RIIO-3 COST OF EQUITY RANGE

PREPARED FOR NATIONAL GRID ELECTRICITY TRANSMISSION

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Executive Summary

Introduction

National Grid Electricity Transmission (NGET) has asked Frontier Economics to estimate the cost of equity for RIIO-3 – covering the April 2026 to March 2031 period. This is to help inform the cost of equity that it applies in the NGET RIIO-3 business plan submission.

An 'early view' RIIO-3 cost of equity range was provided by Ofgem in the Sector Specific Methodology Decision (SSMD) issued in July 2024. This range, at 60% gearing, was 4.57% to 6.35% in CPIH deflated terms.

In this report we consider the approach that Ofgem took to estimate that range. We also consider a range of issues, including:

- The changes to market conditions that have taken place since RIIO-2 – and how they are best reflected in the cost of equity;

- The topic of 'investability' and how that translates into a cost of equity that is sufficient to finance the multi-billion CAPEX plan that NGET has in place to achieve net-zero;

- New information that was provided in the SSMD by Ofgem, including minded-to positions and replies to SSMC submissions.

We conclude with a recommended range and point estimate for NGET to use for business plan purposes. Prior to Draft and Final Determinations, updates of the data and relevant risks will be required – and that may have a bearing on the range set out.

Key findings

The capital market environment has shifted considerably since RIIO-2. The extended period of accommodative monetary policy since the Global Financial Crisis (GFC) has abruptly ended. This is shown by the much higher long-term cost of real borrowing and actions by central banks to actively reduce their holdings of bonds (known as Quantitative Tightening (QT)). This has implications for a cost of equity estimated through CAPM, both directly through the risk-free rate (RFR) and total market return (TMR), and indirectly through the range of outputs that are able to pass market based 'cross-checks'.

Importantly, the CoE allowance needs to be set at a level which allows NGET to retain and attract new investment, given NGET's critical role in delivering 2035 decarbonisation targets

and the sheer scale of its investment programme.[1] This would be in line with (among other things) Ofgem's new Net Zero and growth duties. In this report we have focused on determining how an investable CoE is best constructed, building on evidence and analysis set out in the updated cross-checks report we have produced on behalf of the ENA (Energy Networks Association).[2] We discuss each of the CAPM parameters (risk-free rate, TMR and beta) in turn.

Risk-free rate

The risk-free rate has increased significantly since RIIO-2 with yields on long-term index-linked gilts (ILGs) increasing from around -2.5% in 2021 to above +1% recently. Following academic evidence and regulatory precedent, our approach to estimating the RFR includes an additional allowance to adjust for the convenience premium on ILGs. In line with the CMA at PR19, we use AAA non-government bond indices as an additional source of evidence to account for yields on ILG being lower than the RFR. We find that the scale of convenience premium we use is conservative compared to academic estimates once the higher interest rate environment is taken into account. **Our RFR range is 1.23% to 1.80%.**

Total Market Return (TMR)

The negative real interest market conditions which prevailed leading up to the RIIO-2 decision have reversed. In response, Ofgem has raised its TMR estimate in the RIIO-3 SSMD (vs. the RIIO-2 value), but the key question is whether Ofgem's SSMD TMR range is sufficient to result in an investable CoE?

To ensure a CoE is investable, we understand that Ofgem intends to adopt an element of looking 'through the cycle'[3], while complying with the UKRN's policy of setting a TMR which is 'stable but not fixed'.[4] Based on stated regulatory objectives, we consider it is reasonable to set a long-run unconditional (on prevailing capital markets) range for TMR of 6.5% - 7.5% CPIH-real, anchored around the long-term average of 7.0% CPIH-real, informed by historical evidence on achieved market returns.

Making determinations within this range over time would ensure that allowed TMR would look 'through the cycle', while still allowing sufficient flexibility to respond to changes in the macroeconomic environment in a stable and predictable way.

- ■ The 124-year average TMR (or, long-term average) of 7.0% acts as a lens for the 'through the cycle' level of TMR and an anchor point for this stable range.

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[1]   See for example: https://www.gov.uk/government/news/plans-unveiled-to-decarbonise-uk-power-system-by-2035

[2]   Frontier Economics, 'Updated cost of equity cross-check evidence, a report prepared for the ENA', November 2024.

[3]   Ofgem (2024) RIIO-3 Sector Specific Methodology Decision – Finance Annex, para 3.141

[4]   UKRN (2023) UKRN guidance for regulators on the methodology for setting the cost of capital, page 19

- A range of 1% can be constructed around this point, informed by analysis of how allowed returns flex with the interest rate environment. We have developed the TMR Glider as a framework for assessing a stable TMR, and found that historically, the interquartile range of the Glider is around 1%, suggesting that a stable TMR would adapt within this relatively tight range.

However, while we consider that this range would work well for the long term, the task at hand is to set allowed returns for the RIIO-3 period. Over the past 24 months, market-implied values of TMR e.g. those implied by the Discounted Growth Model (DGM), have been consistently above their median values, implying a significant increase in expectations of the market return.[5] This is corroborated by Ofgem's own TMR cross-checks, which have increased more than 2% since the RIIO-2 Final Determinations. Together, this suggests that Ofgem's 25bps increase in TMR (compared to the RIIO-2 value) is insufficient.

The combination of historical evidence, combined with cross-check evidence, clearly points to the fact that an expected equity return in the top half of this long run range is currently required. We therefore recommend and adopt a **TMR range for RIIO-3 of 7.0% - 7.5%** CPIH real, as part of an overall CoE intended to ensure investability. We note that our range for TMR sits strictly above Ofgem's range. This highlights that the increase in TMR between RIIO-2 and RIIO-3 currently proposed by Ofgem is insufficient.

Beta

A key development set out by Ofgem in the SSMD was the plan to draw on a set of European comparators to inform beta estimation, in addition to UK comparators. We have reviewed the suggested list of European comparators proposed by Ofgem and agree that they are of suitable quality– given their activities and liquidity. We therefore also draw on the latest evidence from the five European comparators proposed when setting the asset beta range.

In addition, we consider data from Pennon is relevant for assessing evidence from UK comparators given that, following a corporate restructuring, it is now a 'pure-play' network operator. We add Pennon to the UK list alongside National Grid, Severn Trent and United Utilities.

We note that, among the 2, 5 and 10-year estimation windows, 5-year beta estimates would cover data back to August 2019. This timeframe contains all pandemic and geopolitical related shocks and associated equity market volatility. The 2-year beta does not suffer from the same issue, while the for the 10-year beta the impact of these shocks will be diluted. Given this, our beta range draws on estimates drawn from the 2-year and 10-year estimation windows.

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[5] We also note that the TMR Glider values have also been above their historical average values over the same time period which captures the higher interest rate environment which currently prevails.

Using these timeframes and our proposed set of UK and European comparators, **our asset beta range is 0.34 to 0.42**. The majority of this asset beta range sits above the final value for asset beta used for RIIO-ET2. We find that this is consistent with heightened risk at RIIO-3.

Conclusion and next steps

In the table below we combine the individual parameter findings into an overall cost of equity for RIIO-3. As shown, **this results in a range from 5.49% to 7.14%, at 60% gearing. The mid-point of this range of 6.31%. This is 85bps greater than the mid-point from the SSMD expressed on the same basis**, revealing that Ofgem's range and point estimate are too low.

Table 1   CPIH-deflated cost of equity for RIIO-ET3

Component	ET3 Low	ET3 High	SSMD low	SSMD high
Risk-free rate	1.23%	1.80%	1.18%	1.18%
Total market return	7.00%	7.50%	6.50%	7.00%
Equity risk premium	5.77%	5.70%	5.32%	5.82%
Debt beta	0.075	0.075	0.075	0.075
Asset beta	0.34	0.42	0.30	0.40
Equity beta	0.74	0.94	0.64	0.89
Cost of equity	5.49%	7.14%	4.57%	6.35%
Midpoint at 60% gearing	6.31%		5.46%	
Point estimate with aiming up	**6.56%**			

Source: Frontier Economics, Ofgem

Note: *CPIH deflated terms. All figures presented at 60% gearing. We calculate the asset beta for each company using our debt beta assumption and the company specific gearing for the relevant estimation window. The asset beta that we use in our range is then re-levered using the notional gearing assumption.*

Building on this CAPM range, we also consider an appropriate point estimate for RIIO-3.

While the outputs above focus on CAPM evidence, when assessing a point estimate we also take into account cross-check evidence. Key cross-check evidence is shown against the proposed CAPM range in the figure below. The details of the cross-check evidence set out can be found in our updated cross-checks report we have produced on behalf of the ENA.[6]

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[6]   Frontier Economics, 'Updated cost of equity cross-check evidence, a report prepared for the ENA', November 2024.

Our proposed point estimate is 6.56%, 25bps above the mid-point of our CAPM range. We adopt this figure for four reasons.

- First, an addition of 25bps to the mid-point brings the point estimate in line with cross-check evidence. This is shown in Figure 1 and is summarised in the supporting text.

- Second, the case for aiming up at RIIO-3 is manifestly stronger than at RIIO-2 given both:

  - □ the rapid change in capital market conditions that has been seen since that time, which increases the risk of error; and

  - □ the sheer scale of NGET's investment programme and the need for it to raise significant new capital.

