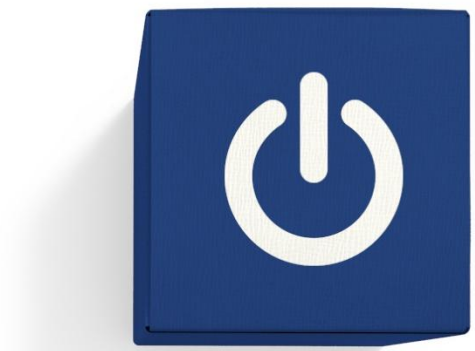
PR6 Cost of Capital Estimation

Commission for Regulation of Utilities (CRU)

9 June 2025



FINAL REPORT

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EXECUTIVE SUMMARY

In this report for the Commission for Regulation of Utilities (CRU) we set out an initial range for the efficient rate of return (or 'cost of capital') for the onshore electricity network price controls at Price Review 6 (PR6). We also propose a cost of capital for the Celtic Interconnector in an Appendix to this report. The cost of capital for the offshore grid in PR6 is addressed in a separate report.

The CRU is responsible for ensuring that customers and network users receive a quality service and value for money, while the electricity network companies earn a fair return on their activities to make the necessary network investments.

E.1. OVERVIEW OF METHODOLOGY

The CRU has historically, and will for PR6, calculate the allowed rate of return for EirGrid and ESBN using a Weighted Average Cost of Capital (WACC) approach. The WACC is computed from (a) the average cost of debt for the various forms of debt held by the company, and (b) the cost of equity. This is the return that investors (shareholders and lenders of various types) require in order to invest in the company.

Mathematically, the following formula is used to compute the WACC:

$$WACC = (E / (D + E)) * rE + (D / (D + E)) * rD$$

Where: rE is the allowed cost of equity, rD is the allowed cost of debt, and E and D are the total values of equity and debt, respectively. E and D determine the level of notional gearing for the firm, which is used in the WACC formula to derive the relative weights between the costs of equity and debt finance.

The CRU's standard practice has relied on a Capital Asset Pricing Methodology (CAPM) approach for estimating the cost of equity, consistent with other regulators in Ireland and the UK. The CAPM relates an investor's required return to two external benchmarks (the risk-free rate and equity risk premium) and an adjustment to reflect the relative riskiness of the regulated company in question (beta).

Typically, the CRU sets its allowed WACC in real pre-tax terms:

- Investors receive a real cash return (via the return on the RAB) and an increase in the value of their asset (the Regulatory Asset Base (RAB)) which is tied (indexed) to outturn inflation.
- Setting a pre-tax rate covers notional tax payable on profit in the allowed return, rather than setting a bespoke tax allowance.[1]

The report has been provided on this basis for PR6.

Estimates of the cost of capital for regulated utilities typically rely on market evidence to help inform a benchmark opportunity cost of capital for investors in the regulated company. For this report, we have focused on Eurozone data, rather than Irish-specific data, consistent with the approach that CEPA has adopted in our analysis for the CRU at PR5 and PC5 (the recent gas price review). This choice is based on the following factors:

- from a theoretical perspective, in a monetary union such as the Eurozone, we might expect that key parameters to the network companies' cost of capital, for example, the risk-free rate, to converge onto some central view over a long enough time period ('long-term equilibrium');

[1] In other words, the price control packages must also provide companies with sufficient revenue to meet their corporation tax liabilities. After interest payments, profits companies have remaining are taxed at a standard corporation tax rate. When the pre-tax WACC value is applied to the RAB, it provides a revenue allowance to meet these tax liabilities. After tax payments are made, it still provides sufficient returns to satisfy equity investors.

- from a practitioner's perspective, we suggest investors would typically view Irish regulated electricity companies as part of an asset class that includes European utilities more generally; and
- from a pragmatic perspective, Eurozone data provides a larger and richer information source than the more limited Ireland-only data, meaning our estimates are more likely to be statistically robust.

As part of our analysis, we consider whether structural differences exist in inflation between Eurozone countries and Ireland and make an adjustment to reflect that the price control is tied to an Irish inflation index (via indexation of the RAB and revenues) but our analysis of the cost of capital is undertaken in real terms, using Eurozone inflation data[2]. Such an approach delivers internal consistency and forms the 'inflation adjustment' in our analysis.

E.2. KEY ISSUES IN ESTIMATING THE COST OF CAPITAL IN PR6

This paper represents an early view of the range for the cost of capital for PR6, and highlights three key issues that are potentially different from previous (PR5 and earlier) electricity network price controls.

Key issue 1: Should the allowed cost of capital be the same for ESB Networks (ESBN) and EirGrid TSO?

Historically the allowed rate of return for EirGrid's TSO business has been set equal to the 'network WACC' estimated for ESBN, with a separate margin allowed to reflect the TSO's higher operational gearing compared to ESBN[3]. For PR6 we propose to move away from this approach and consider the characteristics of EirGrid directly in the cost of capital. The key motivations to differentiate between ESBN and EirGrid TSO are:

- **Debt:** ESBN's debt portfolio is comprised of longer-term finance, issued over a longer historical period to reflect its longer-term network asset lives. In contrast, the TSO would be expected to borrow at shorter debt tenors, reflecting the shorter asset lives of its investments (e.g., IT).
- **Equity:** The systematic risks faced by the two businesses may differ, notably the TSO is 'asset light'.[4]
- **Gearing:** The notional businesses may also adopt different financial structures, though we have adopted the same gearing assumption in our recommendations for PR6.

With the development of EirGrid's offshore role during PR6 – and the expected external scrutiny of its regulatory framework as part of its expected credit rating assessment – there is also a practical rationale for separating the CRU's decisions on EirGrid's allowed returns from ESBN at PR6 and in future price controls.

For PR6, therefore, we have estimated a separate TSO WACC rather a single 'network WACC'.

Key issue 2: Allowed returns and financeability pressures in PR6.

The potential scale of investment at PR6 and the companies' capability to finance these investment programmes, gives particular importance to the returns the CRU will allow for the companies in PR6. Larger investment programmes typically place greater pressure on financeability.[5]

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[2] With Germany used as a proxy for the Eurozone where required.

[3] The higher ratio of expenditure / opex to allowed returns potentially increases the sensitivity of percentage-based returns to shocks of a given size in € terms.

[4] Regulatory precedent (Ofgem + Utility Regulator/CMA on SONI) suggests asset light characteristics are better reflected in beta than margins which would necessitate CRU setting a different cost of capital for the TSO.

[5] For example, via the credit ratios that the rating agencies monitor as part of their rating assessment. The greater the 'headroom' in these credit ratios, the higher the likelihood that the regulated company will be capable of maintaining a comfortable investment grade rating.

In its recent energy network price control decisions, the CRU has adopted the 67th percentile of the proposed WACC range for the price control review – i.e., a point estimate slightly above the mid-point of the range. An important question for PR6 is how the point estimate for the allowed WACC will be selected from a range of evidence given the degree of financeability pressure during this investment period (see issue 3 below).

The more the CRU chooses to 'aim up' when selecting a point estimate from a range of evidence, the more supportive this will be to the financeability of the PR6 programme. On the other hand, the higher the allowed WACC, the greater the pressure PR6 will place on consumer bills. As a high-level estimate, an increase of 0.5% in the allowed WACC during PR6 would increase total allowed revenues by c.€375m (2024 prices) for ESBN assuming its proposed capital programme remains unchanged from its business plan submissions.[6]

The allowed rate of return is, therefore, one of the most significant decisions that the CRU will make in PR6. The final decision on the allowed WACC at PR6 will need to give careful regard to whether the price controls can secure that the electricity network companies are capable of financing the activities and the outputs they are being required to deliver in PR6. We have conducted financeability analysis alongside this report.

Key issue 3: Choice of a point estimate.

The cost of capital cannot be directly observed (in particular, the cost of equity) and therefore an element of judgement must be exercised by the regulator when choosing a value for the allowed rate of return. Estimating a network company's cost of capital over a price control is inherently subject to uncertainty and to deal with this uncertainty some regulators may opt to "aim-up", for reasons set out above and in Section 4.2 of this report.

Both EirGrid and ESBN have proposed to aim up in their WACC estimates: ESBN through the use of a 67th percentile in the overall WACC range; and EirGrid with the use of a 67th percentile, but also aiming up in their underlying estimate of the cost of equity for PR6.

Using the 67th percentile of the overall WACC range is the approach that has been used by the CRU to select a point estimate for both PR5 and PC5. Selecting a point estimate above the mid-point, gives some weight to the argument that the risks to consumers are higher if underestimating the required rate of return risks resulting in underinvestment – if the licensee is ultimately not remunerated for its cost of capital during the price control – and that elements of the WACC, in particular, the cost of equity are ultimately unobservable.

