 to 30 months) of the pandemic.[83] If these ranges are applied to the NZCC's pre-pandemic and pandemic beta estimates, we get to a range of betas from 0.32 to 0.35, of which the NZCC uses only 0.33. Using ten weeks instead of 18 months as a length of the pandemic—consistent with the ten-week window that the NZCC uses to estimate a pandemic asset beta of 0.60—results in a beta of 0.31, which makes the range even wider.

5.35 **The results are even more sensitive to the choice of the representative pandemic and non-pandemic beta estimates**. If the pandemic period is defined as the period from February 2020 to February 2022, the NZCC's beta estimate for that period is 0.44.[84] If a non-pandemic period is defined as the two years before that time, i.e. from February 2018 to February 2020, the NZCC's beta estimate for that period is 0.20. Using the NZCC's pandemic and non-pandemic weights of 7.5% and 92.5%, the weighted average beta would be 0.21, which is a clear underestimation.

5.36 The challenge of defining a representative affected period is further highlighted by the fact that the NZCC chooses a different period for its TCSD estimates—in that section, the NZCC has defined the pandemic as lasting from March 2020 to August 2020.[85] The weekly beta for that period is 0.59.

5.37 By applying special treatment to the COVID-19 period, the NZCC also assumes that **no other factors affected the markets at the same time**. Although it is hard to assess the impact of individual factors in isolation, this is a strong assumption. Moreover, the NZCC **does not apply any special treatment to other periods of market volatility** such as the period of the global financial crisis.

[83] Ofwat (2022), 'Creating tomorrow, together: Our final methodology for PR24. Appendix 11 Allowed return on capital', para. 4.58.
[84] Ibid., para. 4.117.1. An average of weekly and four-weekly estimates. The weekly estimate is 0.50.
[85] Ibid., Table 3.1.

5.38 Once the NZCC has the weighted average asset beta estimate of 0.33, it takes an average of this estimate and the pre-pandemic estimate of 0.31 and arrives at 0.32. It then uses 0.32 as the lower end of its final range from 0.32 to 0.36, **thereby practically accounting for the pre-pandemic estimate twice**. In other words, the NZCC would arrive at the same result by assuming that pandemic-like events happen with half the frequency or half the duration than the NZCC currently assumes.

5.39 Having gone through this step, the NZCC sets a final range of plausible estimates from 0.32 to 0.36, where 0.36 is the result of applying the existing methodology, i.e. taking an average of the estimates for the last two five-year windows. The figure of 0.36 also happens to match the weekly beta for the year after the pandemic. Finally, the NZCC chooses 0.35 from its range. **The NZCC does not explain its choice**, but 0.35 is the asset beta value that was allowed in the 2016 IMs. Therefore, we assume that the NZCC chooses 0.35 to maintain the current level of the allowed beta.

5.40 As a result, the NZCC adopts the same allowed asset beta for energy networks as in the 2016 IMs but **introduces a large degree of subjectivity that undermines the robustness of the analysis**. It is unclear on this basis how the NZCC will methodologically undertake its estimation of the allowed asset beta next time. For example, the pre-pandemic period that the NZCC uses in the 2023 IMs will be outdated, so the NZCC will need to re-define the period that is not affected by the pandemic-like events. Not having a clear set of steps for setting a WACC parameter is a deviation from the NZCC's practice of providing regulatory stability and predictability.

5.41 Finally, the NZCC overlooks the point that, if the risk existed and was only repriced during the pandemic—as the NZCC believes is likely to be the case[86]—**energy networks were underfunded in the periods to which the 2016 IMs applied**, given that the risk that was revealed during the pandemic did not affect the allowances that were applicable at the time.

[86] Ibid., para. 4.67.

5.42 To avoid relying on additional and unnecessary assumptions, we consider that applying the same approach as in the past would provide appropriate results. Under that approach, the NZCC uses ten years of data—i.e. a sufficiently long period to reflect a range of the available evidence. The evidence would include observations that may be perceived as outliers, but that contain important information about tail risk and therefore should not receive special treatment within the assessment of the asset risk of the industry. It is common practice for asset managers to look at 'special' events when considering risks and required returns.

5.43 Quantitatively, keeping the approach unchanged would result in an asset beta of **0.36** (see Table 5.3), which is only 0.01 higher than the NZCC's preferred estimate of 0.35. Adding daily betas to the set of evidence and taking an average of six data points (daily, weekly and four-weekly for the last two five-year periods) would result in an estimate of **0.37**. The range would therefore be 0.31–0.41, and choosing the 75th percentile from this range (in the same way that the NZCC chooses its point estimate of 0.35 from the 0.32–0.36 beta range) would result in an estimate of **0.39**.

Table 5.3 Summary of the asset beta estimates

	2012–17	2017–22	Average of/range over the last two five-year periods
Daily	0.38	0.41	0.40
Weekly	0.35	0.40	0.37
Four-weekly	0.31	0.37	0.34
Average of weekly and four-weekly			**0.36**
Average of daily, weekly and four-weekly			**0.37**
Range of daily, weekly and four-weekly			0.31–0.41 (75th percentile at **0.39**)

Source: Oxera based on New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input'.

6 WACC percentile

6A Background and precedent

6.1 The WACC percentile that the NZCC targets in the electricity and gas distribution sectors was set at the 67th percentile in the 2016 IMs.[87] This followed extensive consultation that the NZCC undertook with industry and stakeholders in 2014 in order to determine the appropriate percentile that should be targeted. As part of this consultation, in 2014 Oxera wrote two reports for the NZCC in which we explained why we considered that a percentile between the 60th and 70th percentiles was the most appropriate to aim for.[88] The NZCC took this, as well as other responses, into account in deciding on the 67th percentile.

6.2 In 2022, we were commissioned by the 'Big Six' EDBs (Aurora, Orion, Powerco, Unison, Vector, and Wellington Electricity) as well as the GDBs (Vector, Firstgas and Powerco) to review the WACC percentile. In these reports, for both the EDBs and GDBs, we explained that the NZCC should continue using the 67th percentile for the regulation of electricity and gas networks because:[89]

- the evidence on the costs of outages supported a WACC percentile anywhere between the 65th and 85th percentile;
- the impact of underinvestment on delaying connection of low-carbon technologies (LCTs) could create a further asymmetric distribution of outcomes (i.e. in addition to the one already considered by the NZCC) that provided further reasons to aim up on the WACC;

[87] New Zealand Commerce Commission (2016), 'Electricity Distribution Services Input Methodologies Amendments Determination 2016', 20 December, p. 134, https://comcom.govt.nz/__data/assets/pdf_file/0018/60543/2016-NZCC-24-Electricity-Distribution-Services-Input-Methodology-Amendments-Determination-2016-20-December-2016.pdf (accessed 5 July 2023).
[88] Oxera (2014), 'Input methodologies—Review of the "75th percentile" approach', 23 June. Oxera (2014), 'Review of expert submissions of the input methodologies', 27 October, https://www.oxera.com/wp-content/uploads/2018/07/Oxera-review-of-the-75th-percentile-approach.PDF.pdf (accessed 5 July 2023). Oxera (2014), 'Review of expert submissions of the input methodologies', 27 October, https://comcom.govt.nz/__data/assets/pdf_file/0025/88522/Oxera-response-to-submissions-on-Input-methodologies-Review-of-the-75th-percentile-approach-27-October-2014.PDF (accessed 5 July 2023).
[89] Oxera (2023), 'Review of the percentile of the WACC distribution that should be targeted by the NZCC', 31 January, pp. 1–3, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-review-of-the-percentile-of-the-wacc-distribution-that-should-be-targeted-by-the-nzcc.pdf (accessed 5 July 2023).

- we exercised judgement to consider that the upper end of the distribution (between the 80th and 85th percentiles) may be unnecessary, especially as other regulatory tools can partially mitigate the risks of underinvestment;
- the NZCC's use of the 67th percentile had achieved good outcomes for consumers because the evidence suggested that the networks had been maintained at a good but not excessive level.[90] The NZCC states that electricity networks have not earned excessive returns and that profitability has been lower than its estimate of a reasonable return on investment.[91]
- there is value in maintaining regulatory stability, and thereby in retaining the level of the 67th percentile as previously used by the NZCC, to set the WACC allowance.

6.3 In June 2023, the NZCC published its DD on the WACC percentile, where it concluded that the percentile that was appropriate for gas network regulation was the 50th, and the percentile that was appropriate for electricity network regulation was the 65th. The reason for choosing a lower percentile for gas was because the NZCC considered that the impact of underinvestment on the gas networks was relatively low.[92] The NZCC's decision to apply the 65th, rather than the 67th, percentile to electricity networks appears to be based on the observation that the 65th percentile represents the mid-point of the range considered reasonable by the NZCC (55th–75th), and that none of the sense-checks run by the NZCC result in it being considered unreasonable.[93] This section of the report addresses the WACC percentile for electricity networks, while the WACC percentile for gas networks is covered in a separate report on behalf of the GDBs.

[90] That is, with reference to evidence on network reliability indicators and returns to networks.
[91] New Zealand Commerce Commission (2022), 'Local line companies' performance trends', 13 July, https://comcom.govt.nz/__data/assets/pdf_file/0019/230518/Local-lines-companies-performance-trends-fact-sheet-13-July-2022.pdf (accessed 17 July 2023).
[92] New Zealand Commerce Commission (2023), 'Part 4 Input Methodologies Review 2023 – Draft decision', paras 6.105–6.112, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).
[93] Ibid., paras 6.87–6.96.

6B Clarification of WACC percentile estimates presented so far—tax issue

6.4 In order to estimate its 55–75% reasonable range of WACC percentile uplifts, the NZCC used the estimates of the costs of outages arising from network underinvestment that were provided to it by four different submissions: those of CEPA, ASCE, CEG, and Oxera.[94] These costs were in the range of NZ$1bn–NZ$1.9bn and were used by the NZCC to calculate the avoided costs of underinvestment from aiming for a percentile above the 50th. This benefit was then offset against the additional costs incurred by consumers when the given WACC percentile was aimed for as the optimal percentile.[95] This comparison of the cost and benefits to determine the optimal WACC uplift is referred to as the loss analysis framework.

6.5 The methodology used by the NZCC was the same as that used by Oxera, except that the NZCC uplifted the value of the RAB to take into account corporation tax.[96] Specifically, it divided the RAB by (1 - corporate tax rate) before multiplying it by the WACC at a given percentile. This increases the costs that consumers face at a higher percentile, while the cost of outages is unaffected, thereby leading to a lower optimal percentile than one would obtain when not applying the tax adjustment.

6.6 By using two different assumptions on the delta between the true and regulated WACC that will cause underinvestment (either a 0.5% or 1% delta), the NZCC produced a range of optimal percentiles between 48 and 83.[97] These percentiles are summarised in Table 6.1 below. From this, the NZCC concluded that the 55th–75th percentile presented the most reasonable range.

[94] Ibid., para. 6.70.
[95] New Zealand Commerce Commission (2023), 'Part 4 Input methodologies Review 2023 - draft decisions — Cost of capital topic paper calculations spreadsheet: NSS spreadsheet model and WACC percentile spreadsheet model', 14 June.
[96] Ibid.
[97] New Zealand Commerce Commission (2023), 'Cost of capital topic paper Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, para. 6.70, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).