- Third, this would be in line with a substantial body of regulatory precedent. As the CMA noted at PR19 "*There is a regulatory history of setting the cost of capital by using a range, and then picking a point estimate from the top half of that range, both in the UK and internationally.*"[7] To ensure that investors are willing to provide the funds needed to support net zero, the allowed return on equity needs to be sufficient to provide incentives to invest. The investment requirement for ET3 is agreed by all stakeholders to be very large and critical to unlocking future economic growth.

- Fourth, the value of 25bps is consistent with the value the CMA applied in the context of the PR19 re-determinations. While it is too early in the RIIO-3 process to conclude on asymmetry of risk in the package (one reason for the CMA's 25bps selection), we find that parameter uncertainty and the need to promote investment (other CMA reasons) are clearly relevant for RIIO-3; and are more acute here than in the PR19 context.

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[7] This was highlighted by the CMA during the PR19 redeterminations in the context of the WACC. CMA (2020), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations, Final report', para 9.1226.

Figure 1 Summary of CAPM ranges and CoE cross-checks (CPIH-real)
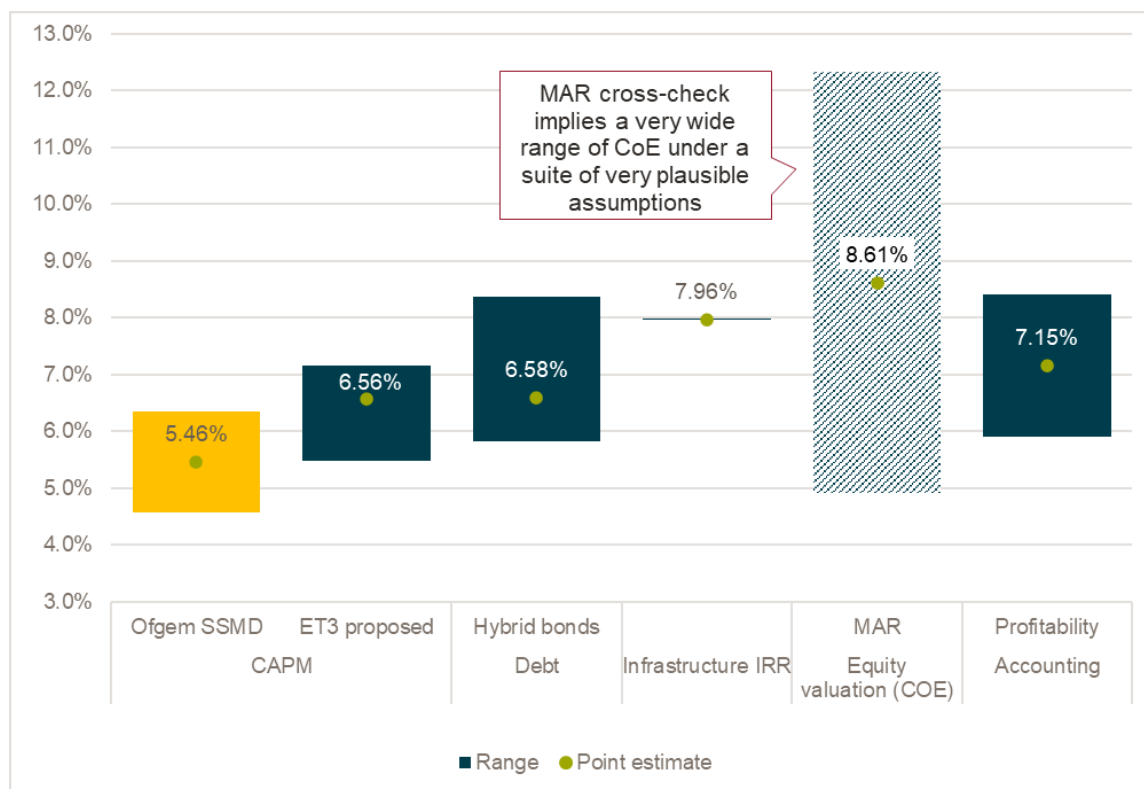
Source: Ofgem, Frontier analysis

Note: ET3 proposed CoE is presented at 60% gearing to be consistent with the SSMD CAPM range

A key reference point supporting this choice of point estimate is the **hybrid bond cross-check**. The CoE point estimate selected is aligned with the point estimate from the hybrid bond cross-check (6.58%). By aligning these two estimates we consider that risks to investability in ET3 are significantly mitigated. While there is overlap between other parts of the CAPM and hybrid bond cross-check range, we find that values further down the CAPM range could increasingly lead to allowed returns which are viewed as irrational by the market, given the relative risk of equity to debt.

Our point estimate is also more consistent with the magnitude of change seen in infrastructure fund equity IRRs. These values have increased by over four percentage points since the RIIO-T2/GD2 Final Determination. Our point estimate is consistent with that direction of travel since RIIO-2, but is much more muted, changing by only half as much.[8] This acknowledges the stability that Ofgem seeks from one price control to another.

In general, the available cross-check evidence indicates that the CoE range proposed in Ofgem's SSMD is too low and that its mid-point is inconsistent with most of the cross-

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[8] The RIIO-2 FD Step 1 cost of equity was 4.55% (CPIH deflated). Our point estimate is approximately two percentage points greater than this. Our point estimate is also considerably lower than the level of infrastructure fund equity IRRs, which are around 8.0% (CPIH deflated).

checks.   This carries with it a material risk of failing to secure investability, which may jeopardise the ability of NGET (and other energy networks) to raise the capital needed and deliver their investment plans, potentially contrary to Ofgem's duties to finance, to assist in meeting net zero targets and the requirement to have regard to economic growth, with obvious negative consequences for consumers and wider society.   A key contributor to this is Ofgem embedding a TMR which is too low. [9]   We conclude that our ET3 proposed point estimate is clearly preferable, as it mitigates this investability risk and avoids any adverse consequences for consumers.

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[9]   Frontier Economics, 'Updated cost of equity cross-check evidence, a report prepared for the ENA', November 2024.

1 Introduction

1.1 Context

1.1 National Grid Electricity Transmission (NGET) has asked Frontier Economics to estimate the cost of equity for RIIO-3 – covering the April 2026 to March 2031 period. This is to help inform the cost of equity that it applies in the NGET RIIO-3 business plan submission.

1.2 Scope of this report

1.2 An 'early view' RIIO-3 cost of equity range was provided by Ofgem in the Sector Specific Methodology Decision (SSMD) issued in July 2024. This range, at 60% gearing, was 4.57% to 6.35% in CPIH deflated terms.

1.3 In this report we consider the approach that Ofgem took to estimate that range. We also consider a range of issues, including:

■ The changes to market conditions that have taken place since RIIO-3 – and how they are best reflected in the cost of equity;

■ The topic of 'investability' and how that translates into a cost of equity that is sufficient to finance the multi-billion pound CAPEX plan that NGET has in place to achieve net-zero;

■ New information that was provided in the SSMD by Ofgem, including minded-to positions and replies to SSMC submissions.

1.4 We conclude with a recommended range and point estimate for NGET to use for business plan purposes. This range is a recommendation specific to the business-plan stage of RIIO-3. Prior to draft and final determinations updates of the data will be required – and that may have a bearing on the range and point estimate set out.

1.5 Unless otherwise stated the data cut-off used in this report is August 2024. Unless otherwise stated figures are also presented in CPIH deflated terms. Inflation assumptions are discussed in Section 2.

1.3 Structure of this report

1.6 This report builds on other RIIO-3 work we have submitted to Ofgem for the ENA (Energy Networks Association) and NGET. Where we draw upon those previous submissions we make cross-references but do not repeat all the evidence and findings in this report.

1.7   This report is structured as follows:

- Section 2 covers the risk-free rate;
- Section 3 covers the total market return;
- Section 4 covers the beta range;
- Section 5 covers the notional gearing assumption;
- Section 6 discusses the overall cost of equity range; and
- Annex A provides more detail on the review of European comparators.

2   Risk-free rate

2.1   Approach to RFR

2.1.1   Ofgem SSMD

2.1   At SSMD, Ofgem used data from 20Y index-linked gilt yields (ILGs) to inform its estimate of the risk-free rate (RFR). This is a continuation of the same approach that it used at RIIO-2.

2.2   Ofgem applied an 11 bps inflation wedge to convert the RPI-linked ILG to a RFR in CPIH terms. To calculate this, Ofgem used a 20-year geometric average of:

(a)   the latest medium-term OBR forecast from March 2024 of the difference between RPI and CPIH inflation rates; and

(b)   a zero wedge for after the reform of the RPI methodology which is assumed to take place in 2030.[10]

2.1.2   Our approach

2.3   Our approach uses two data sources to estimate the RFR. We also use evidence from ILGs but we consider additional evidence from AAA-rated corporate bond indices.

2.4   We consider AAA bond indices as well as the yields on ILGs as there is evidence that there is a convenience yield on ILGs which pushes their yields below the actual market RFR. This is because financial instruments such as index-linked gilts have special characteristics such as safety and liquidity which make them particularly desirable to investors. Therefore, these indices provide an alternative measure of the market RFR and which is not impacted by the convenience premium which reduces the yield on ILG.