As we discuss below, given our approach to producing an initial WACC range for this price control review, we consider that continuing to use the 67th percentile could be suitable for setting the cost of capital for PR6. However, this remains a key area of regulatory judgement, and we would expect the final decision to be informed by:

- the conclusions from the CRU's financeability assessment (see key issue 2 above); and
- further updates to the market evidence ahead of final determinations.

E.3. Our initial ranges for the PR6 WACC

To estimate the cost of capital for ESBN and EirGrid TSO separately, we propose to calculate the following parameters of the WACC consistently for both entities:

- Risk-free rate;
- Total Market Return (TMR); and
- Inflation adjustment.

[6] The average RABs for the TAO and DSO are €5bn and €10bn respectively. Given the RAB for the TSO is much smaller, we have focused on the impact on ESBN in this estimate.

We propose to estimate the following parameters separately and potentially take different approaches for the two entities:

- cost of debt (the TSO has a shorter-term debt than TAO and DSO impacting benchmarks used);
- beta; and
- notional gearing.

Proposed WACC – ESBN

The approach taken for ESBN adopts a well-established and predictable approach in setting parameter estimates and the overall cost of capital. We use market evidence and regulatory precedent to derive a range for each parameter, that is used to derive an overall range for the real pre-tax WACC.

Table E.1 below summarise our initial PR6 WACC ranges for ESBN (i.e., TAO and DSO price controls).

Table E.1: Initial WACC range for the TAO/DSO for PR6 compared to ESBN's proposal and the PR5 allowance

	CRU PR5	ESBN PR6 proposal	CEPA PR6
Cost of debt, pre-adjustment	0.8% to 1.5%	1.15% to 1.49%	1.18% to 1.50%
Issuance costs	0.1% to 0.2%	0.10% to 0.30%	0.10%-0.20%
Cost of debt	**0.9% to 1.7%**	**1.25% to 1.69%**	**1.28% to 1.70%**
Risk-free rate (RFR)	-1.2% to -0.8%	0.36% to 0.65%	0.50% to 0.60%
Total Market Return (TMR)	5.70% to 6.75%	6.45% to 6.80%	6.40% to 6.80%
Equity Risk Premium (ERP)	6.90% to 7.55%	6.09% to 6.15%	5.90% to 6.20%
Asset beta	0.35 to 0.4	0.31 to 0.35	0.31 to 0.35
Equity beta	0.78 to 0.89	0.68 to 0.77	0.69 to 0.78
Cost of equity (post-tax)	4.12% to 5.91%	4.52% to 5.41%	4.56% to 5.42%
Tax	12.5%	12.5%	12.5% to 15.0%
Cost of equity (pre-tax)	**4.76% to 6.76%**	**5.17% to 6.18%**	**5.22% to 6.38%**
Notional Gearing	55%	55%	55%
WACC (pre-tax)	2.64% to 3.98%	3.01% to 3.71%	3.05% to 3.81%
Inflation adjustment	0.00% to 0.40%	0.58% to 0.83%	0.10% to 0.40%
WACC (pre-tax) after adjustment for inflation expectations	**2.64% to 4.38%**	**3.60% to 4.54%**	**3.15% to 4.21%**
WACC Point estimate	**P67= 3.80%**	**P67= 4.23%**	**P67= 3.85%**

Source: CEPA analysis

The largest difference in the ESBN proposal and our recommendation is on the inflation adjustment. Using a consistent P67 estimate gives a 45bps differential on the WACC from this parameter (75bps vs 30bps). On many of the other parameters, our proposed ranges are very close to ESBN's proposals for PR6, as we discuss in further detail below.

Proposed WACC – EirGrid TSO

Our initial range for the TSO WACC is not like-for-like with EirGrid's own proposal for PR6, as EirGrid have continued to assume a separate margin will apply to remunerate its higher operational gearing separately from the WACC. In contrast, we have incorporated an uplift to the beta with no separate margin for operational gearing.[7]

EirGrid's proposals for the WACC (as presented in Table E.2) show the full range of estimates for each WACC parameter absent of any aiming up. EirGrid have, in the financial issues paper of their PR6 business plan, aimed up on the real pre-tax cost of equity, and opted for a range of 6.7-6.9% (as opposed to the 5.38% to 6.97% presented in the table). The reasons why EirGrid argue aiming up is required are set out in section 4.2.1 of the main report.

Table E.2: Initial WACC range for the TSO for PR6 compared to EirGrid's proposal and the PR5 allowance

	CRU PR5	EirGrid PR6 proposal (no additional aiming up)	CEPA PR6
Cost of debt (benchmark)	0.8% to 1.5%	1.91%	1.24% to 1.43%
Small company premium	Not given	0.30%	N/A
Premium on Irish utilities	Not given	0.21%	N/A
Issuance costs	0.1% to 0.2%	0.30%	0.10% to 0.20%
Cost of debt	**0.9% to 1.7%**	**2.73%**	**1.34% to 1.63%**
Risk-free rate (RFR)	-1.2% to -0.8%	0.80% to 1.2%	0.50% to 0.60%
Total Market Return (TMR)	5.70% to 6.75%	6.68% to 6.72%	6.40% to 6.80%
Equity Risk Premium (ERP)	6.90% to 7.55%	5.53% to 5.93%	5.90% to 6.20%
Asset beta	0.35 to 0.4	0.35 to 0.40	0.50 to 0.55
Equity beta	0.78 to 0.89	0.69 to 0.80	1.11 to 1.22
Cost of equity (post-tax)	4.12% to 5.91%	4.58% to 5.93%	7.06% to 8.18%
Tax	12.5%	15%	12.5% to 15.0%
Cost of equity (pre-tax)	**4.76% to 6.76%**	**5.38% to 6.97%[8]**	**8.06% to 9.62%**
Notional Gearing	55%	55%	55%
WACC (pre-tax)	2.64% to 3.98%	3.92% to 4.64%	4.37% to 5.23%
Inflation adjustment[9]	0.00% to 0.40%	0.30%	0.10% to 0.40%
WACC (pre-tax) after inflation expectations adjustment	**2.64% to 4.38%**	**4.22% to 4.92%**	**4.47% to 5.63%**
WACC point estimate	**P67= 3.80%**	**No explicit point estimate chosen**	**P67=5.23%**

Source: CEPA analysis

[7] EirGrid receive other margins for its cash collection agent activities, related to working capital. These are addressed in a separate CEPA report on the financial framework for the TSO.

[8] The overall calculated range for the Cost of Equity (pre-tax) is 5.38% to 6.97%. However, EirGrid propose a reduced range (after aiming up) of 6.7% to 6.9%. From here onwards, as well as in the waterfall chart.

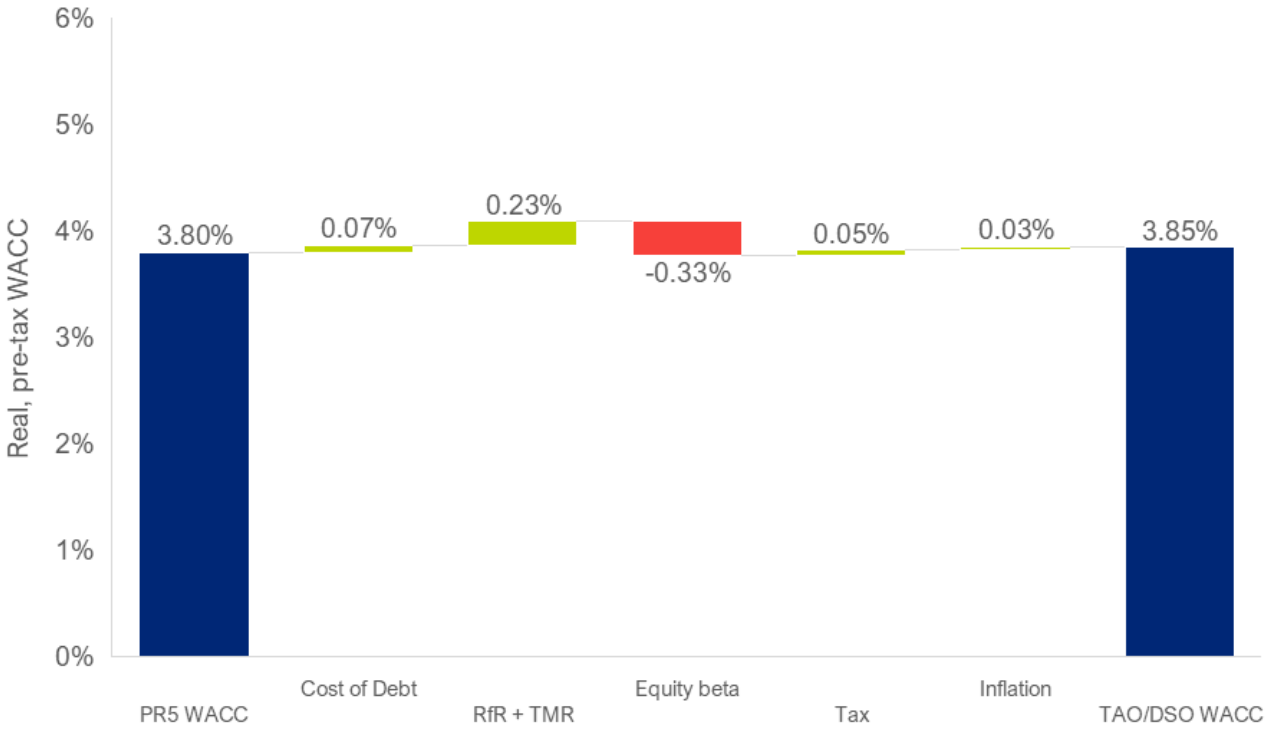
[9] This adjustment seeks to account for structural differences in inflation expectations between European comparators and Irish inflation as opposed to a real/nominal adjustment.