Table 6.1 Summary of WACC percentiles estimated by the NZCC

Delta required to cause underinvestment (cost assumption in brackets)	CEPA cost assumption (NZ$1.9bn)	Oxera cost assumption, bottom end as used by the NZCC (NZ$1bn)	ASCE cost assumption (NZ$1.1bn)	CEG cost assumption (NZ$1.25bn)	Mean
0.5%	83%	67%	70%	74%	**74%**
1%	68%	48%	52%	56%	**56%**
Mean	**76%**	**58%**	**61%**	**65%**	**65%**

Source: New Zealand Commerce Commission (2023), 'Cost of capital topic paper Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, para. 6.70, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).

6.7 The NZCC explained that it undertook this modelling approach because consumers pay pre-tax costs on the WACC percentile uplift, while businesses receive the after-tax benefits.[98] Due to this, the NZCC argues that the uplift is less effective than it would be if there were no corporate taxes because part of the additional cost paid by consumers to networks due to the uplift is transferred to the state through corporate tax. This means that, in order to provide sufficient additional revenue to networks to prevent underinvestment, the regulator needs to charge consumers more than that additional revenue.[99]

6.8 In practice, we observe that corporation tax is redistributed to the population through government expenditure, and thus does contribute to the net social welfare of the population. Given that there is likely to be a large overlap between consumers and those benefiting from government tax spending, the redistribution of corporation tax also contributes to consumer welfare (not just social welfare). We therefore disagree with the NZCC's approach of applying a tax adjustment to the RAB by dividing it by 1 minus the rate of corporation tax.

[98] Ibid., para. 6.66.
[99] Ibid., para. 6.70.2. New Zealand Commerce Commission (2023), 'Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services', 30 October, p. 119, https://comcom.govt.nz/__data/assets/pdf_file/0029/88517/Commerce-Commission-Amendment-to-the-WACC-percentile-for-price-quality-regulation-Reasons-Paper-30-October-2014.PDF (accessed 5 July 2023).

6.9 We note that there are likely to be redistributive effects in the transfer of funds through corporate taxation from (domestic and industrial) bill payers to taxpayers who may be energy customers in a region served by a different EDB. However, on the assumption that government expenditure has social benefits that are in excess of costs, the net effect of the redistribution should be positive.[100] We therefore consider our approach of not inflating the RAB by 1 minus the corporate tax rate to be the more appropriate method for estimating the optimal WACC percentile, rather than assuming that there is no net social benefit of the proportion of energy bills by which corporate taxes are funded. In any case, the proportion of energy bills that funds the networks' tax expenditure cannot be seen as benefits to the investors.

6.10 In addition, we note that we do not consider the NZCC's use of NZ$1bn as our 'preferred' estimate[101] to be a complete representation of the evidence that we have presented as regards the costs of underinvestment. This is because, as we explained in both of our previous reports,[102] we consider any estimates that are adjusted from the 2011 ASCE paper on the impacts of underinvestment on network quality to be reasonable, and estimates of anywhere between NZ$1bn and NZ$1.9bn can be derived from this. By using only the bottom end of the range, there will tend to be an underestimate in the NZCC's overall estimated range, as we explain further below.

6.11 While it is true that we focused on the NZ$1bn estimate in our previous reports, the reason for doing this was in order to be conservative, and in both reports we explained explicitly that we were taking a number from the bottom of the reasonable

[100] While we do not know whether public spending in New Zealand generally leads to greater benefits than costs, we note that the Treasury states that it 'encourages important public sector decisions to be informed by cost benefit analysis'. See The Treasury, 'Cost Benefit Analysis including Public Sector Discount Rates', https://www.treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/plan-investment-choices/cost-benefit-analysis-including-public-sector-discount-rates (accessed 11 July 2023).
[101] New Zealand Commerce Commission (2023), 'Cost of capital topic paper Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, para. 6.70.2, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).
[102] Oxera (2023), 'Asset beta and WACC percentile for New Zealand gas distribution businesses', paras 4.51–4.52, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-nz-gdbs-asset-beta-and-wacc-percentile-01-02-2023.pdf (accessed 5 July 2023). Oxera (2023), 'Review of the percentile of the WACC distribution that should be targeted by the NZCC', pp. 26–27, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-review-of-the-percentile-of-the-wacc-distribution-that-should-be-targeted-by-the-nzcc.pdf (accessed 5 July 2023).

range.[103] In fact, we explained that the true range could indeed be higher than the NZ$1bn–NZ$1.9bn implied by the ASCE paper because it may not be easy or quick to rectify the effects of underinvestment, and the decarbonisation of the New Zealand economy is likely to lead to greater reliance on electricity, meaning that outages will have more of a negative impact in future.[104] If the NZCC is using the bottom end of the range to create a new range, this could lead to an underestimate of the overall mean figure, holding all else constant. However, given that the higher end of the range (NZ$1.9bn) is already included in the NZCC's range, we do not make any adjustments to the cost assumptions used in the range. We do note however, that the mid-point of the Oxera cost estimates (i.e. NZ$1.45bn) results in an optimal WACC percentile of 61–78% even without removing the tax uplift applied by the NZCC. This gives a mid-point of 70%.

6.12 We have adjusted the NZCC's model to remove the tax adjustment to the RAB in Table 6.2, which is an update of Table 6.1.

[103] Oxera (2023), 'Asset beta and WACC percentile for New Zealand gas distribution businesses', para. 4.53, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-nz-gdbs-asset-beta-and-wacc-percentile-01-02-2023.pdf (accessed 5 July 2023). Oxera (2023), 'Review of the percentile of the WACC distribution that should be targeted by the NZCC', p. 27, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-review-of-the-percentile-of-the-wacc-distribution-that-should-be-targeted-by-the-nzcc.pdf (accessed 5 July 2023).
[104] Oxera (2023), 'Asset beta and WACC percentile for New Zealand gas distribution businesses', para. 4.54, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-nz-gdbs-asset-beta-and-wacc-percentile-01-02-2023.pdf (accessed 5 July 2023). Oxera (2023), 'Review of the percentile of the WACC distribution that should be targeted by the NZCC', pp. 27–28, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-review-of-the-percentile-of-the-wacc-distribution-that-should-be-targeted-by-the-nzcc.pdf (accessed 5 July 2023).

Table 6.2 Summary of the NZCC's WACC percentile re-estimates after removing the tax adjustment to the RAB

Delta required to cause underinvestment (cost assumption in brackets)	CEPA cost assumption (NZ$1.9bn)	Oxera cost assumption, bottom end as used by the NZCC (NZ$1bn)	ASCE cost assumption (NZ$1.1bn)	CEG cost assumption (NZ$1.25bn)	Mean
0.5%	88%	77%	79%	82%	**82%**
1%	75%	60%	63%	66%	**66%**
Mean	**82%**	**68%**	**71%**	**74%**	**74%**

Note: The mean calculation is based on the numbers obtained from the NZCC's model, so there may be rounding differences.
Source: New Zealand Commerce Commission (2023), 'Cost of capital topic paper Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, paras 6.67–6.70, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023). New Zealand Commerce Commission (2023), 'Part 4 Input methodologies Review 2023 - draft decisions — Cost of capital topic paper calculations spreadsheet: NSS spreadsheet model and WACC percentile spreadsheet model', 14 June.

6.13 We observe in the table above that, even using the bottom end of the range (i.e. NZ$1bn, as reported in the second column), the average optimal WACC percentile to aim for if underinvestment is assumed to occur at a 1% delta between the true and regulated WACC is 60%, and 77% if it occurs at a 0.5% delta. The mid-point of this range is 68%, which is above the 67th percentile. In aggregate, across the entire cost assumption sample we observe significantly higher average optimal WACC uplifts of 66% to aim for if underinvestment is assumed to occur at a 1% delta between the true and regulated WACC, and 82% if it occurs at the 0.5% delta. The mid-point of this range is significantly above the 67th percentile at 74%.

6.14 Similarly, when using the mid-point of the cost estimates presented by Oxera (i.e. NZ$1.45bn) but not removing the NZCC's tax uplift, the estimated optimal percentile is between 61% and 78%, with a mid-point of 70%. These figures suggest that the 67th percentile was already a conservative estimate, so a further reduction is not justified.

6C Further points that suggest that the NZCC is underestimating the optimal WACC percentile

6.15 The clarifications in the previous sub-section correct the range that the NZCC uses to determine the WACC percentile. In

addition, there are a number of factors that suggest that this estimate is conservative. This section discusses some of these factors where we disagree with some of the conclusions reached by the NZCC. These cover the following issues.

- The NZCC suggests that it is reasonable to use a WACC uplift to target reliability investments, while considering that other categories of spending can also reduce the probability of outages (section 6C.1).
- The NZCC considers the role of decarbonisation to be important only where it directly affects the likelihood of outages. We observe that, for future price controls, *in addition* to causing outages, underinvestment can delay decarbonisation, leading to further social costs (section 6C.2).
- The NZCC does not give sufficient weight to evidence from a relevant academic paper that would suggest a higher WACC uplift (section 6C.3).
- We consider that other regulatory tools do not sufficiently address underinvestment (section 6C.4).
- The NZCC's concern about how the uplift is applied to historical investments is not justified, and we emphasise the value of regulatory certainty (section 6C.5).

6C.1 Investment areas that should feed into the loss analysis framework

6.16 The NZCC states that it is only reasonable to use a WACC uplift to target reliability investments.[105] In doing so, it also appears to indicate that reliability is a relatively small element of network investment as it distinguishes reliability from, for example, investments to meet growth.[106] This appears to be one reason why the NZCC considers a WACC uplift to be a suboptimal regulatory tool.

6.17 We consider that any investments that reduce the probability of outages yield a corresponding benefit when they receive a WACC uplift. The New Zealand EDBs split their capital

[105] New Zealand Commerce Commission (2023), 'Part 4 Input Methodologies Review 2023 – Draft decision', paras 6.12–6.14, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).
[106] Ibid.

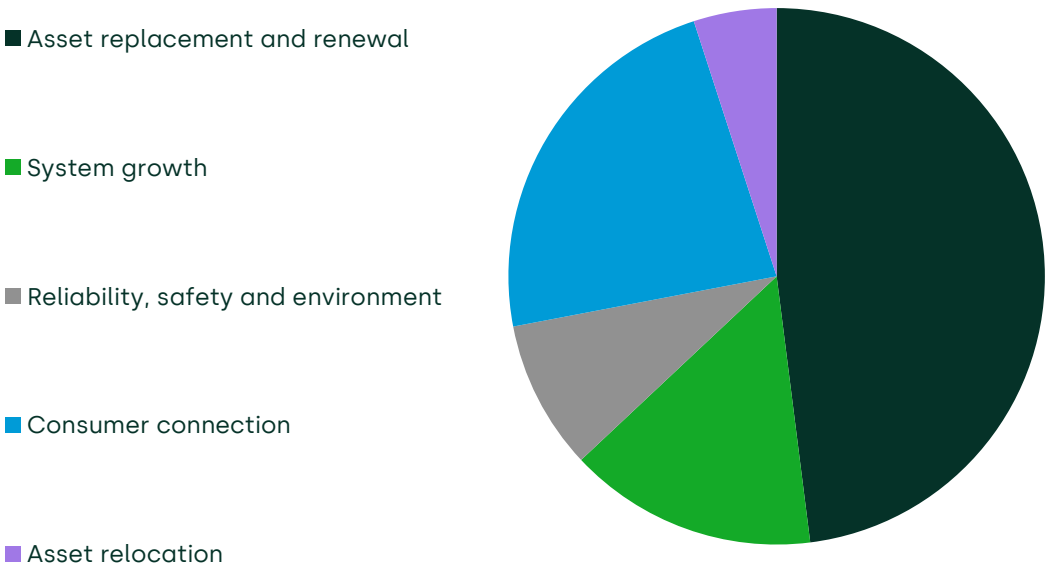
expenditure (CAPEX) into five areas,[107] three of which we consider would tend to increase network reliability. These are:

- asset replacement and renewal—we understand that, without this expenditure, the assets would degrade and create network quality issues, ultimately reducing the quantity or quality of electricity delivered to end-users;
- system growth—we understand that this expenditure covers investments in network infrastructure that help the networks to meet growing demand;
- reliability, safety, and environment—we understand that this expenditure covers investments that reduce the likelihood of the system breaking down, as well as investments that make the system more environmentally friendly. While the environmentally friendly part of this CAPEX category may not contribute to improved network quality, we consider that the other elements may. The expenditure in the sub-category 'environment' is also likely to lead to additional social benefits as part of New Zealand's net zero policies, so an underinvestment in this category would be costly, even though it would not be captured in the loss analysis framework. This is further explored in the next section.