2.5   We agree with Ofgem's approach to calculating the inflation wedge. We therefore also use an 11 bps wedge to convert ILG into CPIH terms since there has not been an updated forecast from the OBR up to our data cut-off.

2.2   Evidence on RFR

### 2.2.1   Evidence from index-linked gilt yields

2.6   A key data source for proxying the risk-free rate is the yield on ILGs . As shown in Figure 2 below, the yields on 20-year index-linked gilts continued to rise

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[10]   The annual inflation rate difference is zero 12-months after the reform is first implemented.

through the second half of 2023 but have stabilised in 2024. The yield at the end of August 2024 was 1.18%. This is significantly greater than the equivalent yield from December 2021, which was around -2.8% (the lowest point on the figure below).

Figure 2   Index-linked gilt yields
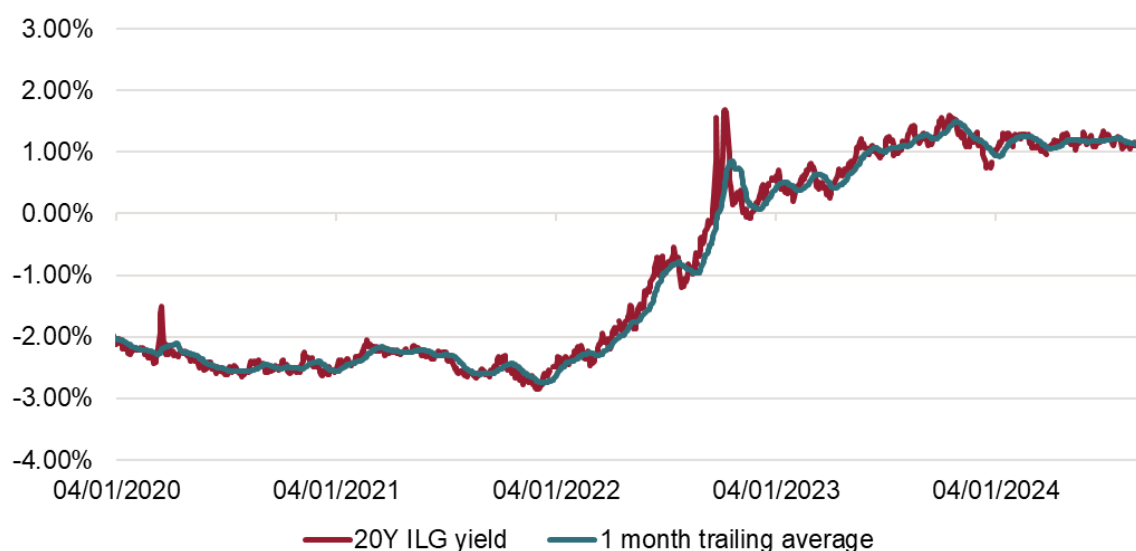
Source: Bank of England
Note: Frontier calculations of trailing average, 20yr Government Liability Curve spot yields

2.7   Taking a one month averaging period, the estimate for the risk-free rate from this data source as at 30 August 2024, is 1.12% in RPI-deflated terms.

2.8   To convert to CPIH terms, we apply Ofgem's estimate of RPI-CPIH wedge of 11 bps to give an estimate of the RFR of 1.23% in CPIH-deflated terms. This approach uses the same methodology as Ofgem used at the SSMD, with updated data to the end of August 2024.

2.2.2 Convenience yield and evidence from AAA bond indices

2.9   Another data source that can be used to inform the risk-free rate is AAA-rated corporate bonds. We consider AAA bond indices as well as the yields on ILGs as there is evidence that there is a convenience yield on ILGs which pushes their yields below the actual market RFR.

2.10   The latest academic literature on whether government bond yields are influenced by convenience is clear – concluding that they are. For example, van Binsbergen et.al (2022), published in the Journal of Financial Economics, finds that:

> *"the yield on a money-like asset is below the risk-free cost of capital, reflecting the liquidity and collateral value of such assets."[11]*

2.11   Diamond and van Tassel (2021) also find the presence of convenience yields for a range of developed economies, including the UK, explaining the reasons for this as follows:

> *"In developed economies with minimal risk of sovereign default, government debt is a uniquely safe and liquid financial asset which plays a role similar to money. Government debt can be held by financial institutions to satisfy regulatory requirements, can be pledged as collateral for a low-interest-rate loan, and can be traded by uninformed agents with little or no fear of adverse selection."[12]*

2.12   The concept of the convenience yield has previously been recognised by the CMA during the PR19 re-determinations, stating that:

> *"On balance, the CMA has accepted arguments and evidence that the ILG rate available to the government is unlikely to be a perfect proxy for the RFR, and that the 'true' rate of RFR in the market is likely to be above this level."[13]*

2.13   Given that the CMA decided that only using ILG would underestimate the RFR, it also considered evidence from AAA non-government bond indices. Specifically, it looked at yields from the iBoxx AAA 10+Y and 10-15Y indices. Its RFR estimate was a 6-month weighted average of the gilt rate (50%) and the deflated iBoxx indices (25% each). Other regulators, such as the Utility Regulator in Northern Ireland, continue to implement this approach.[14]

2.14   Table 2 below shows the yields from August 2024 from the AAA bond indices. In line with the CMA's approach and Ofgem's long-run inflation assumption for the cost of debt, we use 2% inflation to convert these nominal indices into CPIH terms.

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[11]   Van Binsbergen et.al (2022), 'Risk-free interest rates', Journal of Financial Economics 143 (2022) 1–29

[12]   Diamond and van Tassel (2021), 'Risk-Free Rates and Convenience Yields Around the World'.

[13]   CMA (2019) PR19 redeterminations, para. 9.158

[14]   The Utility Regulator used this evidence in the GT22 Final Determination (2022), GD23 Final Determination (2022) and RP7 Final Determination (2024) to estimate the RFR.

Table 2   Yields on AAA bond indices

Index	Yield
AAA 10+Y (nominal)	4.52%
AAA 10+Y (CPIH real)	2.47%
AAA 10-15Y (nominal)	4.30%
AAA 10-15Y (CPIH real)	2.26%

Source: *S&P global, Frontier Economics analysis*
Note: *Deflated using the Fisher equation and a CPIH assumption of 2.0%*

2.15   The data from August 2024 shows a yield for the AAA 10+ Year index of 2.47% and the AAA 10-15Y has a yield of 2.26%, in CPIH deflated terms. Following the CMA's approach, we take a weighted average of this evidence (25% weighting on each index) and the ILG evidence (50%). This gives a RFR of 1.80%.

2.3   Conclusion

2.16   We use Ofgem's approach based on ILG yields only, which gives an estimate of 1.23%, as the bottom end of our range. This approach does not make any additional allowances for the convenience premium on ILG which pushes down the yields on ILG. Therefore, this approach can be interpreted as a lower bound of the RFR.

2.17   As the top end of the range, we use CMA's PR19 approach which includes the evidence from AAA bond indices. This gives an estimate of 1.80% as the top end of our range.

2.18   The top-end of the range, which includes a convenience premium, is 57bps higher than the low-end of the range. Comparing this figure of 57bps with academic estimates of the convenience premium shows that this figure is above long-term averages for advanced economies.[15] However, it is consistent with a key finding from the convenience premium research that, "*There is a strong association between convenience yields and interest rates, with a 1 percent higher interest rate corresponding to a 15 basis point larger convenience yield on average*".[16]

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[15]   Although these averages are for the shorter end of the yield curve the authors find that average level of convenience yields is relatively stable across maturities – indicating that there may not necessarily be a significant drop-off at longer maturities. (see van Binsbergen, Diamond and van Tassel 2023, available at: https://libertystreeteconomics.newyorkfed.org/2023/10/options-for-calculating-risk-free-rates/)

[16]   The authors say that this can be explained by investors choosing to substitute between cash and other sources of liquidity. (see Diamond and van Tassel 2023, available at: https://libertystreeteconomics.newyorkfed.org/2023/10/a-look-at-convenience-yields-around-the-world/).

2.19   Our estimate of the RFR in relation to the convenience premium can be considered conservative as:

■   The CMA used AAA bond yields as its top end and ILG yields as its bottom end at PR19, whereas we have used the average of the AAA and ILG yields as our top end; and

■   Using the convenience premium evidence from advanced economies, a nominal gilt yield of around 4.5% (similar to recent levels on the UK) could be associated with a convenience premium of around 85bps, compared with the 57bps figure implied by the top end of our range.

3 Total Market Return

3.1 Ofgem's primary TMR estimation method at SSMD

3.1 Ofgem's minded-to position in the SSMD was to adopt a TMR range of 6.5%-7.0%. This range is based on long-term historical evidence. Ofgem noted that it considered the high end supported by historical ex post and low end supported by historical ex ante.

3.2 Ofgem then proposes to cross-check its TMR range with other reference points such as the survey of investment managers' TMR expectations.

3.2 Frontier assessment and analysis

3.3 Frontier's position to date has been to rely on an historical ex post approach to determine TMR, and to not place material weight on historical ex ante averaging methods.

3.4 Recent developments in capital markets have prompted us to revisit our approach to the TMR estimation in order to help ensure that our overall CoE estimates are fit for purpose from an equity investability point of view.