E.3. COMPARING OUR INITIAL RANGE TO PR5 AND COMPANY PROPOSALS

ESB Networks

Figure E.1 below illustrates the impact on the overall ESBN WACC of each proposed individual parameter update for PR6 compared to the CRU's PR5 decision. We have used the 67th percentile of each parameter for presentation purposes given that the overall allowance was set at PR5 and PC5 using the 67th percentile.

Figure E.1: Comparison of PR5 parameters applying to ESBN with CEPA intial range for PR6 (67th percentile)



Source: CEPA analysis

Overall, our proposals on the WACC for the DSO and TAO are close to ESBN's proposals, excluding the inflation adjustment. The range for the cost of equity is similar, and our lower bound cost of debt estimate matches that of ESBN. ESBN's higher bound cost of debt reflects use of a forward rate adjustment that we do not apply.

The main drivers of the changes in the WACC between the CRU's PR5 determination and CEPA's initial range for the DSO/TAO in PR6 are as follows.

The **allowed cost of debt**, is an estimate of the notional company's average cost of debt, including the cost of 'embedded' debt – from prior investment in the RAB – and 'new' debt expected to be raised during the price control. While the cost of new debt has risen since PR5, this is offset in our analysis by a fall in the cost of embedded debt, resulting in only a limited change to the average cost of debt relative to PR5. The fall in the cost of embedded debt is a result of the notional company in PR6 having a smaller share of relatively expensive debt issued during the Eurozone sovereign debt crisis (2009-2015), relative to PR5.

On the **cost of equity**, the impact of a proposed change in the methodology to estimate beta (already adopted for the PC5 decision) to focus on a 'pure-play' European energy network comparator set we consider better aligns to the risk of the DSO and TAO, is to reduce the WACC by 0.33 percentage points. While the risk-free rate has

increased since PR5 due to government bond yields increasing, there is a counteracting reduction in the Equity Market Risk Premium in our analysis[10], limiting the increase in the WACC to 0.22 percentage points, relative to PR5.

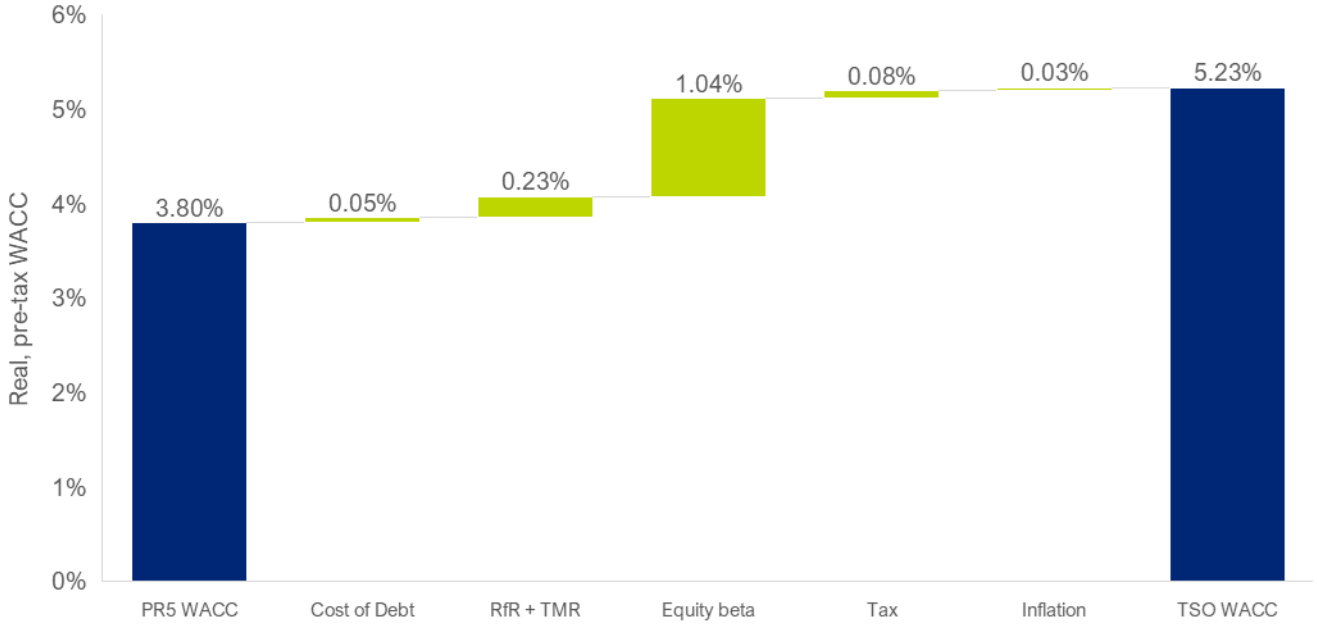
The other WACC parameter proposals generally align with the PR5 determination, including notional gearing (55% and a slightly higher inflation adjustment (0.1%-0.4%).

ESBN's proposed inflation adjustment point estimate of 0.71% is much higher than the assumption that was applied in the CRU's PR5 and PC5 determinations (0.27%) and EirGrid's proposal for PR6 (0.3%). We do not consider ESBN's proposed inflation adjustment is justified based on an assessment of both recent historical and forecast evidence of differentials between Ireland and German inflation and factors which may have influenced the differential in the historical data and may not apply during PR6. Our analysis suggests that an inflation adjustment of 0.1-0.4% is plausible for PR6, with an increase in the lower bound from zero relative to PR5.

EirGrid TSO

Figure E.2 below illustrates the impact on the overall EirGrid TSO WACC of each proposed individual parameter update for PR6 compared to the CRU's PR5 decision.

Figure E.2: Comparison of PR5 parameters applying to EirGrid TSO with CEPA intial range for PR6 (67th percentile)



Source: CEPA analysis

The beta estimate in our initial PR6 WACC range drives the largest change relative to PR5. As discussed above, this is largely driven by differing approaches. For PR5 (and in EirGrid's PR6 proposal), a separate margin was added to EirGrid's allowed revenues relating to how the TSO's higher operational gearing relative to ESBN was expected to impact the TSO's required returns. For this report, we have instead proposed incorporating an uplift to the beta for operational gearing, providing remuneration through the WACC instead of an additional margin.

This is consistent with the approach which Ofgem (NESO) and the Utility Regulator (SONI) have taken to compensate for the effects of high operational gearing on asset light system operators allowed returns.

We have also proposed a change in the approach for estimating the cost of debt for EirGrid, leading to a different approach to that applied for ESBN. We have assumed shorter asset lives (5-7yrs, rather than 10yr+) for the TSO compared to ESBN. This means on average embedded debt is assumed to have been issued more recently than

[10] Consistent with regulatory practice in the UK and Ireland, the Equity Risk Premium is calculated as the Total Market Return minus the risk-free rate.

for ESBN. It also means higher weight is placed on current interest rates across PR6. However, overall, the allowed cost of debt has only varied slightly from the final PR5 decision.

We have not applied any premia to this allowance – despite EirGrid's request for an Irish specific premia and small company premium. We do not consider that the evidence supports these adjustments, nor that EirGrid has justified why their inclusion would be more reflective on an efficient cost of debt.

Finally, another important driver of the difference between EirGrid's proposal and our initial range is EirGrid's proposed approach to aiming-up within its analysis. EirGrid propose that CRU should aim up by selecting the 89th percentile for the real pre-tax cost of equity. For the purposes of this report, we used the 67th percentile of our initial range as indication of a potential point estimate for the PR6 WACC.