6.18 Figure 6.1 below shows that the three categories of expenditure listed above (displayed in different shades of green) account for 73% of EDB CAPEX. This means that the vast majority of the expenditure to which the NZCC provides a WACC uplift is also expenditure that delivers a reliability benefit. Note also that, while we do not include 'consumer connection' expenditure within this 73% estimate, it is possible that consumer connection expenditure also delivers some social benefits in the form of decarbonisation (e.g. if renewables generators are being connected to the grid).

[107] Oxera (2023), 'Review of the percentile of the WACC distribution that should be targeted by the NZCC', Figure 4.3, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-review-of-the-percentile-of-the-wacc-distribution-that-should-be-targeted-by-the-nzcc.pdf (accessed 5 July 2023).

Figure 6.1 Breakdown of EDB CAPEX investments by type of investment



Source: Oxera analysis based on data received from the EDBs.

6C.2 Decarbonisation impacts of underinvestment

6.19 The NZCC considers the role of decarbonisation to be relevant only to the extent that it affects the likelihood or costs of outages.[108] We agree with the NZCC that the costs of outages will increase over time as the economy electrifies, but we disagree that decarbonisation affects the choice of the WACC percentile only through the effect on the likelihood or cost of outages.

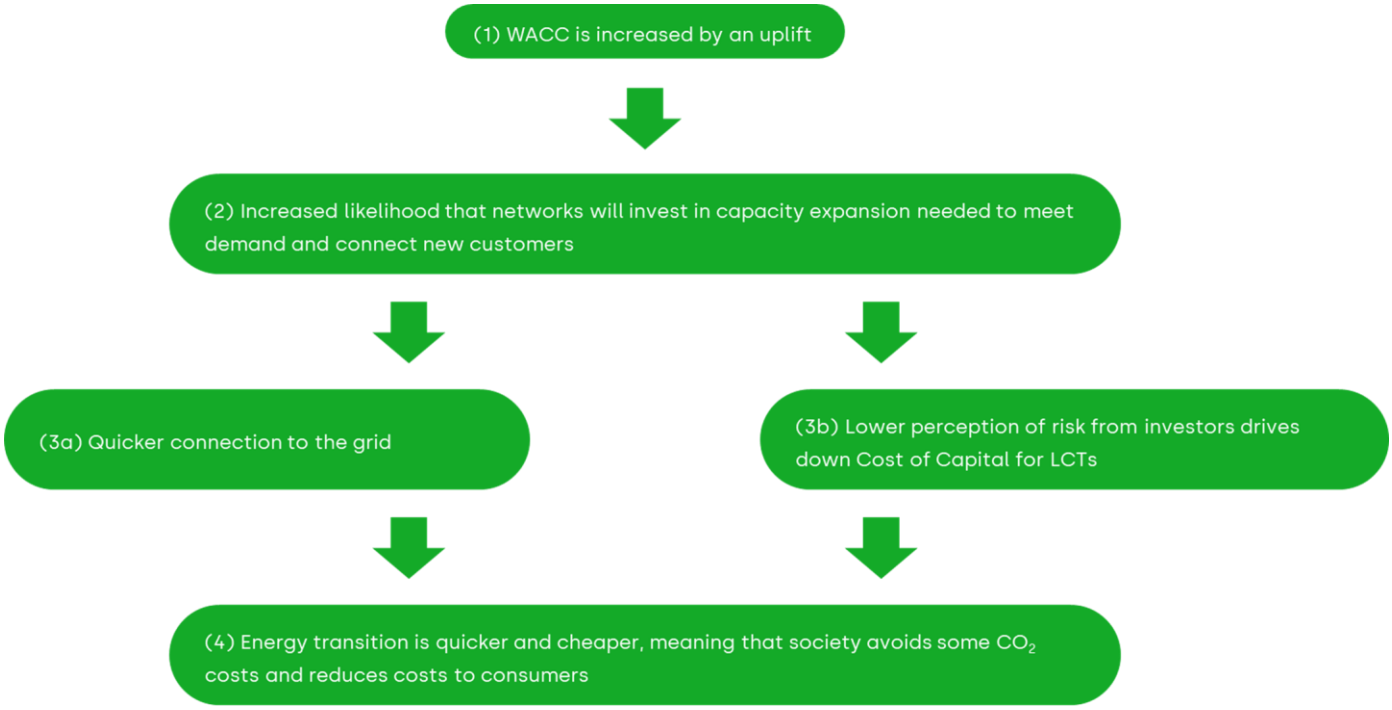
6.20 As we explained in our report for the Big Six,[109] underinvestment in network infrastructure can prevent LCTs from connecting to the network, and can therefore slow down decarbonisation. For example, in the UK, as well as the rest of Europe, connections of renewables to the grid are subject to long waiting times of up to

[108] New Zealand Commerce Commission (2023), 'Part 4 Input Methodologies Review 2023 – Draft decision', para. 6.46, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).
[109] Oxera (2023), 'Review of the percentile of the WACC distribution that should be targeted by the NZCC', section 5.2, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-review-of-the-percentile-of-the-wacc-distribution-that-should-be-targeted-by-the-nzcc.pdf (accessed 5 July 2023).

ten years, with some reports claiming that this is threatening net zero targets.[110]

6.21 As we show in Figure 6.2 below, there is a clear causal mechanism stemming from increasing the WACC for network companies and an energy transition that is quicker and cheaper, meaning that society avoids CO_2 costs and reduces the cost of the transition to consumers.

Figure 6.2 Uplifting the WACC



Source: Oxera analysis based on data received from the EDBs.

6.22 The quicker and cheaper energy transition therefore represents a benefit that should be **added** to the existing benefits estimated through the network reliability framework illustrated in Figure 6.2. Due to this, the estimates provided in Table 6.2

[110] See, for instance, *Financial Times* (2023), 'Gridlock: how a lack of power lines will delay the age of renewables- A backlog of wind and solar projects is waiting to connect to infrastructure built for another era, threatening net zero plans', 11 June, https://www.ft.com/content/a3be0c1a-15df-4970-810a-8b958608ca0f (accessed 6 July 2023); Powersystems (2023), 'Net Zero threatened as delays in grid investment', 13 January, https://www.powersystemsuk.co.uk/net-zero-threatened-as-delays-in-grid-investment/ (accessed 6 July 2023).

represent lower bounds on the WACC percentile that would be optimal to target.

6C.3 The NZCC dismisses evidence from other analytical frameworks

6.23 The NZCC says that it would prefer to rely on its existing loss analysis model in determining the optimal WACC percentile, and not to switch to the model from the Romeijnders and Mulder paper that we outlined in our previous reports.[111] Notwithstanding the fact that, as explained above, the decarbonisation framework should be considered **in addition** to the loss analysis framework since changes in the policy environment would thereby be supported within the evolution of the regulatory regime over time, we support the NZCC's view that it is appropriate to retain the use of the loss analysis framework.

6.24 The NZCC could retain the use of its loss analysis framework but still give some weight to developments in the academic evidence. In relation to this, we observe that the similarity of the Romeijnders and Mulder paper to the loss analysis framework makes it a useful source of information. While we acknowledge that the precise point estimate implied by the paper may not directly read across to the present case, it does serve as a useful cross-check. It is therefore worth highlighting that (our interpretation of) Romeijnders and Mulder's suggestion of c. 77%[112] is closer to the 67th percentile (which we have argued for in our previous report) than the 65th percentile proposed in the current DD.

[111] New Zealand Commerce Commission (2023), 'Part 4 Input Methodologies Review 2023 – Draft decision', para. 6.60, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023). Romeijnders, W. and Mulder, M. (2022), 'Optimal WACC in tariff regulation under uncertainty', *Journal of Regulatory Economics*, **61**, pp. 89–107, https://pure.rug.nl/ws/portalfiles/portal/218127562/Romeijnders_Mulder2022_Article_OptimalWACCInTariffRegulationU.pdf (accessed 11 July 2023).

[112] In our previous report we determined that new academic evidence suggests a mean percentile of 77%, which is materially higher than the NZCC's current percentile. Oxera (2023), 'Review of the percentile of the WACC distribution that should be targeted by the NZCC', section 5.1, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-review-of-the-percentile-of-the-wacc-distribution-that-should-be-targeted-by-the-nzcc.pdf (accessed 5 July 2023). Romeijnders, W. and Mulder, M. (2022), 'Optimal WACC in tariff regulation under uncertainty', *Journal of Regulatory Economics*, **61**, pp. 89–107, https://pure.rug.nl/ws/portalfiles/portal/218127562/Romeijnders_Mulder2022_Article_OptimalWACCInTariffRegulationU.pdf (accessed 11 July 2023).

6C.4 Other regulatory tools do not sufficiently prevent underinvestment

6.25 The NZCC explains in a number of places in its reports that it can use alternative regulatory mechanisms such as the quality incentive scheme and existing incentives that reward cost savings that might be achieved through investments, to prevent underinvestment.[113] We disagree that these are suitable alternatives to a WACC uplift because neither of these are designed to prevent the possibility of the true WACC rising above the regulated WACC.

6.26 The quality incentive scheme is designed to reward or penalise companies for out- or underperforming quality benchmarks.[114] The NZCC measures network quality through reliability targets that are based on historical average performance and are set by the NZCC in the IMs.[115]

6.27 The broader incentives of the regulatory regime allow companies to retain some of their outperformance. In relation to this, the NZCC explains that investments can lead to cost savings and in these cases EDBs would be more likely to carry out an investment (even at a lower WACC percentile) because they benefit from the cost savings that these investments bring. We note that this may be the case for some investments, but there are also likely to be a number of investments that improve the network without directly leading to cost savings. In cases where there are cost savings, these are unlikely to directly translate into incentives for EDBs given the delay in achieving

[113] New Zealand Commerce Commission (2023), 'Part 4 Input Methodologies Review 2023 – Draft decision', paras 6.44–6.45 and 6.93, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).
[114] New Zealand Commerce Commission (2018), 'Introduction to the DPP for stakeholders—2020 reset of the DPP for EDBs', 5 November, p. 111, https://comcom.govt.nz/__data/assets/pdf_file/0021/104826/Knowledge-sharing-session-on-default-price-quality-paths-5-November-2018.PDF (accessed 5 July 2023).
[115] The NZCC incentivises network quality with a revenue-linked quality incentive scheme based on the following reliability targets: the System Average Interruption Duration Index (SAIDI), the average duration per customer; and the System Average Interruption Frequency Index (SAIFI), the average number of interruptions per customer. Companies that under- or outperform the ten-year reference period reliability targets are rewarded (or punished) with an increase (or decrease) of revenues by up to 2% of annual revenues. New Zealand Commerce Commission (2019), 'Reliability standards and incentives model EDB DPP3 final determination 27 November 2019', 27 November, https://comcom.govt.nz/__data/assets/excel_doc/0026/191474/Reliability-standards-and-incentives-model-EDB-DPP3-final-determination-27-November-2019.xlsx (accessed 12 July 2023). New Zealand Commerce Commission (2018), 'Introduction to the DPP for stakeholders—2020 reset of the DPP for EDBs', 5 November, pp. 105–111, https://comcom.govt.nz/__data/assets/pdf_file/0021/104826/Knowledge-sharing-session-on-default-price-quality-paths-5-November-2018.PDF (accessed 5 July 2023).

cost savings following an investment, the periodic reset of allowances, and further efficiency challenges within the scheme.