3.2.1 Issues with Ofgem's historical ex ante approaches

3.5 Regarding the historical ex ante approach, our view has been that it is less transparent than historical ex post, and relies on subjective judgements that are difficult to justify – essentially simply setting aside a proportion of achieved returns. But this is made almost irrelevant by the recent historical data.

3.6 Ofgem and Ofwat have recently arrived at different estimates of the historical ex ante TMR, despite both relying on DMS data to estimate the TMR and using the same approach, i.e. the DMS decomposition approach. This approach involves decomposing achieved returns into a number of elements, and then presuming that returns associated with one part (i.e. expansion of the Price/Dividend ratio) is unrepeatable.

3.7 Ofgem arrived at an estimate of 6.5% CPIH-real in its RIIO-3 SSMD, whereas Ofwat estimated a historical ex ante TMR of 6.6% CPIH-real in its draft determinations, even though these decisions were released within two months of each other. This arises from different views regarding serial correlation – demonstrating the scope for subjective judgements to influence results.[17]

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[17] Serial correlation relates to whether equity market returns between time periods are independent.

3.8   While we are not persuaded that this subjective approach is suitable for use in regulatory proceedings at all, we are particularly concerned about the result of these estimates, given the latest evidence contained in the latest DMS annual yearbook.

3.9   In the 2024 DMS edition, the proportion of achieved historical return arising from expansion of the Price/Dividend (P/D) ratio (according to the authors the 'unrepeatable' element) reported is very small, just 3 basis points measured in geometric mean (GM).

3.10   Table 3 below shows that the P/D ratio expansion accounts for less and less of a share of the total historic equity returns since 2020, possibly due to the decrease in share prices after taking inflation into account. This same factor is also leading to the ex post estimate decreasing over the same period. In other words, for the UK market, the historic ex ante and historic ex post average equity returns in the DMS data have been converging since 2020, such that today these two are only 3 bps apart in GM terms.[18]

Table 3   DMS decomposition, UK

1900 to…	2020	2021	2022	2023
GM dividend yield	4.57	4.56	4.56	4.55
UK real dividend growth rate	0.57	0.69	0.66	0.75
GM ex-ante TMR	5.14	5.25	5.22	5.30
P/D ratio expansion	**0.21**	**0.14**	**0.05**	**0.03**

Source: UBS Global Investment Returns Yearbook
Note: Figures shown in percentage points

3.11   Ofgem does not directly use the GM from DMS to estimate the TMR, and carries out adjustments in relation to inflation and serial correlation. But, the inflation adjustments should be applied consistently for historic ex ante and ex post averages. Therefore, such adjustments should not affect the gap between ex ante and ex post averages.

3.12   This reveals a problem in Ofgem's ex ante estimates. After Ofgem applies a different inflation series and an uplift to convert this series from a GM basis to AM, this underlying 3 basis-point difference between historic ex ante and ex post

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[18] We note that although for the US market, this P/D ratio expansion is much more significant, which partly explains why the authors of DMS stress that the ex ante equity returns will likely be lower than ex post. But it is important to recognise that this phenomenon has existed to a lesser extent to the UK equity market, and now almost does not exist at all.

average swells to a gap of 50 basis points (i.e. the difference between Ofgem's historic ex ante estimate of 6.5% and historic ex post estimate of 7%).[19]

3.13   This shows that Ofgem's approach to estimate the historic ex ante average TMR likely contains errors and is inconsistent with the way Ofgem estimates the ex post average. It casts material doubt over the validity of the assumptions Ofgem has adopted for the ex ante estimates. Overall, we consider there are clearly superior ways to determine a TMR range which meets Ofgem's regulatory objectives, as discussed in Section 3.2.3 below.

3.2.2   Evidence from TMR cross-checks

3.14   Ofgem has stated that cross-checks will play a key role in determining an investable level of allowed CoE in RIIO-3.[20] We agree with Ofgem on this aspect and have developed a cross-check –the hybrid bond cross-check – that indicates whether the allowed CoE is consistent with an investable level.

3.15   However, the hybrid bond benchmark only provides information on the overall CoE and cannot help diagnose if the individual CAPM parameters are set at an appropriate level to produce an allowed equity return which mitigates investability risks.

3.16   It is possible however to cross-check the TMR range with market data to ensure there is not a material disconnect between the CAPM-TMR and current market required rates of return. Ofgem already employs TMR survey data in this respect, and we have proposed additional survey data to supplement Ofgem's existing evidence base (the Fernandez survey). In addition, we have proposed the TMR Glider as a further TMR cross-check at SSMC stage.

3.17   Importantly, we have found that various cross-checks currently indicate that Ofgem's long-term historical TMR range (notwithstanding our wider concerns with how Ofgem has identified the bottom of the range) is not in line with measures of current market expectations. This is corroborated by Ofgem's own TMR cross-check, which shows that investment managers from various funds have increased their TMR expectations by at least 2%.[21]

3.18   There is therefore a material risk that, without change to this parameter, Ofgem's RIIO-3 CoE will be set too low.

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[19]   More specifically, 6.97% CPIH-real. Ofgem (2024) RIIO-3 Sector Specific Methodology Decision – Finance Annex, para 3.123

[20]   Ofgem (2024) RIIO-3 Sector Specific Methodology Decision – Finance Annex, para 3.265

[21]   Frontier Economics, 'Updated cost of equity cross-check evidence, a report prepared for the ENA', November 2024.

3.19   Given the scale of electricity transmission investment required in the next decade to meet decarbonisation goals, this is a concern and introduces investability risks. There is a clear need to re-assess the suitability of the long-term historical average approach to setting TMR which will result in an investable CoE.

3.20   Central to this debate is the notion of 'stable but not fixed' TMR allowance for regulated networks and Ofgem's policy intent of seeing 'through the cycle'.

(a)   The latter would allow the TMR allowance to be temporarily out of line with the prevailing market conditions, with the intended result being that, in the long-run, the peaks offset the troughs and investors can also see through the cycles and value the stability of the regime.

(b)   Whereas a 'stable but not fixed' TMR suggests that the TMR should flex with the market environment to ensure that the price control allowance is fit for purpose. Namely, so that investment can be attracted and retained while also preserving the properties of stability and predictability.

3.21   A pure 'through the cycle' approach is likely to result in a TMR which may be significantly below or above the required TMR.[22] An outcome of this mismatch is that the CoE would be too low or too high for a given price control. If the CoE allowance is too low and set at a level which does not meet investability benchmarks, then consumers suffer from under-investment – a particular point of concern for ET3 given how critical investment is to unlocking future economic growth. On the other hand, if the CoE is too high, then consumer bills are higher than they would otherwise need to be.

3.2.3   Setting an appropriate TMR for ET3

3.22   We consider there is an approach to reconcile Ofgem's 'through the cycle' policy intent with the 'stable but not fixed' approach, using our proposed TMR cross-checks. As highlighted in our report prepared for the ENA, we consider that DGM outputs can be used in partnership with the **long-term historical average TMR** and **TMR Glider** estimates as a balanced set of evidence to be considered alongside Ofgem's survey data to ensure the CAPM-TMR is set at an appropriate level.

3.23   Specifically, the long-term historical average TMR acts as a lens for the 'through the cycle' TMR. The TMR Glider on the other hand acts as a lens through which one could view a 'stable but not fixed' TMR, as the Glider-implied TMR moves with interest rates, but Glider-implied TMR is less significantly variable than the observed variation in interest rates.

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[22]   Ofgem (2024) –RIIO-3 Sector Specific Methodology Decision – Finance Annex, para 3.265

3.24   Finally, while not used directly, observing the evolution of the DGM-TMR can help regulators gauge how market expectations of TMR are evolving based on prevailing share prices and expectations of dividend growth. We consider this to be a helpful supplement to Ofgem's own TMR cross-checks.

3.25   Our key TMR cross-checks are set out in the figure below, which has been reproduced from the updated cross-checks report we have produced on behalf of the ENA.[23]

Figure 3   DGM-based TMR cross-check evidence and the long-run historical TMR (CPIH-real)
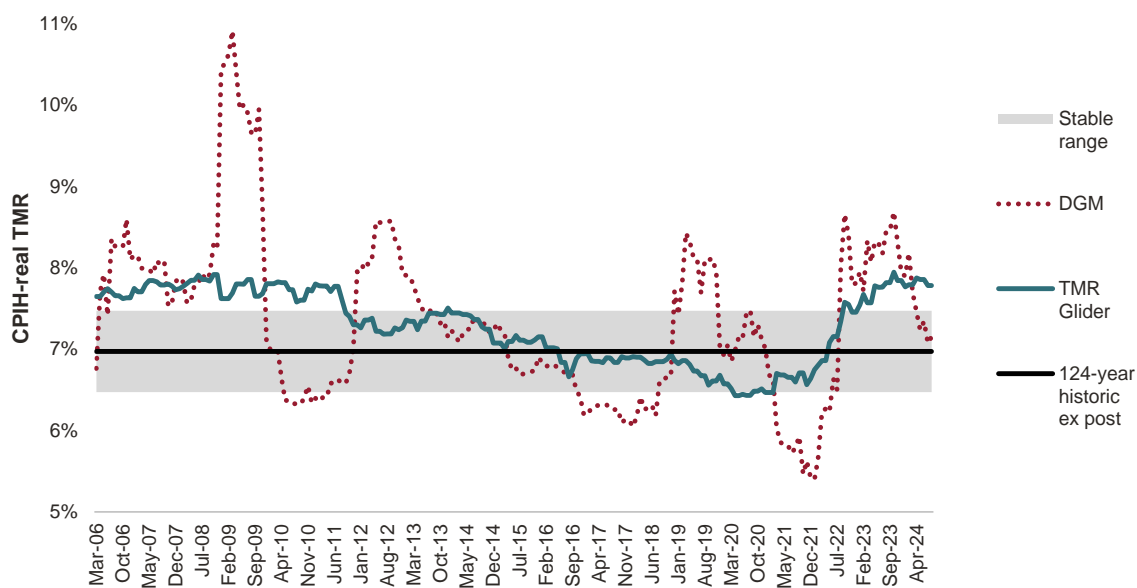
3.26   As we set out in the cross-checks report, we consider that it is possible to construct a TMR range that reflects a 'through the cycle view', and provides sufficient flexibility to allow Ofgem to respond to changes in the macroeconomic environment in a stable and predictable way.