Reflecting circumstances at PR6

We note that the financial environment at each control differs to the last. PR5 and PR6 differ materially with respect to the size of the investment programme and a current higher interest rate environment.

We consider that our approach is robust to these circumstances for the following reasons:

- We have adopted a well-established and predictable approach that looks to reflect suitable allowances over investment horizons longer than a single price control.
- We have updated evidence across the board to our data cut-off (7th March 2025) to capture prevailing market conditions.
- We have used a higher share of new debt in setting our cost of debt allowance to reflect the higher proportion of new debt being issued as result of the size of investment programmes in PR6.
- We have increased the lower bound of the Total Market Return to reflect that the lower part of the PR5 is less likely to be suitable for the PR6 determination.
- The beta evidence is based on comparators also facing material step increases in their investment programme, with some weight placed on a higher risk broader comparator group.
- We have increased the lower bound of the inflation adjustment relative to PR5 to capture potential differences in the inflationary environment.

For these reasons, we would be cautious about using a point estimate higher than the recent CRU precedent of selecting the 67th percentile within the proposed WACC range, despite the known financial issues and financial pressures in PR6.

1. INTRODUCTION

Cambridge Economic Policy Associates (CEPA) has been commissioned by the Commission for Regulation of Utilities (CRU) to provide regulatory finance support for the electricity transmission and distribution revenue controls for 2026-2030 (PR6).

This paper outlines our approach to estimating the efficient level of return (or 'cost of capital') on the Regulatory Asset Base (RAB) that the CRU should set for the electricity Transmission System Operator (TSO), the Transmission Asset Owner (TAO), and the Distribution System Operator (DSO). Proposals for the financial framework and cost of capital for the offshore network in PR6 are addressed in a separate CEPA report.

We provide an initial range for the rate of return and its components, as well as an indicative point estimate informed by what we currently know about the PR6 regulatory framework and the possible expenditure plans of the electricity network companies during PR6.

EirGrid is the electricity TSO in the Republic of Ireland, while the TAO and DSO are owned by ESB Networks (ESBN). The companies' business plan submissions included their proposals for the rate of return for PR6, informed by their advisors.[11] We have considered these submissions in developing our approach and estimates.

Please note that the cut-off date for the data used in this report **is 7th March 2025**. We would propose to update this ahead of the CRU's final PR6 decision, so figures should be considered provisional.

1.1. OUR APPROACH FOR PR6

Objective

Each price control set by the CRU involves estimation of a cost of capital. This is multiplied by the RAB to provide an allowed return to compensate both debt and equity investors for putting in money today for investment and receiving this money back over the economic lives of the assets. The cost of capital reflects the average cost of finance over PR6, 2026-30. This includes compensation for existing debt costs issued prior to PR6 ("embedded debt") as well as issuance during PR6 ("new debt").

The allowed return for EirGrid and ESBN has typically been calculated using a Weighted Average Cost of Capital (WACC) approach. The WACC is a weighted average of the cost of debt and the cost of equity. Finance is provided through debt (borrowings) and equity (investment from shareholders). The cost of capital is set as a fixed ex-ante return for the five-year PR6 period. The cost of equity is estimated using the Capital Asset Pricing Model (CAPM) – a commonly applied approach in economic regulation to set a forward-looking cost of equity (see below).

If the CRU sets a rate of return that is too high, customers end up paying too much. If the CRU sets it too low, utilities cannot raise the finance to deliver the necessary level of network investment, which can result in a reduced quality of service for customers. Setting a fair rate of return helps the utilities manage their challenges, such as financing their investment programme. Principles applied by the CRU on the cost of capital is set out in an information note published in February 2020 (CRU/20/029).

Our approach for estimating the WACC throughout this paper is based on a well-established approach as used in PR5 and PC5, the recent gas price review undertaken by the CRU. Doing so creates a stable and predictable regime which is valued by regulated companies, customers and credit rating agencies. This is supported by the many instances of alignment and coherence between the approach taken by the regulated companies in their PR6 submissions and the CRU's PR5 approach as well as our proposed approach for PR6.

[11] KMPG, Estimation of the allowed return on EirGrid RAB - Prepared for EirGrid plc.; and Frontier Economics, ESBN PR5 WACC and financeability - A report prepared for ESB Networks.

Components of the Weighted Average Cost of Capital (WACC)

As noted above, the WACC represents the average rate of return a company is expected to pay its investors and debt providers at a specific point in time. Therefore, there are debt components and equity components to the calculation. To calculate the WACC, the regulator must follow the following steps:

- **Determine the cost of debt (rD):** This is the interest rate the company pays on its debt. The allowed cost of debt, is an estimate of the company's average cost of debt, including the cost of 'embedded' debt – from prior investment in the RAB – and 'new' debt expected to be raised during the price control.
- **Determine the cost of equity (rE)**: A standard approach used to estimate the cost of equity in economic regulation is the Capital Asset Pricing Model (CAPM) which determines the expected return on an investment based on its risk relative to the market. The CAPM formula is:
    - rE = RfR +β (Rm – Rf) [12]

      where:
        - RfR is the risk-free rate
        - β is the beta of the stock
        - Rm is the expected total market return (TMR)
- **Notional gearing.** Once the cost of debt and cost equity are calculated, an assumption is needed about the mix of debt and equity a regulated company would hold. This is what is meant by *notional gearing (G)*.

Therefore, the calculation of WACC as per the Executive Summary is:

$$WACC = (E / (D + E)) * rE + (D / (D + E)) * rD$$

Or alternatively expressed as:

$$WACC = ((1\text{-}G) * rE) + (G * rD).$$

Key principles for estimating the WACC at PR6

To estimate the cost of capital for ESBN and EirGrid separately, we propose to calculate the following parameters consistently for both entities:

- Risk-free rate;
- Total Market Return (TMR); and
- Inflation adjustment.

All three of these feed into the calculation of the cost of equity, whilst the final item also impacts the cost of debt.

We propose to estimate the following parameters separately for the two licensees, and so consider the merit of different approaches on the following parameters:

- cost of debt (the TSO has a shorter-term debt than the TAO and DSO impacting benchmarks used);
- beta; and
- notional gearing.

[12] We note that some CAPM formulations simplify the calculation shown above with an 'equity risk premium' that captures the difference between the 'total market return' and the 'risk-free rate'.

The equity beta feeds into the cost of equity calculation, and notional gearing brings together the cost of debt and cost of equity.

The objective of this paper is to estimate the rate of return that would be required by the electricity companies to deliver the required outputs for PR6. To do so, our approach is guided by a few high-level principles:

- We estimate the rate of return for EirGrid and ESBN separately. This is a change from PR5 where EirGrid had the same WACC apply as ESBN. For EirGrid, the analysis in this report is for EirGrid's onshore TSO activities only and not explicitly the new offshore grid / asset owner function. Proposals for the offshore cost of capital[13] are provided in a separate paper.
- We estimate the required return for a notional entity. This entity may have different financing structures from those adopted in practice by EirGrid and ESBN.
- We estimate a real cost of capital – this reflects that the RAB is uplifted by inflation, protecting the networks from inflation risk. The CRU has historically set the cost of capital pre-tax. The provision for tax is based on the headline corporation tax rate, rather than a bespoke estimate of tax expense. Our initial range for the allowed WACC in PR6 is also provided on a pre-tax basis.
- We estimate the required return assuming the notional company is operated and financed efficiently. i.e. it is able to deliver the outputs for PR6 within the cost allowance set by the CRU; it raises finances in line with market benchmarks.
- We assume that the incentive package is balanced, with no need to adjust the WACC to compensate for asymmetry.
- In this report we seek to estimate the required return on the RAB. We note EirGrid as the TSO receives the cost of capital on the RAB and side RAB, but also receive margins to reflect their working capital needs. These margins are not considered in this report, nor is EirGrid's offshore cost of capital. The analysis in this report is for the onshore TSO RAB only for EirGrid.
- Since PR5, there has been greater decoupling of UK and Eurozone markets. Higher inflation expectations and higher real interest rates make UK regulatory cost of capital estimates less directly applicable to Ireland than at the time of previous determinations. We provide some cross checks to European regulatory decisions, alongside reference to the methodologies applied by UK regulators.