6.28 While it is possible for these incentive schemes to be calibrated such that companies systematically outperform them, unless this is the **intention** of the NZCC the schemes will not perform the same role as a WACC uplift. In these cases (i.e. where the NZCC does not intend these schemes to allow for systematic outperformance on the WACC), network businesses will expect the financial return on their investments to be equal to the regulated WACC. Therefore, as we explained in our previous reports,[116] fully or partially replacing a WACC uplift with such mechanisms is likely to reduce the returns of network businesses below the true WACC. In times where the true WACC rises above the regulated WACC, these mechanisms will be unlikely to prevent the underinvestment problem from arising.

6.29 Moreover, the operation of penalty-only quality incentives such as the fine for breaching the limit[117] will tend to produce an asymmetry in the financial outcomes for networks, whereby it is easier to lose revenues for failing to deliver the required quality standards without the commensurate (symmetric) ability to gain revenues by delivering high quality standards. Holding all else equal, this would tend to reduce the overall realised return to capital to a lower level than the regulatory allowed return on capital. This would appear to be consistent with the previous outcomes for EDBs that the NZCC remarked on, i.e. that profitability has been lower than its estimate of a reasonable return on investment.[118]

[116] Oxera (2023), 'Asset beta and WACC percentile for New Zealand gas distribution businesses', 1 February, para. 4.64, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-nz-gdbs-asset-beta-and-wacc-percentile-01-02-2023.pdf (accessed 5 July 2023). Oxera (2023), 'Review of the percentile of the WACC distribution that should be targeted by the NZCC', section 4.3, https://blob-static.vector.co.nz/blob/vector/media/vector-2023/oxera-review-of-the-percentile-of-the-wacc-distribution-that-should-be-targeted-by-the-nzcc.pdf (accessed 5 July 2023).

[117] Breaching the limit is a penalty-only incentive that results in a maximum fine under the Commerce Act (section 87) of NZ$5m.

[118] New Zealand Commerce Commission (2022), 'Local line companies' performance trends', 13 July, https://comcom.govt.nz/__data/assets/pdf_file/0019/230518/Local-lines-companies-performance-trends-fact-sheet-13-July-2022.pdf (accessed 17 July 2023).

6C.5 Uplift on historical investments and the value of regulatory certainty

6.30 The NZCC has made a number of comments implying that the WACC uplift is a blunt instrument because it applies to the entirety of the RAB, while the benefit from its application is secured only by new investments in network infrastructure (i.e. the change in the RAB).[119]

6.31 This is true in the first period where a WACC uplift is introduced, because the sunk investments that constitute the RAB were made without a WACC uplift. However, in future periods this is not true because the investments that constitute the RAB will be partially composed of investments that were incentivised through a WACC uplift. In this sense, the WACC uplift simply maintains the level of remuneration that was expected when the investments were first undertaken and, over time, the entirety of the RAB will be composed of investments that were undertaken due to the WACC uplift. In New Zealand, a WACC uplift at the 67th percentile or higher has been used for the past 13 years, so many of the investments in the RAB will have been incentivised by this.

6.32 Relatedly, we consider that the NZCC's decision to reduce the WACC percentile to the 65th percentile creates regulatory uncertainty. As explained above, many of the investments that currently constitute the RAB were undertaken in the past, when the NZCC set the WACC at the 67th percentile. Investors that made these investments would have done so by forming an expectation about the level of the regulated return both in the period of their investment, and by forming an expectation about future regulatory periods (or at least over the life of the asset(s) that they invested in). Therefore, if the NZCC decides to change the WACC percentiles in each regulatory period, the WACC percentile will become a less effective mechanism for preventing the underinvestment problem (because investors will need to take into account the risk that the NZCC will change the percentile that they are aiming for).

6.33 Due to this, and in line with the suggestions made in our previous reports where we have given weight to the importance of

[119] New Zealand Commerce Commission (2023), 'Part 4 Input Methodologies Review 2023 – Draft decision', paras 6.12 and 6.39, https://comcom.govt.nz/__data/assets/pdf_file/0024/318624/Part-4-IM-Review-2023-Draft-decision-Cost-of-capital-topic-paper-14-June-2023.pdf (accessed 5 July 2023).

regulatory stability and predictability even where evidence for a higher percentile could be supported, we consider that the WACC percentile should remain at the 67th percentile.

6D The appropriate WACC percentile to use

6.34 In summary, we consider that the 67th percentile was already at the lower end of the range of the optimal WACC percentile, with the evidence supporting a WACC percentile higher than the 67th percentile. Nevertheless, we had previously argued for a 67th percentile WACC uplift given the value of regulatory certainty. This means that a further reduction to the 65th percentile does not appear to be appropriate. There are two main reasons why we consider the figures estimated by the NZCC to be low.

6.35 First, the NZCC uses an Oxera estimate based on outage costs of NZ$1bn. This represents the lower bound of the range that we consider in our report. Using this lower point of the range to form a new range might therefore underestimate the impact of our derived figures. We note that using the mid-point of the range that we considered (i.e. NZ$1.45bn) results in an optimal estimate of between 61% and 78%, with a mid-point of 70%—even without removing the NZCC's tax uplift. These figures suggest that the 67th percentile was already a conservative estimate, so a further reduction is not justified.

6.36 Second, as taxes are redistributed to society, we consider it appropriate not to uplift the value of the RAB by 1 minus the corporate tax rate in the loss analysis framework. Once this error is corrected, there is an increase in the optimal WACC percentile estimates obtained from the NZCC's model. This results in a range of 60% to 77%, i.e. a mid-point above the 67th percentile under the NZCC's and Oxera's most conservative cost of outages assumption of NZ$1bn.

6.37 A number of additional factors suggest that the 67th percentile is likely to be more appropriate than the 65th percentile. For instance, insufficient investment incentives might risk delaying the energy transition, which would have significant asymmetric effects in terms of social outcomes that are additional to those captured in the loss analysis framework. In addition, we have explained why we disagree with a number of other statements made by the NZCC that do not play an explicit role in the NZCC's calculation of the optimal WACC percentile but do generally lead it to an underestimate of the reasonable percentile. For all of these reasons, and with a view to

maintaining regulatory stability, we consider that the NZCC should maintain the 67th WACC percentile for network regulation.

7 WACC allowance reasonableness checks

7.1 After deciding on the most appropriate WACC allowance estimate, the NZCC undertakes cross-checks to assess the reasonableness of its allowance. In this section, we consider two reasonableness checks.

7.2 In section 7A, we assess the robustness of RAB multiples, which the NZCC relies on in one of its checks. We explain that many factors need to be accounted for when interpreting RAB multiples, and that conclusions are sensitive to assumptions. Therefore, we do not consider RAB multiples to be a reliable check of the reasonableness of the WACC allowance.

7.3 In section 7B, we introduce an alternative approach of cross-checking the cost of equity allowance with reference to the cost of debt estimate. The cross-check shows that the risk premium, embedded in the cost of equity, if adjusted for the effect of leverage, is not sufficiently high relative to the debt risk premium (DRP), which suggests that the overall allowance for the cost of equity should be higher.

7A RAB multiples analysis

7.4 In this section, we consider the NZCC's approach of using RAB multiples as a check of the adequacy of cost of capital allowances, and address the limitations of the approach and the conclusions.

7A.1 Review of the NZCC's submission

7.5 The NZCC has considered RAB multiples as part of the cost of capital allowance reasonableness checks in its DD. RAB multiples are a comparison of the observed market value of a company and the RAB, which shows the value that investors attach to each dollar of the RAB. The NZCC describes RAB multiples as 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'.[120] If the regulatory package allows the business to expect to deliver

[120] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, para. 7.44.

returns close to its true cost of capital, the NZCC expects a RAB multiple to be 1x.[121]

7.6 The NZCC notes that, in incentive-based regulatory regimes such as that in New Zealand, RAB multiples also reflect investors' expectations of the company's ability to under- or outperform relative to other input assumptions of the regulator. Therefore, in the NZCC's view, a RAB multiple greater than 1x implies either (i) that the regulatory allowed rate of return is set too generously; or (ii) that the market expects the company to outperform regulatory assumptions.[122]

7.7 For the energy businesses, the NZCC estimates a RAB multiple of 1.38x for the sale of Eastland Network to Firstgas Group, and relies on estimates of investment banks for the traded multiples for Vector (Jarden: 1.23x for EDBs and 1.00x for GDBs; UBS: 1.3x overall).[123] The NZCC concludes that the multiples are generally above 1x, which suggests that investors are adequately compensated for their investment risk. Therefore, the NZCC considers the regulatory settings to be 'more than sufficient to compensate investors for putting their capital at risk'—in other words, the NZCC considers the WACC allowances for the energy sectors to be reasonable.[124]

7.8 In the rest of this section, we discuss the limitations of using RAB multiples as a reasonableness check, and show that a range of conclusions may be reasonably drawn from the observed levels of RAB multiples.

7A.2 Limitations of RAB multiples as a reasonableness check

7.9 The NZCC acknowledges a number of limitations of the RAB multiples analysis, including the fact that there are a limited number of data points, other factors affecting the multiples such as outperformance of operating expenditure (OPEX) and CAPEX benchmarks, and the difficulty in isolating the enterprise value of regulated activities from non-regulated activities. These factors can drive up RAB multiples and therefore distort the conclusion about the reasonableness of the regulatory parameters. However, despite these limitations, the NZCC

[121] Ibid., para. 7.45.
[122] Ibid., para. 7.46.
[123] Ibid., Table 7.6.
[124] Ibid., para. 7.51.

continues to consider RAB multiples to be an appropriate indicator of the adequacy of regulatory controls, including the allowed WACC.[125]

7.10 While the NZCC already notes some limitations of relying on RAB multiples as a reasonable check, there are a number of additional factors 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 that the regulatory cost of equity allowance is above the investors' required return on equity, as the difference between the allowed and required return on debt can be observed.) These factors include:

- company-specific outperformance on financing, tax and financial incentives (in addition to company-specific outperformance on OPEX and CAPEX, as already mentioned by the NZCC);
- expected RAB growth, which strengthens the impact of outperformance;
- synergy-related cost savings where multiple assets are held, which could create additional value within or outside of the target asset;
- for RAB multiples based on transaction valuations, potential required adjustments due to the network transaction being part of a wider exchange of assets;
- accrued dividends, which are likely to be embedded in the market capitalisation of a company and need to be adjusted for;
- revenue and/or RAB adjustments as reconciliations from the preceding price control (e.g. from wash-up mechanisms);
- an exit RAB multiple used as the terminal value.

7.11 Other qualitative considerations, which are applied mostly to transaction multiples, that can explain how RAB multiples could exceed 1x without the regulated cost of equity allowance being higher than the true cost of equity include:

[125] Ibid., paras 7.53–7.54.