(a)   The central point of this range is defined by the long-run, 124-year historical ex post average, roughly 7.0% CPIH-real.[24]

(b)   The TMR Glider provides a framework for a TMR which moves with gilt yields, although not fully one-to-one. As we saw in the previous section, the width of

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[23]   Frontier Economics, 'Updated cost of equity cross-check evidence, a report prepared for the ENA', November 2024.

[24]   To be precise, this figure is 6.97% CPIH-real but we round this to 7% for ease of discussion.

the Glider interquartile range is c. 1%, and therefore this could be interpreted as a reasonable range of variation of a stable TMR.

3.27   Taking all of the evidence together, we conclude that a long-run unconditional range of **6.5% - 7.5%** CPIH-real (unconditional on prevailing capital markets), anchored around the long-term average of 7.0% CPIH-real, is an approach to setting the TMR which looks 'through the cycle', but is sufficiently flexible to allow it to respond to changes in the macroeconomic environment in a stable and predictable way.

3.28   We also note that the DGM and TMR Glider values have been consistently above their historical averages for approximately the last 24 months. This indicates that current expectations of TMR lie above long-term average values, which is corroborated by the survey evidence Ofgem has hitherto relied on, which as noted above have increased by c. 2% or more since Ofgem reviewed the evidence in RIIO-2.

3.29   Given this, we consider that Ofgem should set the TMR range at the top end of the stable range, at **7.0% - 7.5%** CPIH-real. This range reflects current market conditions, and lies within the boundaries of a stable TMR. Ofgem's current proposals for TMR are too low, leading to an overall range for COE that is also too low with obvious risks for investability.

4 Beta

4.1 In this section we set out estimates for the RIIO-3 asset beta. We focus the discussion on three topics:

(a) The most suitable comparator set – covering both UK and European comparators;

(b) The timeframes used to assess asset beta values; and

(c) What has contributed to different levels of asset beta values over time.

4.2 Consistent with the SSMD we base our beta analysis on OLS regressions of listed comparators. We also de-gear and re-gear these estimates using the relevant level of notional gearing (discussed in Section 5).

4.1 Comparator set

4.3 In the SSMD Ofgem set out a minded-to position to include relevant European utility comparators in addition to UK water companies and National Grid. We therefore review both European and UK comparators in order to form a view on the most suitable comparator set.

4.1.1 UK comparators

4.4 Regarding UK comparators, we agree with the inclusion of National Grid (energy), United Utilities (water) and Severn Trent (water). We also see merits in the exclusion of SSE. However, we consider that Ofgem has too lightly – and wrongly – dismissed evidence from Pennon (a third listed water company).

4.5 As set out in the text below, Ofgem's concerns are regarding Pennon's non-network business lines.

> *"Given the significant weight of historical non-network business lines in both SSE plc (Energy) and Pennon plc (Water), we do not plan to use these companies in our comparator set."* [25]

4.6 In response to this we set out key information regarding Pennon below:

(a) Pennon shareholders approved the sale of its key non-network business line – the Viridor waste business – on 28 May 2020.[26] The completion of the sale was 08 July 2020.

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[25] Ofgem SSMD para 3.202.

[26] Information available at: https://www.pennon-group.co.uk/investor-information/viridor-disposal

(b) Since that point in time Pennon has expanded further into the water sector in England and Wales, with acquisitions of Bristol Water and Sutton & East Surrey Water in 2021 and 2024 respectively.

(c) The financial year 2021 annual report for Pennon Group highlights the, "UK Water Industry focus", following the disposal of Viridor.[27]

(d) The most recent financial year accounts for Pennon Group show that "Other" revenue is only 1% of the size of the revenue from water sector related activities.[28]

4.7 Given this information, it is clear that Pennon has been a "pure play" water network since it sold its waste management business in mid-2020. This demonstrates that Pennon can provide information on relevant risks as long as specific timeframes are used.

4.8 For example, a spot 2-year daily beta from August 2024 would draw on data from September 2022 to August 2024. This would ensure the data used was from the pure-play time period – providing a high quality observation. However, a 5-year or 10-year daily beta from the same August 2024 date would be lower quality given the overlap with the non-network business line time period.

4.9 We therefore consider that Pennon should be included in the 2-year beta sample. For this time period Pennon can be combined with United Utilities and Severn Trent on an equal footing.

4.10 Increasing the sample size of water companies helps to provide a broader perspective on risk, as there will be different combinations of cost and outcomes incentive performance covered within a large sample.

4.11 By excluding Pennon, Ofgem is failing to take into accounts highly relevant information, which has a significant impact on 2-year beta estimates.

4.1.2 European comparators

4.12 In the SSMD Ofgem set out a plan to include the following European comparators as part of the beta assessment:

(a) Enagas (Spain);

(b) Red Electrica (Spain);

(c) Italgas (Italy);

(d) Snam (Italy); and

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[27] Pennon Group plc – Annual Report and Accounts 2021, pg.11.

[28] £11.8m of 'Other' revenue compared against £999.3m of revenue from 'Water' and 'Non-household retail'; Pennon Group plc – Annual Report and Accounts 2024.

(e) Terna (Italy).

4.13   We agree that there are merits in reviewing information from European comparators so long as they are sufficiently robust and are estimated with an appropriate stock market index.

4.14   In order to scrutinise the European comparator list proposed in the SSMD we undertook an exercise for a longer-list of potential European comparators which was focused on:

(a) The share of regulated revenues (as a percentage of total revenue); and

(b) The liquidity of the stocks (as captured by a range of measures).

4.15   The detailed results of this exercise are set out in Annex A.

4.16   Overall, we agree that the comparator list proposed by Ofgem is suitable both from a regulated revenue and liquidity perspective. In addition, we also find that Elia (who operate electricity networks across Belgium and Germany) are another comparator which could be considered.[29]

4.17   We therefore estimate asset beta values for the five European comparators proposed in the SSMD, and also include a further sensitivity with the inclusion of Elia.

4.1.3   Asset beta estimates for the comparator group

4.18   In the table below we set out the latest figures for the UK and European comparator set. The stock index used for the UK comparators is the FTSE All-share, and the stock index used for the European comparators is the Stoxx 600.[30]

4.19   Consistent with the presentation by Ofgem in the SSMD, we show figures for the 2-year, 5-year and 10-year daily asset beta from mid-August 2024.[31]

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[29]   Historically we have been more cautious about Elia from a liquidity perspective, but find that the liquidity position has improved over time. Specifically, while the free float percentage for Elia remains lower than some other companies, its market capitalisation has grown significantly over time. We consider the case for including Elia to be marginal, as it demonstrated poorer liquidity, but arguably not to a degree that makes it necessary to exclude it.

[30]   The Stoxx 600 is a broad index, so has similarities with the broad nature of the FTSE All Share index. The Stoxx 600 is also Euro denominated, meaning it can consistently be applied to companies whose accounting and activities are predominantly undertaken in Euros.

[31]   A 0.075 debt beta is consistently applied to all comparators. The cut-off date used was 16 August 2024.

Table 4   Asset beta for chosen comparators

Company	Sector	Country	2yr beta	5yr beta	10yr beta
National Grid	ET	GB	0.36	0.35	0.36
United Utilities	Water	GB	0.39	0.31	0.33
Severn Trent	Water	GB	0.42	0.32	0.33
Pennon	Water	GB	0.45		
GB average			**0.40**	**0.33**	**0.34**
Enagas	GT	ES	0.38	0.37	0.38
Red Electrica	ET	ES	0.40	0.32	0.36
Terna	ET	IT	0.48	0.45	0.45
Snam	GT	IT	0.49	0.46	0.47
Italgas	GD	IT	0.40	0.39	
Elia	ET	BE, DE	0.54	0.41	0.32
European average			**0.45**	**0.40**	**0.39**
European average exc. Elia			**0.43**	**0.40**	**0.41**

Source: Frontier Economics, Bloomberg

Note: 0.075 debt beta; Italgas data not available for 10-year beta given listing date

4.2   Timeframes and asset beta range

4.20   Given the outputs set out in Table 4 above, there are two main areas where judgement is required to set the asset beta range used in the CAPM:

(a) The use of different comparators; and

(b) Combining outputs from different time frames.