Regulatory decisions on the rate of return are typically judged against previous decisions by the same regulator and those of other regulators. We agree that predictability and consistency of regulatory decisions are, ultimately, in consumers' interest as they foster a supportive environment for investment. At the same time, regulatory estimates of the cost of capital may change over time for one or more of the following reasons:

- **Movements in market evidence.** The cost of capital directly utilises market data. A change in underlying financial data leads to differences in the cost of capital when decisions are made at different points in time.
- **Interpretation of market evidence.** As financial data will change, there is naturally a requirement for interpretation, especially if there have been significant changes and an assessment is needed for how enduring such a change is.
- **Methodology.** Debates over the best way to estimate the cost of capital are ever evolving. It is appropriate for regulators to reconsider their approach if an alternative is demonstrated to be more suitable.

[13] Alongside discussion of the broader financial framework for the offshore grid.

We stress that, to the extent that regulatory precedent is informative in setting the rate of return, it is the *approach* used in past precedents that may be relevant and not necessarily the *values* that were derived at the point in which the estimates were made.

Data used to estimate the rate of return

We have focused our approach on Eurozone data on the cost of capital, rather than Irish-specific data. We have done that for the following reasons:

- from a theoretical perspective, in a monetary union such as the Eurozone, we might expect that key parameters to the network companies' cost of capital, for example, the risk-free rate, to converge onto some central view over a long enough time period ('long-term equilibrium');
- from a practitioner's perspective, we suggest investors would typically view Irish regulated electricity companies as part of an asset class that includes European utilities more generally; and
- from a pragmatic perspective, Eurozone data provides a larger and richer information source than the more limited Ireland-only data, meaning our estimates are more likely to be statistically robust.

We recognise, however, each five-year price control period may not necessarily represent a long-term equilibrium, and that some structural differences between Ireland and the Eurozone may persist during PR6.

In this report we test:

- whether the cost of debt for Irish utilities is structurally different from that of other European utilities, after controlling for form of debt, credit rating, tenor, and timing of issuance – this is sometime referred to as a 'country risk premium' and was more notable in the wake of the Global Financial Crisis; and
- whether there is a structural difference in long-term inflation expectations between Ireland and wider Eurozone evidence we adopt in our analysis.

The issue of inflation expectations is particularly important given that the regulated revenues of the licensees are set with reference to Irish not Eurozone inflation, through the indexation of the RAB and allowed revenues. Expected returns in financial markets are nominal, but under a RAB-based price control framework, investors receive their total return through a real cash return and then inflation of the asset base to Irish HICP inflation. This is sometimes referred to as setting the price control on a real returns basis.

The inflation adjustment section of this report addresses this issue in more detail. We have used Eurozone[14] market evidence in our analysis whilst the RAB is indexed to Irish HICP inflation. To the extent that there is a structural difference between Eurozone and Irish inflation expectations (e.g. if Irish inflation is expected to be structurally lower than Eurozone inflation), we consider that an adjustment to the real rate of return may be needed to remunerate investors at the appropriate cost of capital through the price control.

1.2. Structure of this report

The remainder of this report is structured as follows:

- In Section 2 we present our estimates for parameters that are consistent between EirGrid and ESBN. This includes the Risk-free rate, the TMR, and any inflation adjustment.
- In Section 3 we present our estimates for parameters that have separate approaches for EirGrid and ESBN. This includes the cost of debt, beta, and notional gearing.

[14] Specifically German breakeven inflation.

- In Section 4 we summarise our initial ranges for the WACC, and address the issue of how the CRU might approach selecting a point estimate for the allowed rate of return at PR6.

2. CONSISTENT PARAMETERS

2.1. RISK-FREE RATE

The risk-free rate represents the rate of return that an investor would require from a riskless investment. In practice, no investment is truly devoid of risks such as default, liquidity, currency exchange, or inflation. In regulatory cost of capital estimation, the risk-free rate is typically proxied by the yield on AAA-rated government debt.

In this section we first present EirGrid and ESBN's proposals before setting out our approach.

2.1.1. EirGrid Submission

In its submission, KPMG (on behalf of EirGrid) assessed the use of Irish and German index-linked government bonds for setting the RfR in PR6 eventually concluding on using German bonds. KPMG also considered precedent from UK onshore and offshore transmission company price reviews, as well as other regulated utilities, to inform its choice of tenor and conclude that this precedent supports using debt tenors at least as long as 10 years.

The evidence EirGrid use to estimate the risk-free rate is to look at German index-linked bonds of 10yr and 30yr maturities. The 'base' risk-free is equal to the average of yields on 10yr and 30yr series. From May 2019-May 2024, the difference between 10yr and 30yr tenors has been less than 10bps[15].

KPMG use a 1-month average (to ensure estimates reflect latest market information) of the bond series. KPMG do not apply forward rate adjustments due to limited predictive power as well as *'the high volatility in interest rates and the uncertainties regarding potential rate cuts by the ECB and other central banks,'*[16] as well as being consistent with relevant regulatory precedent in Great Britain.

KPMG consider that the 'true' risk-free rate sits above the yield on government bonds, with reference to the convenience yield[17]. KPMG present:

- academic research which points to an uplift of 0.33-0.36% in the Eurozone;
- regulatory precedent citing adjustments of 0.29-1.00%[18];
- academic papers suggesting it is the rate at which investors borrow, not the rate at which companies borrow that should drive the RfR estimate, since it is investors who provide capital to companies[19]; and
- a comparison of yields on German government bond relative to iBoxx EUR AAA indices, showing a 0.78% difference over the past five-years[20].

[15] We note that the difference in the one-month to our cut-off is materially larger than 10bps.

[16] KPMG (2024) Annex 12 – Cost of Capital estimation for EirGrid's onshore activities at PR6

[17] Convenience yield is the concept that the rates that governments get on bonds are lower than the rates a risk-free private corporation would be eligible for because the government are sovereign and are exceptionally risk-free, and government bonds provide additional benefits to the holder beyond their risk-free status, such as liquidity and tradeability.

[18] The CMA used an adjustment of 0.29% in the UK for the PR19 redetermination; the CAA used an adjustment of 0.32%; BNetzA in Germany provided implicit adjustments for convenience yield through the use of an index containing bank, corporate and public sector bonds instead of just looking at ILGs; and ARERA in Italy applied a 1.00% adjustment.

[19] KPMG state "*The AAA corporate borrowing rate is a conservative estimate of the investor borrowing rate since corporates are backed by tangible assets whereas investors are backed by securities whose prices can significantly fluctuate. Thus, the true upper bound might be higher than the yield on AAA corporate bonds.*"

[20] KPMG calculate German government 'Bund' spreads in the following way: the daily yield of a maturity-matched Bund is subtracted from the daily yield of the iBoxx € Corporates AAA 10+ index over a five-year period, from May 2019 to May 2024.

KPMG conclude that the appropriate risk-free rate for the CAPM lies somewhere between the convenience yield adjusted returns on index-linked government bonds and at the yield on AAA corporate bonds. Therefore, they propose an upwards convenience yield adjustment (0.35% to 0.78%) on the risk-free rate for PR6.

KPMG's preferred approach to estimate the risk-free rate is shown in Table 2.1.

Table 2.1: KPMG / EirGrid's estimation of the risk-free rate for the TSO

		Lower bound	Upper bound
Base	1-month average of the average of 10yr and 30yr German inflation-linked bond yields (as of 31 May 2024)	0.41%	0.41%
Adjustment	Lower bound: German index-linked bond yield + convenience yield	+0.35%	
	Upper bound: AAA corporate bond yield (which captures IL sovereign bond yield + an adjustment for the difference between borrowing and lending)		+0.78%
Risk-free rate estimate (real)		**0.76%**	**1.19%**

Source: KPMG (2024) Cost of capital estimation for EirGrid's onshore activities at PR6 (part of EirGrid's business plan submission)

2.1.2. ESBN Submission

Frontier Economics (on behalf of ESBN) proposes to use 10yr German index-linked government bonds as the basis for the risk-free rate in PR6. Frontier noted consistency with previous CRU decisions in adopting their approach.

Frontier cites regulatory precedent from CRU (PR5 and PC5), Ofwat, Ofgem and the CMA for recent determinations, in particular noting a broad regulatory shift towards a focus on shorter-term, current market data when setting the risk-free rate. This forms the basis for their risk-free rate estimate.

Frontier also advocate for the use of forward curves to estimate the risk-free rate over the duration of PR6 – rather than relying solely on current market evidence; an approach that they state is consistent with the PR5 approach.

Frontier do not propose inclusion of a convenience yield adjustment to evidence from government bond yields.

Table 2.2: ESBN's estimation of the risk-free rate for the TAO/DSO

	Lower bound		Upper bound	
Risk-free estimate (real)	Current spot rate of German 10-year index-linked government bonds	0.36%	Current spot rate projected forward over the PR6 period using the German forward curve	0.65%

Source: Frontier Economics (2024) PR6 WACC and Target Rating (part of ESBN's business plan submission)

2.1.3. CEPA Approach

Methodological choices and comparison to PR5

The risk-free rate is a market-wide parameter; and given the nature of energy network investments, we consider that estimates of the risk-free rate should capture a relatively long-term investor horizon of at least ten years. This is consistent with the assumptions that the electricity network companies and their advisors make in their analysis.