- the winner's curse—the winning bid on a transaction is the one with the highest valuation, which often happens to be above the intrinsic asset value;[126]
- a control premium—in a competitive process, investors are willing to pay a premium for a majority stake in a business, which is explained by the perceived value of having some real options on future strategic decisions, which is not the case when owning a minority stake in the company;[127]
- financial restructuring—there is the potential to restructure the financing of the business and create value for the shareholders;
- environmental, social and governance factors, and market sentiment.

7.12 Consequently, several factors determine the value that investors attach to regulated companies, which have a direct impact on RAB multiples. These need to be accounted for when drawing conclusions from observed premia on the RAB, and, given that it is typically not possible to adjust for all these factors accurately, RAB multiples may not end up being a reliable reasonableness check.

7A.3 A range of conclusions can be drawn from the observed RAB multiples

7.13 The NZCC refers to the following RAB multiples when concluding that the allowed WACC must be reasonable.

- For the sale of Eastland Network, the electricity network of Eastland Group, to Firstgas Group, the NZCC estimates the transaction RAB multiple to be 1.38x. This is based on a transaction price of NZ$260m (further adjusted

[126] See, for example, Andrade, G., Mitchell, M. and Stafford, E. (2001), 'New Evidence and Perspectives on Mergers', *Journal of Economic Perspectives*, spring, **15**:2.
[127] Control premia are common in the academic literature. It is well understood in the mergers and acquisitions literature that the acquisition of control—especially 100% control—generally comes with the payment of a control premium. According to some studies, between 1978 and 2009 the average control premium for US acquisitions of publicly listed firms was 43.3%. While we acknowledge that the control premium for a regulated business would generally be worth less due to a ceiling on overall profitability, we still perceive real value in control. Even if a bidder used exactly the same WACC as the NZCC, a RAB multiple of 1 would be almost inconceivable with a control premium. The 43.3% premium for control in US mergers comes from Gaughan, P.A. (2011), *Mergers, Acquisitions and Corporate Restructurings*, Wiley, p. 572. See also UKRN (2018), 'Estimating the cost of capital for implementation of price controls by UK Regulators', p. 176.

downwards by NZ$1.1m for capital work in progress) and a RAB of NZ$188m.[128]

- For Vector, the only publicly traded company with energy network businesses in New Zealand, the NZCC refers to third-party RAB multiples. UBS estimates a RAB multiple of 1.3x for Vector overall, while Jarden specifies a RAB multiple of 1.23x for the EDBs and 1.00x for the GDBs.[129]

7.14 We comment on each of the estimates individually before providing considerations that are relevant to both sets of estimates.

Eastland Network transaction RAB multiple

7.15 As discussed above, a wide range of factors influence transaction multiples and can therefore result in valuations above the RAB, irrespective of the reasonableness of regulatory allowances. For example:

- the winner's curse is likely to apply to the final takeover price of NZ$260m, given that the highest offers tend to be accepted in the bidding process;
- Firstgas Group acquired the entirety of Eastland Network and is therefore able to exercise control, which could lead to a control premium;
- synergy-related cost savings from the integration of the Eastland Network assets into the Firstgas Group could be another driver of valuations above the RAB.

7.16 Consequently, the observed takeover price, and resultant RAB multiple, are likely to have reflected strategic and operational considerations beyond the adequacy of the level of the regulated WACC.

7.17 Finally, the market environment is a key determinant of the valuation of investors and therefore affects the enterprise valuation of companies in transactions. The NZCC presents a RAB multiple based on the sale of Eastland Network to First Gas in November 2022. However, the market environment, including interest rates that inform financing conditions, has been

[128] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, paras 7.47–7.56.
[129] Ibid., Table 7.6.

changing significantly, meaning that even such a recent transaction as the one announced in November 2022 may reflect outdated investor expectations.

Vector RAB multiple

7.18 As for the RAB multiple for Vector, the NZCC does not disclose UBS's and Jarden's calculations underlying the RAB multiples.[130] We have therefore cross-checked the estimates reported by the NZCC.

7.19 Vector's closing RAB in 2022 was NZ$4.13bn (the EDB RAB was NZ$3.64bn[131] as at 31 March 2022, and the GDB RAB was NZ$0.48bn[132] as at 31 June 2022). Given that the RAB values are specified for slightly different dates, we have sourced an average enterprise value from 31 March 2022 to 30 June 2022 from Bloomberg, which is NZ$7.37bn.[133]

7.20 In addition, Moody's reports that Vector generated 35% of its EBITDA in 2022 from non-regulated business segments including metering and gas trading.[134] We have therefore adjusted the enterprise value downwards by 35% to approximate the enterprise value associated with regulated activities, which leads to a value of NZ$4.80bn. As a result, we have estimated an adjusted RAB multiple of 1.16x.

7.21 There are still many factors listed in paragraph 7.10 above that we have not accounted for in this calculation.

[130] The NZCC states: 'We have surveyed research analysts at the New Zealand investment banks in early 2023 regarding their RAB multiples for Vector and AIAL.' See New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, Table 7.6, footnote 343.
[131] New Zealand Commerce Commission (2023), 'Performance summaries for electricity distributors – Year to 31 March 2022', 29 June, tab 'Calculations', https://comcom.govt.nz/__data/assets/excel_doc/0022/320467/Performance-summaries-for-electricity-distributors-Year-to-31-March-2022.xlsx (accessed 10 July 2023).
[132] New Zealand Commerce Commission (2023), 'Gas distribution information disclosure data 2013-2022', 29 June, tab 'Database', https://comcom.govt.nz/__data/assets/excel_doc/0020/233363/Gas-distribution-information-disclosure-data-2013-2022.xlsm (accessed 10 July 2023).
[133] The enterprise value is broadly consistent with the sum of market capitalisation and net debt.
[134] Moody's (2023), 'VECTOR Limited. Update to credit analysis', 19 January, p. 3.

The impact of RAB growth, outperformance and terminal value

7.22 Assuming that RAB multiples are indeed 1.38x for Eastland Network and 1.16x for Vector (notwithstanding the caveats in relation to these estimates provided above), we assess what these RAB multiples tell us about the implied required return on equity relative to the cost of equity allowance.

7.23 For this assessment, we have built a stylised DCF model that uses a RAB multiple, expected outperformance (including outperformance on financing, tax and financial incentives, as well as outperformance on OPEX and CAPEX), RAB growth and the cost of equity allowance as inputs and shows the cost of equity under- or overfunding (i.e. the difference between the allowed and required costs of equity) as an output.[135]

7.24 The model is set for cash flows to equity investors. The key components are the initial investment, the cost of equity allowance, the return on equity corresponding to outperformance, the reinvestment of cash flows into growth, and the terminal value.[136] We assume that the same RAB multiple applies to the terminal value as to the initial investment.

7.25 We use the leverage of 42% and the cost of equity allowance of 5.01% from the 2020 EDBs default price–quality path (DPP), which was the regulatory setting applicable in 2022.[137] This does not cover Vector's GDB business but, given that it is relatively small,[138] we do not expect it to affect our conclusions.

7.26 When the RAB multiple is 1x and no outperformance is assumed, the model shows that this set of assumptions corresponds to the required cost of equity being the same as the cost of equity allowance, i.e. that there is no under- or overfunding. For greater RAB multiples, the model is more likely to show the cost of equity overfunding (i.e. a positive difference between the cost of

[135] The cost of equity underfunding refers to the outcome when the required cost of equity implied from the model is above the cost of equity allowance. The cost of equity overfunding refers to the outcome when the required cost of equity implied from the model is below the cost of equity allowance.
[136] The model is set for ten years, although the results are not sensitive to the chosen time period.
[137] New Zealand Commerce Commission (2019), 'Electricity Distribution Business. Price-Quality Regulation 1 April 2020 DPP Reset. WACC waterfall model. Final determination', 27 November, tab 'Waterfall', https://comcom.govt.nz/__data/assets/excel_doc/0028/191476/WACC-waterfall-model-EDB-DPP3-final-determination-27-November-2019.xlsx (accessed 8 July 2023).
[138] As per the data provided in this section, Vector's GDB RAB was 12% of the total regulated networks' RAB in 2022.

equity allowance and the implied required cost of equity). For greater expected outperformance and RAB growth, the model is more likely to show the cost of equity underfunding for a given multiple.

7.27 Table 7.1 and Table 7.2 below show the cost of equity under- or overfunding corresponding to the 1.38x and 1.16x RAB multiples and a series of RAB growth and outperformance assumptions.

Table 7.1 Cost of equity under- or overfunding for a RAB multiple of 1.38x (corresponds to Eastland Network's RAB multiple), depending on the RAB growth and outperformance assumptions

Expected return on equity outperformance	RAB growth			
	0%	**2%**	**4%**	**6%**
0%	2.0%	1.2%	0.4%	-0.4%
1%	1.4%	0.6%	-0.2%	-1.0%
2%	0.8%	-0.0%	-0.8%	-1.6%
4%	-0.4%	-1.3%	-2.1%	-2.9%

Note: The table shows the difference between the cost of equity allowance and the implied required cost of equity. Positive numbers correspond to cost of equity overfunding, i.e. the cost of equity allowance being above the true required return on equity. Negative numbers (highlighted in green) correspond to cost of equity underfunding, i.e. the cost of equity allowance being above the true required return on equity.
Source: Oxera analysis.

Table 7.2 Cost of equity under- or overfunding for a RAB multiple of 1.16x (corresponds to Vector's RAB multiple), depending on the RAB growth and outperformance assumptions

Expected return on equity outperformance	RAB growth			
	0%	2%	4%	6%
0%	1.1%	0.6%	0.2%	-0.2%
1%	0.3%	-0.1%	-0.6%	-1.0%
2%	-0.5%	-0.9%	-1.4%	-1.8%
4%	-2.1%	-2.5%	-3.0%	-3.4%

Note: The table shows the difference between the cost of equity allowance and the implied required cost of equity. Positive numbers correspond to cost of equity overfunding, i.e. the cost of equity allowance being above the true required return on equity. Negative numbers (highlighted in green) correspond to cost of equity underfunding, i.e. the cost of equity allowance being above the true required return on equity.
Source: Oxera analysis.

7.28 The tables show that, for many combinations of RAB growth and outperformance expectations, the 1.38x and 1.16x multiples correspond to cost of equity underfunding (see cells shaded in green), meaning that the true investors' required return on equity is above the allowance.

7.29 Indeed, the average expected RAB growth in 2020 EDBs DPP from 2018/19 to 2024/25 was 3.1% and 3.9% for the Eastland Network and Vector EDB businesses respectively.[139]

7.30 As for outperformance, it would be reasonable for investors to expect some outperformance, not least because under incentive-based regimes networks are incentivised to outperform their cost allowances by regulatory construct, such that efficiencies can be passed through to consumers over time. As for Eastland Network with the transaction multiple of 1.38x, the network was taken over in its entirety and it is reasonable to expect that the investor must have assumed operational or

[139] Simple average of closing RAB values. Oxera estimate based on New Zealand Commerce Commission (2019), 'Electricity Distribution Business. Price-Quality Regulation 1 April 2020 DPP Reset. Financial model. Final determination', 27 November, tab 'RAB', https://comcom.govt.nz/__data/assets/excel_doc/0025/191464/Financial-model-EDB-DPP3-final-determination-27-November-2019.xlsx (accessed 8 July 2023).

financial improvements or synergies when undertaking the transaction (i.e. paid a control premium).

7.31 Therefore, if any conclusion were to be drawn from the Eastland Network transaction and Vector traded RAB multiples, combined with the observed levels of RAB growth corresponding to future expected growth assumptions, it is that the cost of equity allowance is likely to be below the true required return on equity.