4.21   We discuss each in turn, concluding with the current asset beta range we consider appropriate for RIIO-3.

4.2.1   Use of comparators

4.22   Firstly, having set out the asset beta estimates for Elia in the previous subsection, we find that the results for Elia are more volatile than for other companies. The difference between the highest and lowest observation for Elia is 0.22, more than double the next largest difference. As Elia was already a

marginal case, this volatility in outputs suggests that it is clearly preferable not to consider it directly when forming an asset beta range.[32]

4.23   We also note that Ofgem is likely to want to avoid a very wide asset beta range. With this in mind we focus on averages from the two different comparator groups when forming an asset beta range – rather than looking at the values for individual comparators.

4.2.2   Timeframes

4.24   When considering timeframes the impact of the pandemic is a key issue. This is because the pandemic had a significant impact on equity markets that may not be representative of a future five-year period (such as RIIO-3).

4.25   There is no single agreed method of dealing with data from a potentially unrepresentative period such as this. We are wary of manually excluding particular observations from the dataset when estimating betas. Nonetheless, we consider it would be wrong to apply equal weight to all timeframes when considering the appropriate beta range for RIIO-3. This would clearly be overly simplistic given the circumstances and we note that our concerns are greatest where a dataset has a high proportion of pandemic associated shocks in it, such as the announcement of lockdowns or key vaccine developments.

4.26   With this in mind we comment on the three timeframes set out in Table 4 above:

(a)   2-year – this includes data back to August 2022. This timeframe is pandemic-shock free given the advanced stage of vaccine rollout by this time.

(b)   5-year – this covers data back to August 2019. This timeframe therefore contains all pandemic related shocks, and will have the equity market volatility associated with those events.

(c)   10-year - this covers data back to August 2014. This timeframe also contains all pandemic related shocks, but the impact of these will be diluted compared to the 5-year periods.

4.27   For setting the RIIO-3 range we therefore have the greatest concerns about the 5-year beta values. This is because of the higher proportion of observations that are associated with pandemic shocks for that timeframe. We therefore focus on the 2-year and 10-year estimates when deriving asset beta ranges. We observe however that despite reservations over the reliability of beta estimates over this

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[32]   We also note that the impact of including Elia has a symmetric impact on the European comparator average (+0.02 to the high end, and -0.02 to the low end). 0.45 net of 0.43 at the high end of the range, and 0.39 net of 0.41 at the low end of the range.

5-year window, this period is still reflected in our estimate through the 10 year beta estimates.

4.28   We also consider that there are factors beyond the pandemic which mean the 2-year beta values are of key interest. These are:

(a)   The 2-year estimates will reflect, to a greater extent, the scale of CAPEX plans in transmission – as more information on how net zero is to be operationalised has been revealed to the market more recently. This is especially important as RIIO-3 will see a period of significant investment which carries additional risk.

(b)   The sample size of the comparator set is larger. Specifically, figures for Pennon are available and figures for Italgas are not available over the 10-year timeframe. This aids the robustness of asset beta estimation as the outputs are less likely to be skewed by company-specific circumstances.

4.2.3   Asset beta range

4.29   Taking into account all of the factors above **we consider that this supports an asset beta range from 0.34 to 0.42**.[33]

4.30   The low-end of the range is guided by the 10-year beta for all UK comparators. The high-end of the range is guided by average of the 2-year and 10-year beta values for all European comparators (excluding Elia).[34]

4.31   We note that in many cases the 2-year beta values tend to be towards the top-end of this range.

4.3   Contribution to different levels of asset beta over time

4.32   We provided a March 2024 report to the ENA on what we labelled the 'low beta puzzle'. In that report we set out a number of risk factors that had increased for RIIO-3. Despite these factors we noted that betas of network utilities remained low compared to historical values. We identified that these low betas could be a function of higher equity market volatility.

4.33   Since drafting that report there has been a decrease in equity market volatility (as measured by option implied volatility). This has been associated with an increase in the 2-year asset betas observed across a range of comparators. In other words, as some of the past events contributing to that higher market volatility (such as the pandemic and onset of the Ukraine war) have left the 2-

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[33]   Debt beta of 0.075.

[34]   These figures are 0.43 and 0.41, respectively.

year beta dataset some of the underlying risks our report identified are now more clearly represented in the data.

4.34   In the SSMD Ofgem stated that the topic of beta was:

> *"Made more complex by arguments from Frontier that shorter-term betas may be 'less problematic' if they were to rise"* [35]

4.35   This is an incorrect characterisation of our work. The key points in our report were that: (a) high volatility may lead to both upward pressure to the market implied ERP and downward pressure on the beta; and (b) during those periods of high volatility beta estimations mathematically may become less robust (high betas are higher and low betas are lower). These two problems mean that periods of high market volatility need to be carefully considered for reliability when selecting an asset beta range.

4.36   We have addressed both of those key points in this report. In the TMR section we consider how long-run TMR evidence can be combined with data on current market conditions in a way that still achieves the overall aim of TMR stability. And in the selection of the asset beta range we have drawn on a mix of short-term and long-term beta estimators – placing less weight on estimators which are most acutely impacted by periods of higher volatility that are less likely to be a reliable indicator of RIIO-3 risks.

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[35]   Ofgem SSMD for ET3 and GD3, para 3.173.

5 Gearing

5.1   In order to re-lever the asset beta into an equity beta an assumption for notional gearing is required when estimating the cost of equity. In this section we set out evidence on gearing levels and value we use for re-levering purposes.

5.2   We review three key sources of evidence for gearing:

(a) Credit rating agency guidance ranges;

(b) Actual average gearing levels; and

(c) Recent regulatory decisions on gearing.

5.1   Credit rating agency guidance

5.3   In order to understand the gearing levels that are broadly aligned with different credit rating bands, we review figures set out by Moody's. Specifically, we draw upon the net debt to RAV ranges in its 2022 'Regulated Electric and Gas Networks' methodology. The values from that document are set out in Table 5 below. While these ranges only form one part of the overall rating assessment, they help provide a view on the gearing ranges that can be sustained while achieving a given rating band.

Table 5   Moody's ranges

Rating band	Net debt to RAV range
A	45% to 60%
Baa	60% to 75%

Source: Moody's
Note: 2022 Methodology

5.4   As set out, the gearing range is 60%-75% for the 'Baa' rating band (equivalent to BBB rating with Standard and Poor's) and is 45-60% for the 'A' rating band (equivalent to A rating with Standard and Poor's). This is before UK specifics such as a relatively stable regulatory regime compared to other geographies globally has been overlaid – which may raise this range, all else equal.

5.2   Actual average gearing levels

5.5   Regulated companies have an incentive to seek efficient capital structures as this reduces their financing costs. Given this incentive, market evidence from similar regulated entities provides a reference point for considering efficient gearing levels.

5.6   In Figure 4 below we set out the average actual gearing for ET2 up until to FY2023. The average gearing across the three ET companies is 55%. There is relatively little variation around this average (+/-2%).

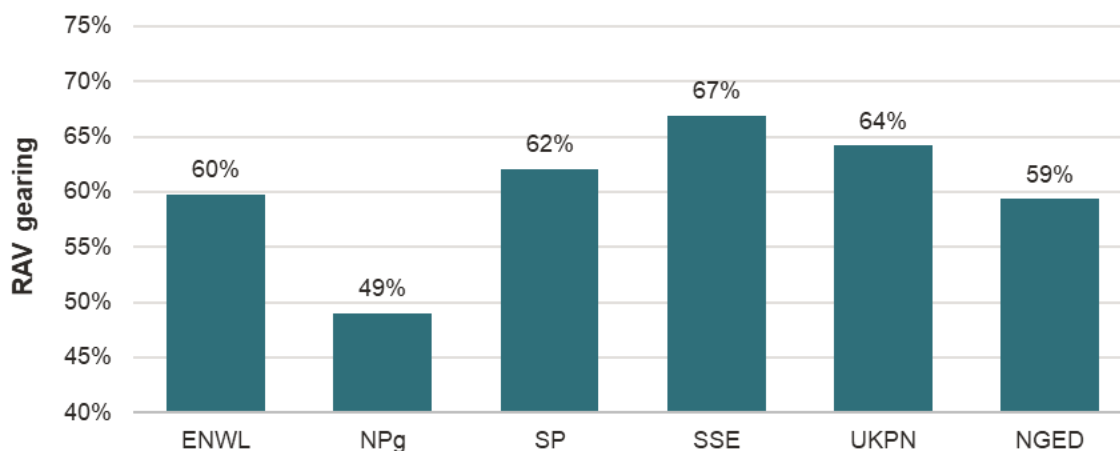## Figure 4   RIIO ET2 average actual gearing to FY23
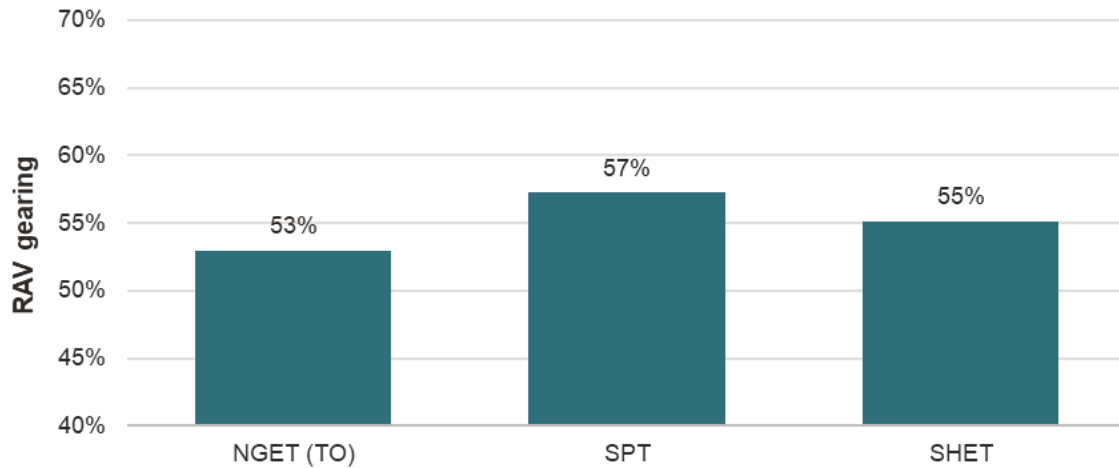
Source: Frontier Economics, Ofgem
Note: RAV gearing from Regulatory Financial Performance data file 2022-23