In terms of regulatory precedent:

- For PR5, the CRU focused on 10-year German government bonds as benchmark risk-free assets. The CRU also considered forward curve adjustments.
- For PC5, the CRU looked exclusively at shorter term averages of German index-linked bonds, compared to a mix of both shorter term and 10-year rolling averages at PR5. Forward curve evidence was not used,

based on relevant regulatory precedent increasingly using spot yields and shorter trailing averages without using forward curve evidence (as set out by KPMG on behalf of EirGrid at PR6).

We propose to continue with the established approach of considering long-term German government bonds as a proxy for the risk-free rate:

- Our estimation of the risk-free rate will focus on yields from 10yr German government index-linked bonds[21] (rather than having reference to longer tenor bonds).
    - We consider that German government bonds constitute a good proxy for the risk-free rate of return on Eurozone investments, as they are widely considered to have negligible default risk and currently hold a AAA credit rating.
- We do not apply a convenience yield adjustment, and consider that bond yields reflect a suitable proxy for the risk-free rate without adjustment.

We discuss key methodological choices below.

Consideration of longer duration bonds

EirGrid and KPMG include reference to 30yr German index-linked bonds in their approach.

Our approach above makes use of 10yr German government index-linked bonds. This differs slightly to EirGrid's approach where they consider 10yr and 30yr index-linked bonds for the lower bound of their range.

The use of 10yr bonds is consistent with precedent, is more closely aligned with the expected investor horizon and Germany issue a higher volume of 10yr bonds (relative to 30yr bonds). Holding a bond for 30yrs has higher default risk than holding the same bond for 10yrs, so we consider that the 10yr bond is also closer to the theoretical nature of a risk-free asset.

Convenience yield

EirGrid and KPMG note that government bonds provide additional benefits for investors pushing their yield below a true 'risk-free rate' (they have benefits such as liquidity and tradability, which create additional demand for the bonds and push down the yield). The CAPM assumes that investors can borrow at the risk-free rate. Government bonds may be considered favourably by investors and preferred to corporate bonds, and we consider it plausible that a convenience yield is reflected in the yield of highly-rated government bonds.

However, we consider the following factors in not applying a convenience yield:

- The academic evidence is limited overall, with extrapolation needed to estimate a convenience yield relevant to the 10yr German index-linked bonds and material uncertainty around how this would change and whether a convenience yield would persist.
- The iBoxx evidence has a small sample size, risks building in 'noise' through idiosyncratic features and is not a robust approach to setting regulatory parameters.
- Regulatory precedent overall is mixed and certainly far from conclusive that a convenience yield should apply. Whilst there are some cases of regulators applying such an adjustment, the majority of regulators do not apply a convenience yield, including historic CRU decisions.[22]
- Regulatory best practice principles better support use of adjusted government bonds yields as the proxy for the risk-free rate, with a more transparent, time consistent and simpler approach overall.

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[21] This is equivalent to using nominal German bonds deflated by breakeven inflation of the same tenor.

[22] As we discuss below, Ofgem has not applied a convenience yield in its recent cost of equity decisions.

Academic evidence

The academic literature listed by KPMG in their WACC submission, includes analysis of German and French government bonds.[23] We consider that although Montfort & Renne (2014) and Ejsing et al. (2015) point towards evidence of a convenience yield, the data is now dated, is not specific to 10yr German index-linked bonds and is not data that can be used for periodic updates of any convenience yield. The 2023 updated version of the Diamond and Van Tassel paper displays average convenience yields of 24bps on 2-year maturities in Europe, and 38 bps in the UK. Whilst this is more recent than the other references, convenience yields for 10yr German index-linked bonds are not available.

iBoxx evidence

KPMG compare tenor-matched corporate AAA bonds with German government bonds. With limited index-linked bonds, this analysis relies on nominal bonds.

KPMG state that they have used the iBoxx EUR Corporates AAA 10yr+ index. This index appears to only draw on Euro-denominated bonds from Johnson & Johnson, a US-based pharmaceutical. In late 2024, this was limited to three bonds.

A decision that increased the cost of capital for networks based on such evidence does not seem to be robust evidence. The small sample size means that idiosyncratic features impact on the results. Small differences in yield may reflect a difference in view between credit rating agencies and investors.

Regulatory precedent

Some European regulators have recently adjusted their risk-free rate to reflect the convenience yield, whilst the majority of decisions we have reviewed have not.

The German Bundesnetzagentur (BNetzA) recently provided an uplift to the cost of equity for the fourth electricity and gas regulatory period to reflect the convenience yield in German government debt and we note the approach of ARERA in Italy.[24] These examples are choices adopted by regulators and the same choices can be considered by the CRU.

However, we do not find these two cases compelling, driven by how the estimates have been derived and the evidence base used. With respect to the Competition and Market Authority (CMA) precedent quoted by EirGrid:

- the evidence base for a convenience yield on 10yr nominal government and index-linked gilt debt is weak and an extrapolation of the CMA's approach to incorporating a convenience yield for its PR19 redetermination[25,26], in our view, is not robust; and
- the CMA's determination of an appeal of Ofgem's 2021 determination for electricity transmission, gas transmission and gas distribution licence holders found the omission of a convenience yield to 'not be wrong'[27].

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[23] Montfort and Renne (2014) Decomposing Euro-Area Sovereign Spreads: Credit and Liquidity Risks, Review of Finance (2024:18); Ejsing et al.(2015) Liquidity and credit premia in the yields of highly-rated sovereign bonds, Journal of Empirical Finance 33; Paret and Weber (2019) German Bond Yields and Debt Supply: Is There a 'Bund Premium'?, IMF Working Paper; Jiang et al. (2021) Bond Convenience Yields in the Eurozone Currency Union, Stanford Business School Working Paper; Corradin et al. (2021) Euro area sovereign bond risk premia during the Covid-19 pandemic.

[24] Quoted in Bundesnetzagentur (2021), 'Beschluss in dem Verwaltungsverfahren nach § 29

[25] The first regulatory determination in the UK to do so.

[26] On the basis that government bonds might be trading at a premium to low-risk non-government bonds; and that the market RFR for borrowing and lending might be different.

[27] The regulatory standard in energy network price control appeals does not involve a full redetermination, unlike water. CMA (2021) [The companies] vs GEMA for RIIO-2. Paragraph 5.45. Available online

Additionally, there is no precedent within recent CRU determinations for making such an adjustment. Frontier Economics and ESBN do not include a convenience yield in their estimates.

Regulatory best practice principles

There are arguments to be made that use of 10yr index-linked bonds would overestimate the risk-free rate, with liquidity risk, a term premium and presence of default risk. Introducing error through a less robust methodology is a risk of changing the approach to include a convenience yield.

We consider that regulatory best practice principles better support use of adjusted government bonds yields as the proxy for the risk-free rate, with a more transparent, time consistent and simpler approach overall.

Forward-curve adjustment

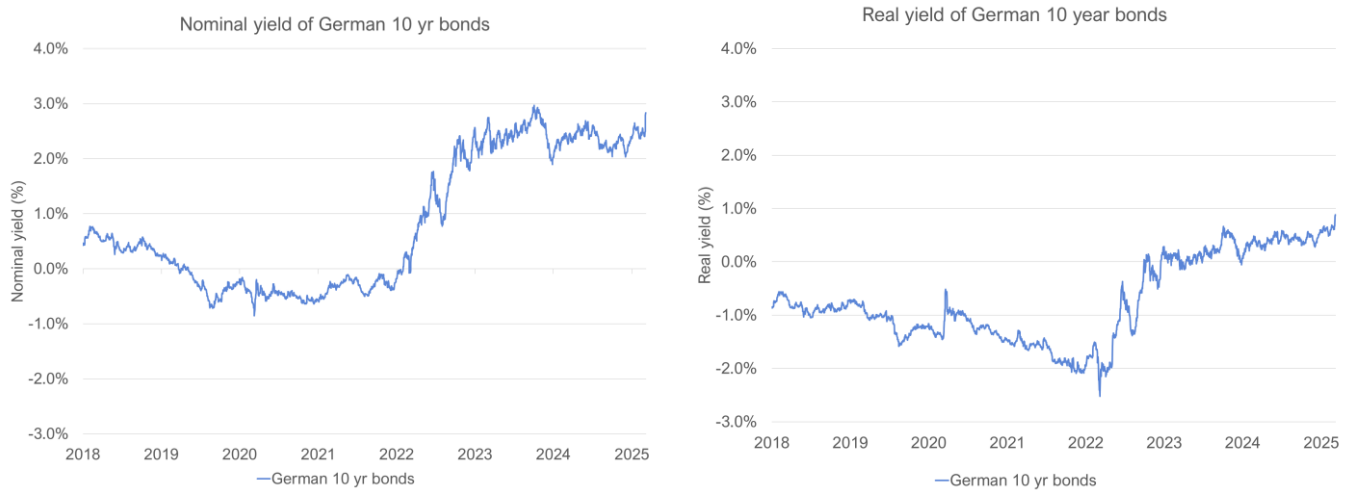
As set out previously, we consider that the evidence supports short-term averages having better predictive power than forward-curve evidence, when estimating the risk-free rate. As such, we do not consider that a forward-curve adjustment should be applied at PR6.