7.32 In fact, Jarden's RAB multiple estimate of 1x for Vector's GDB is even more likely to imply cost of equity underfunding. This would be in contrast to the NZCC's interpretation that this is 'due to factors other than our current WACC parameters' because it 'reflects uncertainty around the long-term outlook for the sector and the regulatory settings leading up to switch-off'.[140] If such asymmetric uncertainty exists, it could be reasonable to compensate investors with a higher cost of equity allowance, to ensure that the regulatory package reflects the NPV = 0 principle.

7B Asset risk premium–debt risk premium analysis

7.33 In this section, we set out the implications of the NZCC's cost of capital estimates using the asset risk premium (ARP) relative to DRP ('ARP–DRP') framework, which has been developed by Oxera and considered by the UK CMA during both the PR19 and RIIO-2 appeals.[141] The CMA has commented that the ARP–DRP

[140] See New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, para. 7.52.
[141] 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, paras 9.1384–9.1386, https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf (accessed 9 July 2023). Competition and Markets Authority (2021), '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, paras 5.591–5.748, https://assets.publishing.service.gov.uk/media/617fe5468fa8f52980d93209/ELMA_Final_Determination_Vol_2A_publication.pdf (accessed 13 July 2023).

framework is based on 'a logical principle'[142] and 'provides one useful perspective'.[143]

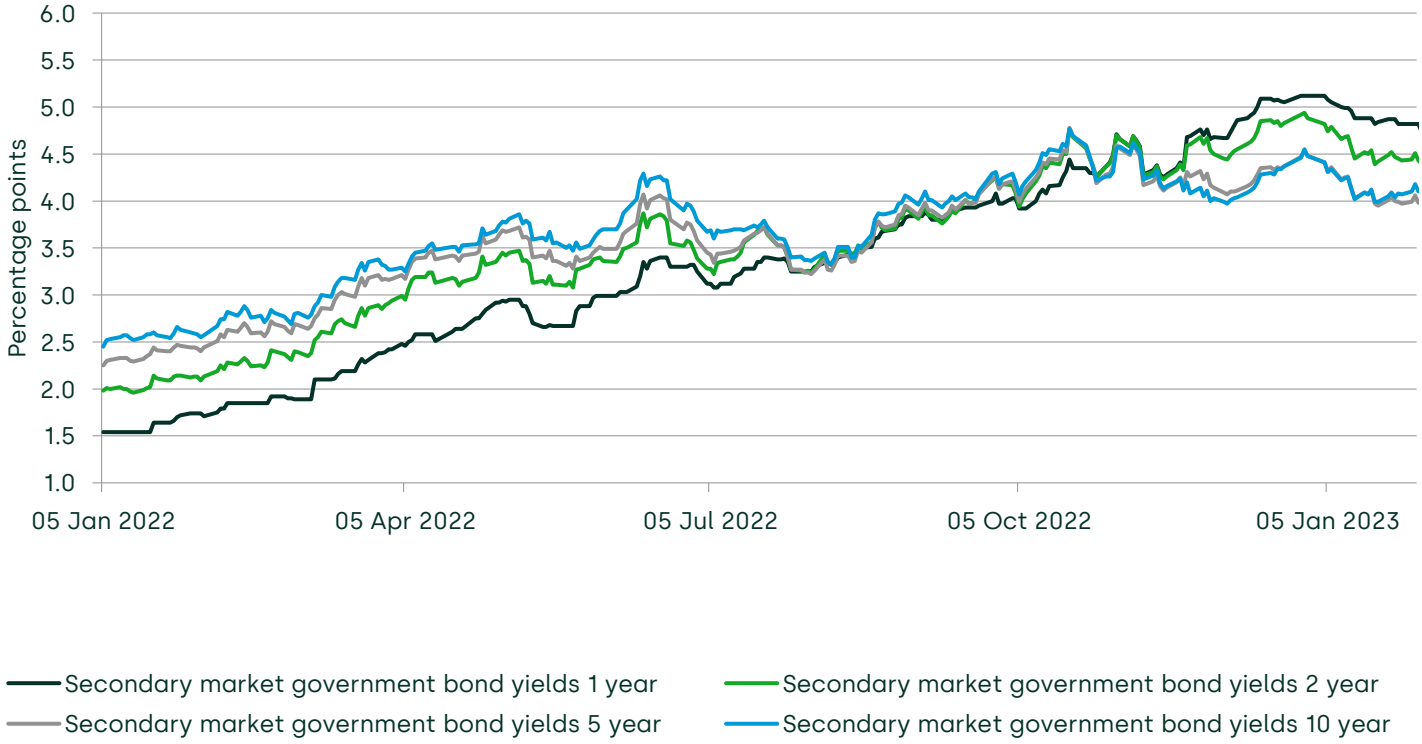
7.34 We show that the ARP–DRP differential for the EDBs, calculated based on the updated 2023 IMs, is lower than the conceptual minimum threshold. In other words, **the cost of equity allowance implies an unlevered risk premium on equity that is not sufficiently higher than the risk premium on debt**. As explained in section 7B.2, this finding directly contradicts corporate finance principles and has potentially resulted from the NZCC's underestimation of the asset beta and TAMRP, which we discuss in more detail in sections 4 and 5.

7B.1 Overview of recent developments in the debt market

7.35 Since the beginning of 2022, New Zealand has witnessed a period of significant increase in interest rates. This is shown in Figure 7.1 below.

[142] 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, para. 9.1384, https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf (accessed 9 July 2023).
[143] Competition and Markets Authority (2021), '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, para. 5.692, https://assets.publishing.service.gov.uk/media/617fe5468fa8f52980d93209/ELMA_Final_Determination_Vol_2A_publication.pdf (accessed 13 July 2023).

Figure 7.1 New Zealand government bond yields (%)



Source: Oxera analysis based on data from Reserve Bank of New Zealand.

7.36 The impact of the increase in yields on the cost of debt warrants an examination of the adequacy of the cost of equity allowances. In particular, the mid-point of the NZCC's unlevered cost of equity of 6.79%[144] for disclosure year 2024 for EDBs is close to the cost of debt of 5.97%.[145] This demonstrates that the risk premium in the cost of equity, which is a combination of the asset beta and TAMRP assumptions, could be low relative to the risk premium in the cost of debt.

7.37 A more sophisticated way to compare the cost of equity and cost of debt is through the 'ARP–DRP differential', which we explain in detail in the subsection below. This differential allows us to establish further theoretical and empirical benchmarks for

[144] Calculated using the following formula: asset beta (0.35) * TAMRP (7.00%) + RFR (4.34%). The parameters are set out in New Zealand Commerce Commission (2023), 'Cost of capital determination for disclosure year 2024 for information disclosure regulation', 1 May, p. 5, https://comcom.govt.nz/__data/assets/pdf_file/0030/314598/NZCC-8-Cost-of-capital-determination-EDBs-and-WIAL-ID-1-May-2023.pdf (accessed 17 July 2023). We do not make an adjustment to the RFR for the New Zealand investor tax rate, for comparability.
[145] Calculated using the following formula: debt premium (1.43%) + RFR (4.34%) + debt issuance cost (0.20%). The parameters are set out in New Zealand Commerce Commission (2023), 'Cost of capital determination for disclosure year 2024 for information disclosure regulation', 1 May, p. 5.

the NZCC's cost of equity allowance, including the adjustments made in the latest IMs DD. This comparison illustrates the cumulative impact of issues in relation to the NZCC's estimate of the cost of equity parameters.

7B.2 Methodology

7.38 We outline the general methodology for estimating the ARP–DRP differential before moving on to the methodology for benchmarking it.

General methodology for estimating the ARP–DRP differential

7.39 The 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 (e.g. relevant iBoxx indices). In the case of New Zealand, the NZCC calculates the debt premium annually based on traded bonds of comparable companies for information disclosure purposes.

7.40 The ARP–DRP differential implied by each regulatory determination should be strictly positive.[146] However, as we explain in more detail below, comparisons with a conceptual minimum threshold higher than zero are also relevant.

7.41 The ARP reflects the excess return required by investors in return for providing capital to risky assets. The ARP is calculated using the following formula.

Measuring the asset risk premium

$$ARP = \beta_a \cdot TAMRP$$

$\boldsymbol{ARP}$, asset risk premium; $\boldsymbol{\beta_a}$, asset beta; $\boldsymbol{TAMRP}$, tax-adjusted market risk premium

[146] This was also acknowledged by the UK CMA. See 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, para. 9.1386, https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf (accessed 9 July 2023).

7.42 The DRP reflects the excess return required by investors in return for acquiring debt claims on the same assets. The DRP is calculated using the following formula.

Measuring the debt risk premium

$$DRP = DP - expected\ loss$$

$\boldsymbol{DRP}$, debt risk premium; $\boldsymbol{DP}$, debt premium

7.43 This definition of the DRP is lower than the spread between the promised yield on debt and the RFR. The investor receives the promised yield if the bond does not default. If the bond defaults, the investor will suffer a loss. To compensate for the possibility of this loss, the investor requires a yield premium. The yield premium for expected loss is higher for bonds with lower credit quality and smaller for investment-grade bonds. Deducting an estimate of this premium from the promised yield provides the expected return on debt from which the DRP can be calculated.

General methodology for benchmarking the ARP–DRP differential

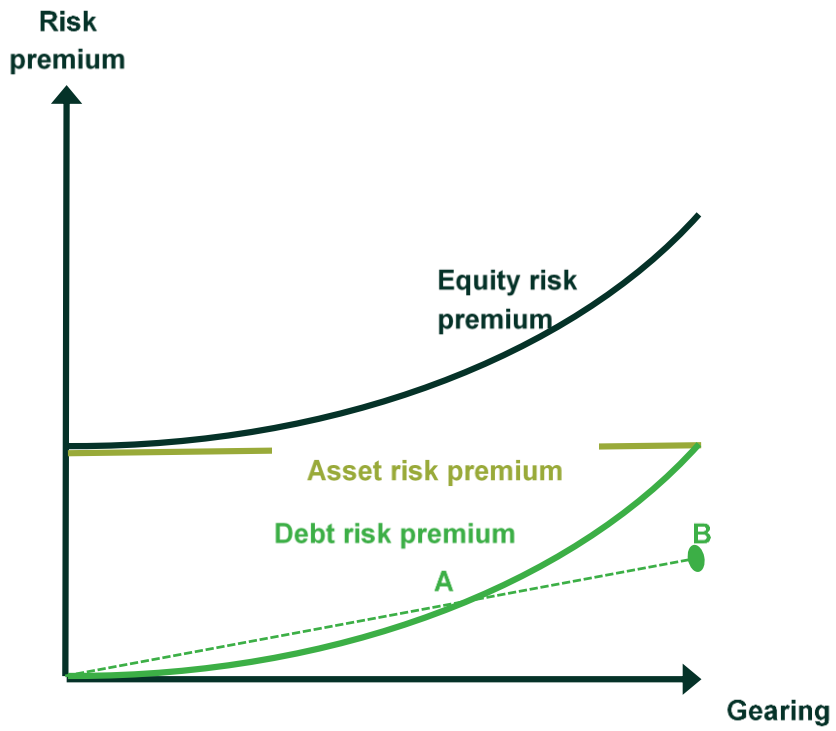
7.44 As a first economic and financial principle, the ARP–DRP differential must always be greater than zero, as the overall assets of a company, which are financed through a mix of debt and equity, should always be riskier (and therefore have a higher risk premium) than the debt of that company. This is because equity is a contingent claim on the company's residual assets after all debts are paid off, and therefore ranks junior to the claim of debt holders.