5.7   However, we note that where a regulated network is financed as part of a larger group (as is the case with NGET and the parent company National Grid plc) then there is some allocation required between different entities within the group – this can creates uncertainty over the precision of RAV gearing in those circumstances.

5.8   Given this, we also review actual gearing more widely – looking at evidence from electricity distribution networks. In Figure 5 below we set out average actual gearing for ED1. The average gearing (RAV weighted) across the group is 61%.

Figure 5   RIIO ED1 average actual gearing to FY23

Source: *Frontier Economics, Ofgem*
Note: *RAV gearing from Regulatory Financial Performance data file 2022-23*

5.9   Broadening out the sample further, we note other regulated infrastructure also has higher gearing. For example, the GB water sector has average RAV gearing of 68.5%. While there are moves to lower average water sector gearing over time in order to ensure greater financial resilience, even a material lowering of this level implies a higher gearing level against the ET sector.

5.10   We also note that other comparators from competitive infrastructure finance, which are consistently higher than 60%. For example, the Thames Tideway Tunnel recently had a gearing of 83% and Offshore Transmission Operators have typically been financed at gearing levels of 75%-85%.

5.11   Heathrow Airport, a business regulated under a RAV model, has maintained an actual gearing level above the CAA's 60% notional assumption, and yet has remained resilient through a very large revenue shock to the aviation industry due to the pandemic. It has maintained an investment grade rating at these gearing levels.

5.3 Recent regulatory decisions on gearing

5.12 Another source we consider is recent regulatory decisions on notional gearing. In Table 6 below we set out three energy network decisions that have been taken since the RIIO-ET2 FD. In two out of three cases the notional gearing figure used has been 60%, with GD23 using a lower gearing figure of 55%.

Table 6 Recent regulatory decisions

Regulator (price control)	Notional gearing
Ofgem (RIIO-ED2)	60%
UR (GT22)	60%
UR (GD23)	55%

Source: Regulatory final decisions

5.13 We note that ED2 also contained a high proportion of CAPEX relative to RAV as networks adapt to net zero, and will have a risk profile that overlaps with that of RIIO-ET2.

5.4 Conclusion

5.14 Based on the range of evidence set out above, we adopt a gearing figure of 60% for re-levering the asset beta in this report. This is the same gearing figure that Ofgem applied when estimating the WACC for the energy sector for RIIO-2.

5.15 Overall, we adopt this figure of 60% as it is commonly observed across a range of sources. This makes it a reasonable assumption for regulatory purposes.

6   Cost of equity

6.1   In this section we consider the overall cost of equity range for NGET in RIIO-3. In order to form a view on the appropriate range and point estimate, we:

(a)   Bring together the CAPM evidence from the sections above; and

(b)   Consider cross-check evidence alongside investability and wider sector-specific considerations for RIIO-3.

6.1   CAPM evidence

6.2   Summarising the estimates of each individual parameter, we present the overall cost of equity estimates from our CAPM methodology in the table below.

Table 7   CPIH-deflated cost of equity for RIIO-ET3

Component	ET3 Low	ET3 High	SSMD low	SSMD high
Risk-free rate	1.23%	1.80%	1.18%	1.18%
Total market return	7.00%	7.50%	6.50%	7.00%
Equity risk premium	5.77%	5.70%	5.32%	5.82%
Debt beta	0.075	0.075	0.075	0.075
Asset beta	0.34	0.42	0.30	0.40
Equity beta	0.74	0.94	0.64	0.89
Cost of equity	5.49%	7.14%	4.57%	6.35%
Midpoint at 60% gearing	6.31%		5.46%	
Point estimate with aiming up	**6.56%**			

Source: Frontier Economics, Ofgem

Note: CPIH deflated terms. All figures presented at 60% gearing. We calculate the asset beta for each company using our debt beta assumption and the company specific gearing for the relevant estimation window. The asset beta that we use in our range is then re-levered using the notional gearing assumption.

6.3   To recap our methodology and compare to that used by Ofgem in the SSMD:

■   On RFR we continue to find it appropriate to factor in a convenience premium in addition to ILG yields, and our estimates for the RFR incorporates a range of estimates for the convenience premium;

■   Our long term TMR midpoint estimate of 7% is informed by the long-term historical evidence based on latest DMS data. Our long-term unconditional TMR range of 6.5% - 7.5% is informed by the historical development of market based DGM-based cross checks. In our view, constructing the range in this

way reflects Ofgem's regulatory objectives. Our TMR range specific to RIIO-3 is then based on choosing the most appropriate part of our long-term range based on the current readings from the DGM and Glider. This evidence suggests a range of 7.0%-7.5% is appropriate. We note that our range for TMR sits strictly above Ofgem's range. This highlights that the increase in TMR between RIIO-2 and RIIO-3 currently proposed by Ofgem is insufficient.

■ Our beta estimates are based on empirical estimates for UK listed utility comparators and appropriate European comparators. We consider both long-run and short-run estimation windows, including 10-year and 2-year windows, but we recommend that no weight is placed on the 5-year window at this time.[36]

6.2 Cross-check evidence

6.4 We note that this report focusses on the CAPM evidence, however, we have also taken into account key cross-check evidence. This is set out in the figure below.

Figure 6 Summary of CAPM ranges and CoE cross-checks (CPIH-real)
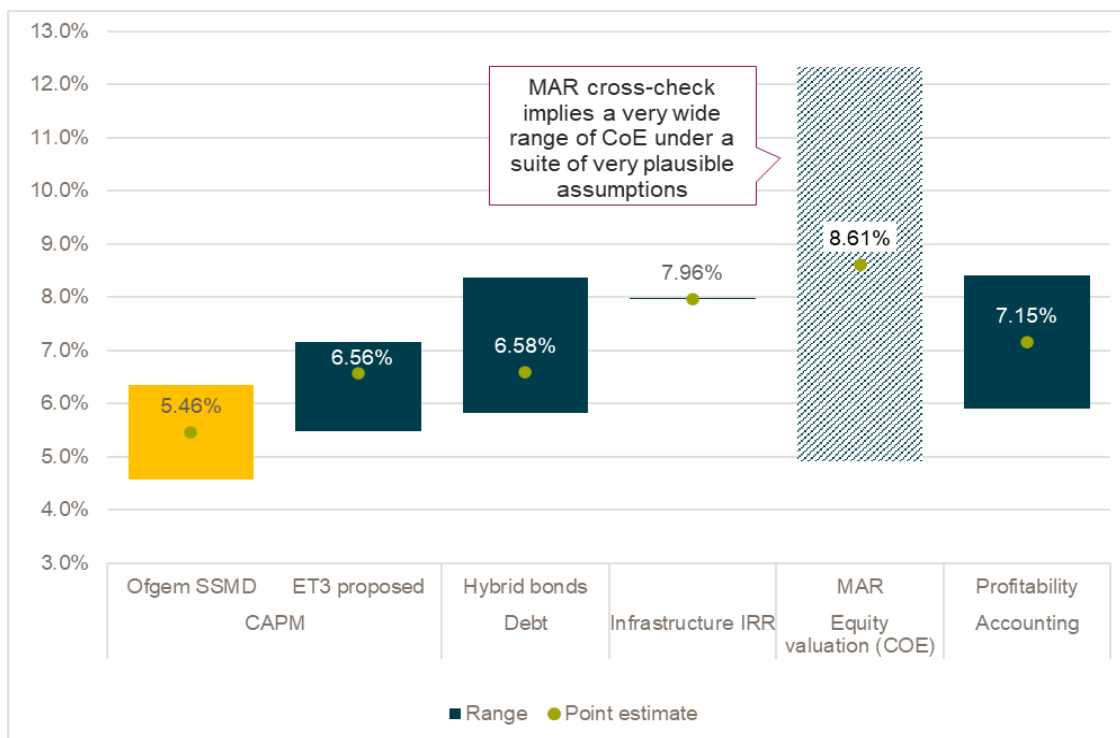
Source: *Ofgem, Frontier analysis*
Note: *ET3 proposed CoE is presented at 60% gearing to be consistent with the SSMD CAPM range*

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[36] This is because this window is dominated by the high market volatility period during and following Covid. We observe, that this period is still reflected in our estimates of 10 year betas but is diluted.