Market evidence

Figure 2.1 illustrates the spot rates for 10yr German nominal government bonds over the period 2018-2025. This shows government bond rates have increased to a higher level than yields used for setting the PR5 allowance. Most notable the real yields are now positive (versus the PR5 risk-free rate of -1.2% to -0.8%).

We have included nominal German bonds for context, but place primary weight on German index-linked bonds as we are estimating a real cost of capital.

Figure 2.1: German 10-year bond yields from 2018 to 2024



Source: CEPA analysis of Bloomberg data

To estimate an initial range for the RfR for PR6, we have considered 1-month, 3-month, 6-month and 12-month trailing averages of real yields on index-linked debt and these are shown in Table 2.3 below.

Our proposed range for the **risk-free rate is 0.50-0.60%.** This is based on interpretation of the evidence and placing more weight on 1-month and 3-month averages in setting a risk-free rate. This is balanced by the lower figures over 6-months and 12-months, with the spot rate indicating a higher figure.

We do not place weight on any longer-term trailing averages beyond 12 months. As the evidence above illustrates, interest rates have increased materially in the past few years and use of longer-term trailing averages are less likely to capture the prevailing market conditions, hence the expected risk-free rate in PR6.

Table 2.3: Trailing averages of 10-year German and Irish gilt yields (nominal and real)

	Cut-off date	Spot	1-month	3-month	6-month	12-month
Nominal rate, 10yr German government bonds	**07/03/2025**	2.83%	2.48%	2.44%	2.33%	2.38%
Index-linked rate, 10yr German government bonds	**07/03/2025**	0.77%	0.54%	0.49%	0.41%	0.39%

Source: CEPA analysis of Bloomberg data

2.1.4. Summary

Overall, our proposed range for the **risk-free rate is 0.50% to 0.60%**.

When comparing to proposals from EirGrid and ESBN, it is important to note that the data cut-off for this report and those from the companies are different. On a parameter like the risk-free rate, where prevailing market evidence is a key input, differences in estimate may arise through timing.

Our proposals are below the rate proposed by EirGrid (0.76% to 1.19%) as we have not made the same convenience yield adjustment that EirGrid have made, or included higher yielding German 30yr bonds.

Our estimate sits within the range proposed by ESBN of 0.36% to 0.65%. There are similarities in approach, but ESBN have included a forward adjustment that increases the proposed range compared to our own.

2.2. Total Market Return (TMR)

The TMR is defined as the overall rate of return investors expect to earn from holding the market portfolio. It can be decomposed into the risk-free rate and an equity risk premium (ERP), which reflects the additional yield that an investor would expect to earn on a portfolio of equity investments over and above the risk-free rate.

We propose to estimate the TMR directly rather than take an additive approach of risk-free rate plus ERP. This is consistent with established precedent in both Ireland and Great Britain.

Our evidence base to estimate the PR6 TMR consists of two perspectives on market returns:

- **Historical 'ex post' evidence**: uses long-run averages of realised equity market returns. This approach assumes that long-run historical returns achieved by equity investors are a good proxy for forward-looking expectations of returns, and relies on the assumption that expected total market returns are broadly constant over time. The TMR therefore is calculated by looking at an average of historical returns (reflecting the totality of dividends and share price appreciation).
    - The realised return for an investor is simply the outturn and can be considered as equal to: Expected return +/- Surprise[28]
    - For historical ex-post returns, we implicitly assume that over time the 'surprise' element cancels out and realised returns are on average equal to expected returns.
- **Historical 'ex ante' evidence**: uses long-run averages of realised equity market returns adjusted for one-off factors that are unlikely to be repeated in the future / that investors were unlikely to have foreseen.
    - For historic ex-ante returns, the approach attempts to strip out the 'surprise' element. This can be done either by using dividend discount models or decomposition approaches.

In addition, there are various averaging techniques available to calculate the TMR estimate. This includes arithmetic averages (1, 10, and 20-year holding periods); geometric averages; or horizon-weighted averages like the JKM estimator or Blume estimator.

Regulatory precedent in Ireland and Great Britain tends to place more weight on arithmetic averages than geometric averages when setting a range, though arithmetic averages may tend to over-estimate the true TMR when annual stock returns are volatile[29].

Both historical ex-post and ex-ante evidence are relevant evidence sources when estimating the TMR. Following the same approach taken at PR5 and PC5, we have used the Credit Suisse Global Investment Returns Yearbook (2024) based on the Dimson, Marsh and Staunton (DMS) data series. This source provides estimates of long-term historical returns from 1900 across a sample of countries. As we look at a long-term time series, each new individual data point on annual stock returns has relatively limited impact on the long-run TMR estimate.

We first present EirGrid and ESBN's proposed approaches to calculating the TMR, and then follow with the detail of CEPA's proposed methodology and calculations.

2.2.1. EirGrid Submission

KPMG, on behalf of EirGrid, consider evidence and analysis on historic ex-post approach and historic ex-ante approaches.

KPMG propose use of a 1-year simple arithmetic mean for averaging (as was used in PR5).

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[28] Or one-off unexpected factor.

[29] The arithmetic mean is commonly referred to as an average or mean; it takes the total sum of figures and divides by the number of observations. The geometric mean focuses on the starting and final values and infers the annual estimate. For example, a stock that goes from 100 to 200 (+100%), back to 100 (-50%) has a 25% arithmetic mean and 0% geometric mean.

For market selection, KPMG raised concern around the robustness of an estimate based solely on Irish DMS data given limitations to Ireland's limited sovereign debt market, and instead consider both the German market and Eurozone market. KPMG conclude that the Eurozone market would yield more robust estimates than German or Irish in isolation, and this approach is more consistent with regulatory precedent.

Their proposal therefore is to use the arithmetic mean resulting from these two approaches with the Eurozone[30] as the market, using evidence from 1900 to 2023. Their resulting range is between 6.68% (historical ex-ante approach) to 6.72% (historical ex-post approach).

Table 2.4: EirGrid's estimation of the TMR for the TSO

	Lower bound	Upper bound
TMR estimate	Historical ex-ante	Historical ex-post
	6.68%	6.72%

Source: KPMG (2024) Cost of capital estimation for EirGrid's onshore activities at PR6 (part of EirGrid's business plan submission)

KPMG gained confidence in their estimated range by cross-checking it with recent Ireland, GB and UK regulatory decisions which suggested a range of 6% to 7%.

2.2.2. ESBN Submission

Frontier Economics on behalf of ESBN focus only on historical ex-post approach results as they are of the view that *"historical outturn returns are likely to provide a reasonable indicator of expectations regarding future returns*", and that *"ex-ante adjustments rely on judgement rather than outturn data, and are therefore subject to bias."*[31]

For averaging technique, Frontier use 1-year arithmetic means.

For market selection, Frontier considers both Eurozone and Irish returns, given they argue that Irish investors would be considering Irish returns as well as the broader currency bloc.

Table 2.5: ESBN's estimation of the TMR for the TAO/DSO

	Lower bound		Upper bound	
TMR estimate	Eurozone returns	6.45%	Irish returns	6.80%

Source: Frontier Economics (2024) PR6 WACC and Target Rating (part of ESBN's business plan submission)

Frontier gained confidence in its estimated range through cross-checks against with recent Irish regulatory decisions.

2.2.3. CEPA Approach

Methodology

We consider both historical ex-post and historical ex-ante data. The historical ex-post data focuses on the arithmetic mean, across three main country groups – namely i) Ireland, ii) Eurozone[32], and iii) 'Eurozone +' [33]. We use the headline measures as published in the DMS 2024 sourcebook.

[30] Excluding Greece as complete data from 1900 to 2023 is not available

[31] Frontier Economics (2024) PR6 WACC and Target Rating (part of ESBN's business plan submission)

[32] Available countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Spain.