7.45 This principle can be extended by considering the relationship between risk premia and gearing.

7.46 Specifically, the DRP should be close to zero when gearing is close to zero, and should increase with gearing. This increase is driven by the greater likelihood and cost of financial distress, which are positively correlated with gearing. At 100% gearing, the DRP must equal the ARP, as the company would now be financed entirely by debt. At no point in this relationship would the DRP ever surpass the ARP. On this basis, the ARP–DRP differential should strictly be greater than zero at less than 100% gearing.

7.47 By the same logic, the minimum level of the theoretically appropriate ARP–DRP differential can also be further deduced using the relationship between the risk premia and gearing. These relationships are visually illustrated in Figure 7.2 and are explained under the figure.

Figure 7.2 The relationship between risk premia and gearing



Source: Oxera.

7.48 The DRP is associated with the company's level of gearing and is depicted by point A in the figure. The relationship between the DRP and gearing is also shown. The DRP should be close to zero when gearing is close to zero, and increases with gearing. The risk profile of debt will resemble the risk profile of the assets as gearing approaches 100% of enterprise value, at which point the risk premium of debt converges to the risk premium of the assets (i.e. the unlevered cost of equity minus the RFR).

7.49 The DRP is usually assumed to be a convex function of gearing, and estimating this function is not straightforward. However, extrapolating the line connecting the origin and point A provides a prediction of the DRP at 100% gearing (point B). The slope of the line is given by dividing the observed DRP by the observed gearing (point A). Multiplying the slope by 100% provides the

DRP at point B. For example, if a DRP of 100bp is observed at 50% gearing (point A) then a DRP of 200bp is predicted at point B. Such a linear extrapolation to 100% gearing will underestimate the ARP if debt risk is a convex function of gearing as depicted in the figure. Therefore, the risk premium on unlevered equity (i.e. the ARP) should be strictly greater than the risk premium on debt (DRP) divided by gearing. This provides the second constraint on estimates of the cost of equity.

7B.3 Results and conclusions

7.50 Table 7.3 presents the calculations of the ARP–DRP differential for the WACC allowance in the NZCC's 2023 IM DD. The minimum required differential for ARP–DRP is derived by linearly extrapolating gearing to 100%.[147]

Table 7.3 The ARP–DRP differential implied by the NZCC's IMs review 2023, based on the cut-off date of the disclosure year 2024

Parameter	Formula	EDBs
Cut-off date[1]		01/04/2023
TAMRP	[A]	7.00%
Asset beta	[B]	0.35
ARP	**[C]=[A]*[B]**	**2.45%**
Average debt premium	[D]	1.43%
Expected loss[2]	[E]	0.30%
DRP	[F]=[D]-[E]	1.13%
ARP–DRP differential	**[G]=[C]-[F]**	**1.32%**
Gearing[3]	[H]	41%
Minimum required differential based on relationship of risk premia	**[I]=[F]*[1/H-1]**	**1.63%**

Note: [1] This is the cut-off date used for the cost of capital determination for disclosure year 2024. [2] We estimate an expected loss of 30bp for senior unsecured debt, based on evidence from academic studies and Moody's. For more details, see Oxera (2019), 'Risk premium on assets relative to debt', 25 March, p. 7, https://www.oxera.com/wp-

[147] The DRP at 100% gearing is calculated as (DRP at notional gearing) * (1/gearing). As explained in section 817B.2, since DRP should theoretically equal ARP at 100% gearing, the minimum required ARP–DRP is calculated as (DRP at notional gearing) * (1/gearing) - (DRP at notional gearing), or (DRP at notional gearing) * (1/gearing - 1).

content/uploads/2019/03/Oxera-2019-%E2%80%98Risk-premium-on-assets-relative-to-debt-25-March.-1.pdf (accessed 11 July 2023). [3] We have used a gearing of 41%, based on the updated estimate in the DD. The disclosure uses a gearing of 42%.
Source: Oxera analysis based on data from New Zealand Commerce Commission (2023), 'Cost of capital determination for disclosure year 2024 for information disclosure regulation', 1 May, Table 3.

7.51 Compared with the minimum threshold (i.e. 1.63%), which is estimated based on a linear extrapolation of the DRP to 100% gearing, the ARP–DRP differential for the EDBs sits below at 1.32%. This insufficiency in equity return allowances is likely to be driven by the methodological issues associated with the estimation of the asset beta and TAMRP, which have led to a downward bias in these parameters. We discuss these issues in more detail in sections 4 and 5.

7.52 These comparisons between the cost of equity and cost of debt are consistent with the evidence set out in this report and elsewhere. To restore the ARP–DRP differential, the overall allowance for the cost of equity should be higher.

8 Financeability

8.1 In this section, we discuss two related issues.

8.2 In section 8A, we explain that financeability is affected by the cost of capital allowance. Therefore, we suggest that the NZCC could either undertake the financeability test at the IMs review using cost forecasts that networks submit to the NZCC annually or set up the principles at the IMs for the test to be run at the DPPs, customised price–quality paths (CPPs) or individual price–quality paths (IPPs). As for the form of the test, in addition to its present focus on the financeability of actual networks, the NZCC could assess the financeability of a benchmark (efficient) company.

8.3 In section 8B, we discuss whether it would be appropriate to provide EDBs with an allowance for equity issuance costs. While we agree with the NZCC that retained profits can be used to invest in growth instead of issuing new equity, we explain that retained profits may not always be sufficient, while not paying dividends for a long period of time is not sustainable, and at times new equity financing may be needed. An allowance for equity issuance costs, combined with a regulatory assumption that dividend payments will be made, is aligned with precedent. Practically, financial modelling required for the financeability test would show whether networks need to issue equity to finance their investment programmes.

8A The need for financeability assessment

8.4 In the DD, the NZCC discusses the potential for introducing a financeability test in the IMs—its decision is not to do so, because it considers that adopting a financeability test would not achieve the IMs review's overarching objectives.[148]

8.5 The NZCC considers that an efficient operator is unlikely to face financeability issues because the NZCC follows the principle of the NPV = 0 in its determinations.[149] Instead, financeability issues,

[148] New Zealand Commerce Commission (2023), 'Financing and incentivising efficient expenditure during the energy transition topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', para. 3.288.
[149] Ibid., para. 3.292.

or the inability to invest, may be caused by company-specific decisions such as poor performance of unregulated business units, excessive dividend payments, or excessive leverage.[150] Given that the NZCC sees financeability as a company-specific concern, it notes that it does consider financeability 'where relevant and not inconsistent with promoting the Part 4 purpose', and provides examples of financeability assessments at setting DPPs and implementing CPPs and IPPs.[151]

8.6 The NZCC considers that it should not be concerned about the impact that company-specific decisions have on the companies.[152] However, we explain below that regulatory determinations also play a big role in companies' financeability. Therefore, it is important that the NZCC looks at the drivers of a financeability problem, if it is identified, and undertakes an assessment of whether any such problems are due to company-specific inefficiencies or suboptimal financial decisions, or if they arise due to low regulatory allowances. In practice, this challenge tends to be navigated by regulators by undertaking financeability testing for a benchmark (efficient) regulated network, not accounting for the impact of non-regulated activities or company-specific factors such as financing decisions or cost efficiency and quality incentives performance. This approach of assessing financeability on a 'notional' basis is widely used, for example, in UK regulation.[153]

8.7 We agree that the stage of setting price–quality paths is a convenient stage of the process to carry out the financeability assessment. This is because financeability reflects whether networks' cash flows are sufficient for them to raise financing, and no cash flow forecasting is undertaken and assessed by the NZCC specifically for the IMs review.

8.8 However, by leaving the financeability assessment until DPPs, CPPs or IPPs, the NZCC potentially limits the effectiveness of the test in its role as a cross-check of the sufficiency of the regulatory price control package. Moreover, the NZCC limits the

[150] Ibid., para. 3.293.
[151] Ibid., para. 3.288.
[152] Ibid, para. 3.296.
[153] For example, Ofgem undertakes the assessment for the 'notional efficient operator'. See Ofgem (2022), 'Decision – RIIO-ED2 Final Determinations Finance Annex', 30 November, section 5, p. 64.

options of remedies that it could deploy should a financeability issue be found. We discuss these concerns in turn below.

8.9 While individual companies' poor decisions—like those mentioned by the NZCC and highlighted above—affect networks' ability to raise financing, regulatory allowances also play a deterministic role. Some of those allowances are set in IMs reviews. For example, the cost of capital allowance and its components show whether a benchmark (efficiently run) company would have sufficient profits (determined by the cost of capital allowance) to cover its interest expenses (which are supposed to be broadly aligned with the cost of debt allowance, adjusted for the notional gearing). Where the cost of capital is insufficiently higher than the cost of debt, the benchmark company's interest cover ratio could be too low to raise financing on reasonable terms. A financeability test could help in identifying this issue.

8.10 The impact of the cost of capital allowance on the financeability of networks is recognised by credit rating agencies. For example, S&P states that the '[l]ower regulated weighted average cost of capital for electricity network [is] putting some pressure on regulated cash flow' in relation to Vector.[154]

8.11 Other reasons why a benchmark company with a regulatory package that follows the NPV = 0 principle may encounter financeability challenges are related to cash-flow misalignments. In other words, if the timing of cash outflows and inflows is not sufficiently aligned, the company may need to secure a significant amount of financing, which may or may not be possible to do on reasonable terms. This is more likely to be problematic in high-growth phases where CAPEX outflows are fairly high relative to the depreciation allowance. The misalignment of CAPEX and regulatory depreciation allowance cash flows is acknowledged by the NZCC.[155]

8.12 Turning to the potential remedies for any financeability concerns, if the NZCC undertakes a financeability test only at the stage of setting price–quality paths, it limits the range of

[154] S&P Global (2022), 'Vector Ltd.', 8 December, p. 1.
[155] New Zealand Commerce Commission (2023), 'Financing and incentivising efficient expenditure during the energy transition topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', para. 3.294.

remedies that it could deploy to solve financeability issues. For example, the NZCC can make changes to the regulatory depreciation allowance profile at that stage—the more cash flows allocated to the upcoming price control period, the stronger the financeability of the current price control period. However, other considerations such as intertemporal fairness, affordability or the effect on long-term financeability should also be accounted for when setting the depreciation profile, and limit the effectiveness of this measure. The remedy that would not be fully available to the NZCC if it undertakes the financeability assessment *after* a decision is taken as part of the IMs review is the cost of capital allowance. If the cost of capital allowance is set in such a way that would not allow networks to be financeable, the NZCC would not have full discretion to address the issue at source once identified. Although the NZCC can change the cost of capital allowance at the DPPs stage, IMs reviews remain the key stage at which the cost of capital methodologies are set. Changing the cost of capital allowance methodologies at the DPPs stage may undermine investors' confidence.

8.13 For example, in a recent re-determination by the UK CMA, for PR19 for water networks, financeability was one of the reasons to aim up on the cost of equity, i.e. to set a WACC percentile above the 50th percentile.[156]

8.14 To overcome the challenges of running a financeability test only at the stage of setting price–quality paths, as described above, the NZCC could follow at least one of these two options:

- at the stage of the IMs review, commit to undertake a financeability test at the DPPs, CPPs or IPPs and set up the framework of the financeability test that the NZCC will follow, to provide networks with certainty. According to the NZCC, providing certainty is the purpose of the IMs;[157]

[156] 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, para. 9.1402, https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf (accessed 13 July 2023).
[157] According to the NZCC, '[t]he purpose of IMs, set out in section 52R of the Act, is to promote certainty for suppliers and consumers in relation to the rules, requirements and processes applying to Part 4 regulation'. See New Zealand Commerce Commission (2022), 'Part 4 Input Methodologies Review 2023. Framework paper', 13 October, para. X8,

- undertake a financeability assessment using provisional cash flow forecasts when reviewing the IMs. This would be done as a provisional check in a stylised way, before going through the more tailored and detailed financeability testing that the NZCC states that it currently goes through on a case-by-case basis. We consider this approach to be sufficiently practical, given that networks provide the NZCC with their updated CAPEX and OPEX forecasts annually,[158] which ensure that the NZCC has the required data for the financeability test.