6.5   As shown in the figure above, our CAPM estimate range for ET3 is **5.49% - 7.14% CPIH-real.**

6.6   In relation to the hybrid bond cross-check, we have estimated a CAPM range where the lower bound and higher bound both sit below the equivalent points in our hybrid bond range. This reflects our overall methodology, which is cognisant of the profound changes in market conditions since RIIO-2, and considers that a material move up in CoE is necessary as a consequence; but, at the same time does not mechanistically follow short run market movements. In this respect, our proposed range is looking through the cycle.

6.7   However, it is of concern that the midpoint of our range is still below the point estimate of our hybrid bond cross-check (6.58%) given the need for NGET (and other networks) to raise a sizeable quantum of capital over the decades ahead, and retain existing capital, in the face of intense competition for funds globally. Given this relativity, we consider that even this CAPM range may create a risk that returns may not prove sufficient for NGET to attract and retain equity finance for the investment needed for RIIO-3 given the current market conditions.

6.8   We note that at the PR19 redeterminations, the CMA provided 25 bps aiming up on the CoE for disputing water companies. We supported the principle of aiming up at RIIO-2 appeals for a similar set of reasons to those put forward by the CMA at PR19.[37]

6.9   Ofgem has stated in the SSMD that it will not consider aiming up on principle, although specific circumstances such as market conditions evidenced by cross-checks may provide justifications to aim up in the CAPM range on a case by case basis.

6.10   We consider that the need for aiming up at RIIO-3 is considerably more pronounced than at RIIO-2. In particular, **aiming up by 25 bps**, following the CMA PR19 precedent, would make the CoE point estimate 6.56%, more in line with cross-check evidence, and strikes a more appropriate balance between Ofgem's competing policy objectives, to ensure investability while looking through the cycle.

6.11   We consider that Ofgem's proposed CoE range carries with it a material risk of failing to secure investability when compared to the hybrid bond range, even if Ofgem selects a point estimate from the very top of that range. Ofgem's range is simply too low. The other cross-checks, such as infrastructure fund IRR, MARs, and long-term profitability cross-checks, all suggest that the CoE range and mid-

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[37]   We note that under different legal framework for appeals, the CMA found that Ofgem was 'not wrong' when it aimed straight at RIIO-2.

point proposed in Ofgem's SSMD are too low, while further supporting the reasonableness of our range.

6.12   A key contributor to the SSMD CoE range being too low is the TMR range proposed by Ofgem. We discuss this in more detail in the updated cross-checks report we have produced on behalf of the ENA. [38] We have found that the SSMD TMR range is inconsistent with TMR cross-check evidence, and the proposed uplift of just 25 bps is inconsistent with the scale of change seen in wider market evidence.

6.13   A RIIO-3 TMR range of 7.0% - 7.5% CPIH-real is more in line with the TMR cross-checks (such as DGM and the TMR Glider) and leads to an overall CoE range that is consistent with the CoE cross-checks. We have therefore included this range in the CAPM estimate for ET3.

6.14   Overall, our CAPM cost of equity range overlaps with the bottom half of the range produced by our hybrid bond CoE cross-check, and the midpoint of our range 6.31% is lower than the point estimate of our hybrid bond cross-check 6.58%. It is only with a 25 bps aiming up adjustment that **our point estimate of 6.56%** becomes broadly consistent with the point estimate of our hybrid bond cross-check. Given the risks associated with setting CoE too low, and the location of our CAPM CoE range versus our hybrid bond CoE range, we consider that the 25 bps aiming up from the midpoint of our range is necessary to ensure equity investability for RIIO-3.

6.15   In general, the available cross-check evidence indicates that the CoE range proposed in Ofgem's SSMD is too low and that its mid-point is inconsistent with most of the cross-checks. This carries with it a material risk of failing to secure investability, which may jeopardise the ability of NGET (and other energy networks) to raise the capital needed and deliver their investment plans, potentially contrary to Ofgem's duties to finance, to assist in meeting net zero targets and the requirement to have regard to economic growth – with obvious negative consequences for consumers and wider society. We, conclude that our ET3 proposed point estimate is clearly preferable, as it mitigates this investability risk and avoids any adverse consequences for consumers.

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[38]   Frontier Economics, 'Updated cost of equity cross-check evidence, a report prepared for the ENA', November 2024.

Annex A – European comparator review

A.1   In this Annex we set out the details of our review of potential European comparators.

A.2   The longlist of companies we consider are based on all those that were mentioned during RIIO-2 and by Ofgem in the RIIO-3 SSMD.[39] This provided us with thirteen candidates.

A.3   For each company on this longlist we then considered two key pieces of information:

   (a) Share of regulated revenue – to capture this information we reviewed accounting information for 2023. This measure is to capture the extent to which the activities of the company are regulated network activities. Comparators were considered most suitable where the vast majority of revenues were from regulated network activities e.g. 80% or greater.

   (b) Liquidity – as there is no single measure of stock liquidity that is perfect, we consider a range of data points, including:

      (i)   Bid-ask spreads – measured as a percentage of the stock price, providing a barometer of how actively traded a stock is, we consider a bid-ask spread greater than 1.0% to be a liquidity concern;

      (ii) Free float percentage – measuring the proportion of shares that are traded; and

      (iii) Market capitalisation – smaller stocks can be less frequently traded, and we consider that a lower free float percentage could be more problematic if the underlying size of the company is already relatively small.

A.4   We also considered regulatory comparability at a high-level, but did not undertake a granular assessment of each regulatory regime compared to that proposed for RIIO-3.

A.5   In the table below we set out the findings of our review. As shown, there are five companies which have both a high share of regulated revenues and appear to be sufficiently liquid for robust beta observation:

- Terna;
- Snam;

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[39]   For RIIO-2 we reviewed European companies mentioned in various consultant reports as well as those mentioned by Ofgem.

- Italgas;

- Red Electrica; and

- Enagas.

A.6   These five companies are the same set of companies that Ofgem identified in the SSMD. In addition to those five, we also consider that the liquidity case for Elia is more marginal. This is because although Elia has a relatively low free float percentage compared to other companies, it's market capitalisation is over €7bn. In previous comparator assessments, Frontier has been more cautious about the inclusion of Elia on liquidity grounds, but Elia's larger market capitalisation now compared to several years ago has mitigated some of our concerns. We therefore test the sensitivity of the beta results to its inclusion.

Table 8   Results against comparator criteria

Company	Country	Sector	Regulated revenue share (%)	Liquidity – bid-ask spread (%)	Liquidity – free float (%)	Liquidity – market cap (EUR bn)	Included?
Elia	BE, DE	ET	>90%	<0.5%	41%	7.1	Sensitivity
Fluxys	BE	GT	50% - 60%	>1.0%	10%	1.1	No
Terna	IT	ET	80% - 90%	<0.5%	70%	15.5	Yes
Enel	IT	ED	20% - 30%	<0.5%	76%	66.8	No
HERA	IT	ED/GD	30% - 40%	<0.5%	56%	5.0	No
A2A	IT	ED/GD	10% - 20%	<0.5%	50%	6.3	No
Snam[40]	IT	GT	70% - 90%	<0.5%	59%	14.8	Yes
Italgas	IT	GD	>90%	<0.5%	57%	4.1	Yes
REN	PT	ET/GT	>90%	<0.5%	61%	1.6	No
Transelectrica[41]	RO	ET	40% - 90%	0.5% - 1.0%	35%	0.7	No
Red Electrica	ES	ET	80% - 90%	<0.5%	76%	9.1	Yes
Endesa	ES	ED	10% - 20%	<0.5%	30%	19.3	No
Enagas	ES	GT	>90%	<0.5%	89%	3.6	Yes

Source: *Frontier Economics, Bloomberg, 2023 company accounts unless otherwise stated*

Note: *Average bid-ask spread measured over 5 years; average free float share measured over 5 years. We also tested the results are the 2-year horizon and did not find significant differences in most cases.*

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[40]   Snam's most recent regulated revenue figures are at the top-end of this range, therefore we do not exclude based on this criteria. Specifically, the first half of 2024 results showed significantly less revenue from the 'Energy Transition Business Revenues' segment (down 70% from the first half of 2023). The results noted the end of 'Superbonus incentives' as a contributing factor.

[41]   The wide range for Transelectrica's share of regulated revenue is based on two scenarios where revenues from balancing market activities are either considered or not.

A.7   The table also shows the companies from the longlist that we have excluded. These seven companies are:

- Fluxys;
- Enel;
- HERA;
- A2A;
- REN;
- Transelectrica; and
- Endesa.

A.8   In most cases, the main reason for exclusion is the low percentage of regulated revenue. Other sources of revenue that many companies in the sample have is from generation activities (rather than regulated network activities). Given the potential differences in risk profile between network activities and generation activities – we do not include these companies in our beta estimation.

A.9   In other cases, liquidity is a key reason for exclusion, particularly in the cases of Fluxys, REN and Transelectrica. For REN, although the free-float percentage was not as low as some companies, when combined with its lower market capitalisation the amount of stock value that is available to trade is significantly lower than most other comparators.

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