8.15 Either option would allow one to test whether the regulatory package allows companies to finance their operations on reasonable terms and have the capacity and capability to manage their financial affairs.

8B Equity issuance

8.16 The NZCC does not provide an allowance for equity issuance costs.[159] It states that no allowance is required because equity is available in perpetuity, retaining profits can be used instead of issuance of new equity, and there is generally no evidence of material equity raising costs.[160]

8.17 However, the NZCC highlights that Transpower may require equity financing beyond that which is available via retained earnings and reduced dividends, alluding to the idea that the equity issuance allowance may be justified for the companies that are expected to issue equity.

8.18 In response to the EDBs' submission stating that the companies will need to issue equity, the NZCC notes that the equity financing requirements in the modelling presented do not exceed the sum of the 'Dividend at Assumed Payout Ratio' and 'Retained Cashflow Available for Reinvestment under Assumed Payout Ratio'.[161] With this statement, the NZCC suggests that

https://comcom.govt.nz/__data/assets/pdf_file/0034/294793/Input-methodologies-2023-Decision-Making-Framework-paper-12-October-2022.pdf (accessed 17 July 2023).
[158] New Zealand Commerce Commission (2018), 'Electricity Distribution Information Disclosure Determination 2012 ', 3 April, clause 2.6.6, https://comcom.govt.nz/__data/assets/pdf_file/0025/78703/Electricity-distribution-information-disclosure-determination-2012-consolidated-3-April-2018.pdf (accessed 17 July 2023).
[159] New Zealand Commerce Commission (2023), 'Cost of capital topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, p. 9.
[160] Ibid., para. 4.211.
[161] Ibid., footnote 235.

companies can forgo dividend payments without any consequences.

8.19 We agree that reducing and reinvesting dividends is a natural source of equity financing for RAB growth. In this case, we have not analysed cash flow models for the upcoming price control period to assess the extent to which new equity issuance may or may not be required by the EDBs. However, in principle, we observe that if the only way to finance (potentially significant levels of) CAPEX, while keeping the gearing at the notional level, is to significantly reduce the dividend payout, one of the following conclusions can be made:

- the new equity issuance is required to avoid a prolonged period of lower-than-expected dividend levels, and therefore the allowance for equity issuance costs is justified;
- an alternative remedy, such as a higher revenue allowance, is required, so that companies can finance their (potentially high level of) investment via retained earnings.

8.20 The possibility of providing equity issuance costs while assuming that dividends are paid is supported by international precedent. For example, the energy regulator for Great Britain, Ofgem, provides a 5% allowance on the notional equity issuance requirement.[162] In other words, if Ofgem's financial modelling shows that the benchmark (efficiently run) company requires equity issuance to maintain the notional level of gearing, Ofgem increases the revenue allowance by 5% of the notional equity issuance amount.[163] At the same time, in its modelling Ofgem assumes a notional (positive) level of the dividend yield at 3%.[164]

[162] Ofgem (2021), 'RIIO-2 Final Determinations – Finance Annex (REVISED)', p. 137, https://www.ofgem.gov.uk/sites/default/files/docs/2021/02/final_determinations_-_finance_annex_revised_002.pdf (accessed 7 July 2023). Ofgem (2022), 'RIIO-ED2 Final Determinations Finance Annex', 30 November, para. 10.82, https://www.ofgem.gov.uk/sites/default/files/2022-11/RIIO-ED2%20Final%20Determinations%20Finance%20Annex.pdf (accessed 7 July 2023).
[163] Ofgem (2022), 'RIIO-2 Price Control Financial Model (PCFM)', tab 'Revenue'.
[164] The notional dividend yield in the RIIO-2 price controls was 3%. This corresponded to the 57% payout ratio for electricity distribution, where the cost of equity allowance was 5.23% (CPIH-real), the 75% payout ratio for electricity transmission with a cost of equity allowance of 4.02% (CPIH-real), and the 70% payout ratio for gas transmission and distribution with a cost of equity allowance of 4.30% (CPIH-real). See Ofgem (2021), 'RIIO-2 Final Determinations – Finance Annex (REVISED)', p. 137 and Table 13, https://www.ofgem.gov.uk/sites/default/files/docs/2021/02/final_determinations_-_finance_annex_revised_002.pdf (accessed 7 July 2023). Ofgem (2022), 'RIIO-ED2 Final Determinations Finance Annex', 30 November, paras 10.82 and 4.1,

In addition to equity issuance requirements during the price control period, the need to reduce the notional gearing between the price controls also leads to an equity issuance allowance under Ofgem's regime.

8.21 Ofwat, the economic regulator of the water industry in England and Wales, is also planning to provide an equity issuance cost allowance in the upcoming price control period.[165] In the case of Ofwat, the allowance is 2% of the required equity issuance amount. In addition, unlike Ofgem, Ofwat does not consider that the notional company needs to issue equity at the start of the price control period to reduce the gearing, because of the current high inflationary environment which, according to Ofwat, allows companies to de-gear without additional equity issuance.[166] Ofwat assumes that the equity issuance is required when it is not sufficient to reduce the notional dividend yield assumption by 50%:[167]

We consider that investors in a company undergoing large scale investment may expect to receive more of their return as growth of its equity value. However, we do not expect a resilient, notionally structured, company that is performing in line with our determinations to totally forego dividends.

8.22 The process of establishing the equity requirements for a benchmark company is closely related to the financeability assessment—debt financeability issues can be remedied by dividend reductions and equity injections. But these potential remedies come at the expense of equity financeability. Ensuring

https://www.ofgem.gov.uk/sites/default/files/2022-11/RIIO-ED2%20Final%20Determinations%20Finance%20Annex.pdf (accessed 7 July 2023).

[165] Ofwat (2022), 'Creating tomorrow, together: Our final methodology for PR24. Appendix 10 Aligning risk and return', p. 48, https://www.ofwat.gov.uk/wp-content/uploads/2022/12/PR24_final_methodology_Appendix_10_Aligning_risk_and_return.pdf (accessed 7 July 2023).

[166] Ibid., p. 25.

[167] Ibid., p. 48. Ofwat's suggested figure for the maximum reasonable dividend yield is 4%, which corresponds to the payout ratio of 97% based on the cost of equity allowance of 4.14% (CPIH-real). This level of the dividend yield corresponds to little real RAB growth. If RAB growth is expected, Ofwat considers a 2% dividend yield to be reasonable. See Ofwat (2022), 'Creating tomorrow, together. Our final methodology for PR24', December, p. 114, https://www.ofwat.gov.uk/wp-content/uploads/2022/12/PR24_final_methodology_main_document.pdf (accessed 8 July 2023); and Ofwat (2022), 'Creating tomorrow, together: Our final methodology for PR24. Appendix 11 Allowed return on capital', December, p. 7, https://www.ofwat.gov.uk/wp-content/uploads/2022/12/PR24_final_methodology_Appendix_11_Allowed_return.pdf (accessed 8 July 2023).

that equity requirements are met provides another reason for introducing financeability testing.

8.23 It could be reasonable for networks to propose an issuance cost allowance in their CPP applications. This would be justified if networks identify the need for equity issuance during the price control period at that stage. However, if financeability testing is undertaken for all the networks outside of CPP applications, the need for an equity issuance allowance for each of the companies could also be identified at other stages of the review process.

9 Concluding remarks

9.1 In this report, we have commented on selected areas of the NZCC's 2023 IMs review DD on the cost of capital allowance and related issues.

9.2 We have shown that in a few areas the NZCC has not changed its approach, although it had sufficient evidence for a change. These are:

- not adding a convenience yield to the RFR;
- not increasing the term of government bonds to proxy the RFR;
- keeping the approach of the fixed debt premium;
- keeping the estimate of the TCSD at 7.5bps;
- keeping the asset beta estimate at 0.35.

9.3 At the same time, the NZCC has changed its approach to a few parameters on which the evidence does not support a change. Those are:

- an update to the TAMRP from 7.5% to 7.0%;
- a change to the approach to estimating the asset beta;[168]
- an update to the WACC percentile for EDBs from the 67th to the 65th percentile.

9.4 As a result, our assessment points to an overall underestimation of the cost of capital allowance.

9.5 We have also shown that we do not consider the NZCC's reasonableness check with RAB multiples to be reliable, and have proposed an alternative check that supports the rest of the evidence pointing to the finding that the cost of equity allowance is underestimated.

9.6 Finally, we have suggested practical ways in which the NZCC could approach financeability and the equity issuance allowance.

[168] The NZCC has changed the approach to assessing the asset beta, but kept the estimate unchanged.

9.7 There are, however, areas of the NZCC's DD relating to the cost of capital that we have not assessed in this report. For example, we have not assessed the liquidity of the instruments that are potentially available for estimating the convenience yield in New Zealand. This would be a potentially valuable assessment for the NZCC—the practical challenge that the NZCC faced in estimating the level of the convenience yield was one of the reasons why the NZCC has decided not to account for the convenience yield in setting the RFR allowance.

9.8 Neither have we commented on the NZCC's proposed debt adjustment to the revenue wash-up mechanism.[169] This adjustment is novel for the New Zealand EDBs' regulatory regime and has not been replicated by the NZCC based on a well-established precedent, so that EDBs could observe the impact of the mechanism on networks and consumers in another regime.

9.9 The consultation window of five weeks provided by the NZCC is fairly short relative to consultation windows by other regulators that the NZCC often refers to. In particular:

- Ofgem's consultation on the RIIO-ED2 draft determinations ran from 29 June 2022 to 26 August 2022, i.e. over eight weeks;[170]
- the AER's consultation on the draft rate of return instrument 2022 and explanatory statement was issued on 16 June 2022, while the submissions were expected by 2 September 2022, i.e. within 11 weeks.[171]

9.10 If a further window of consultation and/or engagement with stakeholders were available, further evidence on these areas and others could be usefully developed to inform the IMs review.

[169] New Zealand Commerce Commission (2023), 'Financing and incentivising efficient expenditure during the energy transition topic paper. Part 4 Input Methodologies Review 2023 – Draft decision', 14 June, paras 5.63–5.115, https://comcom.govt.nz/__data/assets/pdf_file/0026/318626/Part-4-IM-Review-2023-Draft-decision-Financing-and-incentivising-efficient-expenditure-during-the-energy-transition-topic-paper-14-June-2023.pdf (accessed 17 July 2023).
[170] Ofgem (2022), 'RIIO-ED2 Draft Determinations', 29 June, https://www.ofgem.gov.uk/publications/riio-ed2-draft-determinations (accessed 17 July 2023).
[171] Australian Energy Regulator (2022), 'AER consults on draft Rate of Return Instrument 2022', 16 June, https://www.aer.gov.au/communication/aer-consults-on-draft-rate-of-return-instrument-2022#:~:text=We%20welcome%20submissions%20on%20the,AEST%2C%20Friday%202%20September%202022.&text=We%20prefer%20that%20all%20submissions,public%20documents%20unless%20otherwise%20requested (accessed 17 July 2023).

Contact

Sahar Shamsi, CFA
Partner
+44 (0) 20 7776 6624
sahar.shamsi@oxera.com

oxera.com