[33] The Eurozone countries plus Norway, Sweden and the United Kingdom

Historical Ex-post estimates

We begin by calculating the ex-post TMR for our list of comparator countries. To derive a European aggregate, we calculate the median country and average (mean) across countries for TMR estimates in Table 2.6, for both Geometric Mean (GM) and Arithmetic Mean (AM) estimates for each country.

Table 2.6: Mean annualised real 1900 - 2023 European equity market returns, historical ex post estimates

	Ex-post TMR, GM	Ex-post TMR, AM
Ireland	4.29%	6.79%
Eurozone set (median)	3.49%	6.43%
Eurozone set (average)	3.46%	6.72%
Eurozone + (median)	4.00%	7.05%
Eurozone + (average)	4.01%	6.94%

Source: CEPA analysis based on DMS Credit Suisse Equity Returns Yearbook 2024 data

Long-run historic estimates can vary substantially, depending on the choice of average and the volatility of the underlying data. In the case of our preferred dataset, the two approaches result in a 250 to 305 basis points difference between GM and AM resultsTable 2.6.

We note that the CRU has considered both the geometric and arithmetic averages in recent determinations, with the decisions generally informed by the latter (i.e. arithmetic averages). This is also consistent with regulatory precedent in the UK and many other jurisdictions and theoretical reasons for why regulators might place greater weight on evidence of arithmetic averages rather than geometric averages.[34]

Overall, we consider this analysis points to a broad ex-post TMR range of 6.43%-7.05%. Irish evidence sits in the middle part of this range for historical ex-post data.

Historical Ex-ante estimates

Our starting point for ex-ante estimates is the geometric ex-post TMR. We then look to correct for one-off non-repeatable factors through the historical returns attributable to expansion in the price to dividend (P/D) ratio in the historical ex-post estimates[35]. This is the assumed wedge between ex-ante and ex-post estimates. We derive the implied GM ex-ante TMR in Table 2.7.

Table 2.7: Mean annualised real 1900 - 2023 European equity market returns, historical ex-ante estimates

	Ex-post TMR, GM	minus Expansion in the P/D Ratio, GM	*equals* Ex-ante TMR, GM
Ireland	4.29%	0.73%	3.53%
Eurozone set (median)	3.49%	0.15%	3.34%
Eurozone set (average)	3.46%	0.12%	3.34%
Eurozone + (median)	4.00%	0.15%	3.85%
Eurozone + (average)	4.01%	0.14%	3.87%

Source: CEPA analysis based on DMS Credit Suisse Equity Returns Yearbook 2024 data

[34] This typically provides more stable estimates of return over time and is argued to be more consistent with financial theory, given that the holding period is significantly shorter than the total period for which data is available.

[35] [(1+ Geometric mean dividend yield) * (1+ Growth rate of real dividends) * (1+ Expansion in the P/D ratio)]-1.

The next step is to calculate the AM ex-ante TMR from our GM estimate. We do this by calculating an AM-GM wedge for each country and adding it to the TM ex-ante TMR value as shown in Table 2.8.

Table 2.8: Mean annualised real 1900 - 2023 European equity market returns, historical ex-ante

	Ex-ante TMR, GM	*plus* AM-GM Wedge	*equals* Ex-ante TMR, AM
Ireland	3.53%	+2.50%	6.03%
Eurozone set (median)	3.34%	+3.20%	6.54%
Eurozone set (average)	3.34%	+3.26%	6.60%
Eurozone + (median)	3.85%	+2.55%	6.40%
Eurozone + (average)	3.87%	+2.94%	6.80%

Source: CEPA analysis based on DMS Credit Suisse Equity Returns Yearbook 2024 data

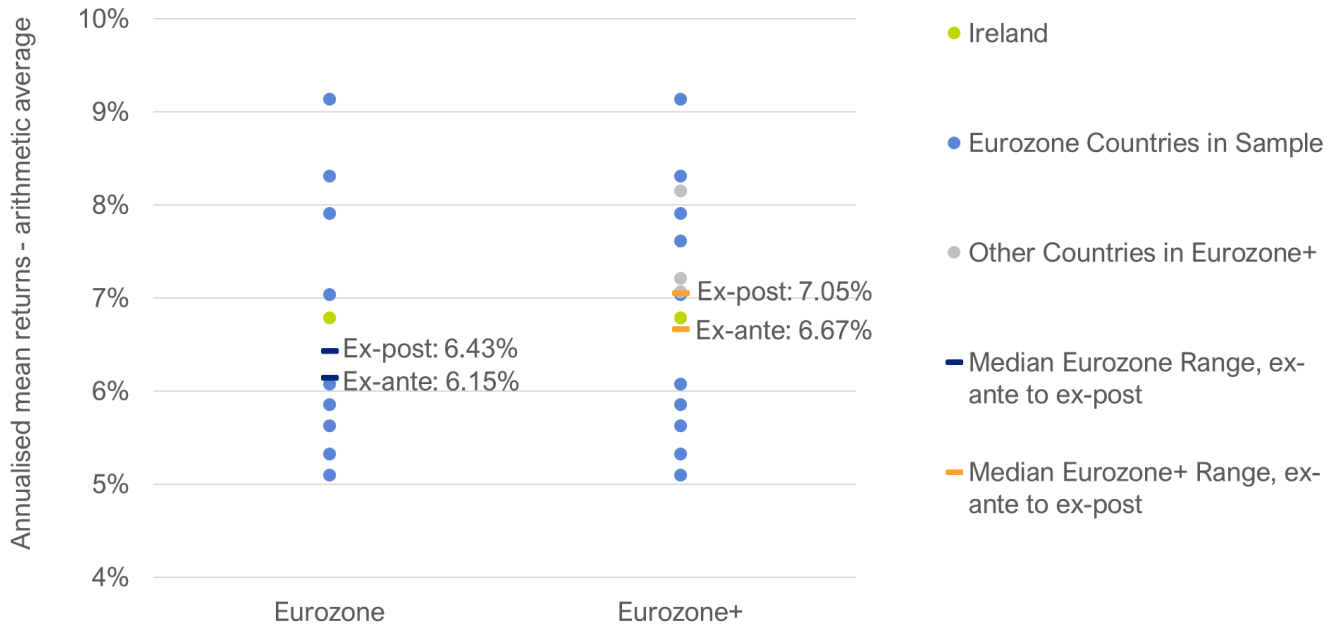
The ex-ante approach is a variant of the ex-post approach, which relaxes the assumption that average returns achieved over the long run are a good predictor of future expected returns. The approach has theoretical merits but is more subjective in its application. As such, regulators have tended to place less weight on the ex-ante approaches, particularly when there is no conclusive evidence on the merits of different adjustments.

Overall, we consider this analysis points to a broad ex-ante TMR range between 6.03%-6.80%. We note that Irish evidence sits in the lower part of the ex-ante range, but the middle of the ex-post range.

Bringing the evidence together

Figure 2.2 below plots the ex-post and ex-ante arithmetic means for the Eurozone countries and our Eurozone+ sample, with a summary provided in Table 2.9.[36]

Figure 2.2: DMS estimates of TMR for selected European countries, arithmetic averages



Source: CEPA analysis based on DMS Credit Suisse Equity Returns Yearbook 2024 data

[36] Note the chart starts at 4% on the y-axis

Table 2.9: Mean annualised real 1900 - 2023 European equity market returns, historical ex-post and ex-ante

	Ex-post TMR, AM	Ex-ante TMR, AM
Ireland	6.79%	6.03%
Eurozone set (median)	6.43%	6.54%
Eurozone set (average)	6.72%	6.60%
Eurozone + (median)	7.05%	6.40%
Eurozone + (average)	6.94%	6.80%

Source: CEPA analysis based on DMS Credit Suisse Equity Returns Yearbook 2024 data

We consider that the Eurozone sample, or Eurozone + sample, is most appropriate and consistent with our estimates for other CAPM parameters, but we also consider Irish TMR evidence.

Therefore, our analysis suggests that ex-post estimates range from 6.4% to 7.0%, and ex-ante estimates range from 6.0% - 6.8%. This gives a broad TMR range of 6.0% - 7.0%, based on the following (highlighted in blue in Table 2.9):

- Lower bound of 6.03% which is the value estimated for the Ireland ex-ante TMR, AM.[37]
- Upper bound of 7.05% which is the value estimated for Eurozone +, ex-post TMR, AM.

We are cautious in use of the ex-ante evidence[38] and do not include a figure as low as the Irish specific estimate. We propose a narrow range of **6.4% to 6.8%**. This is overall higher than the range for PR5 (5.7% to 6.75%) and the upper end of our range incorporates the Irish ex-post arithmetic mean TMR.

Regulatory Precedent

A useful crosscheck to these findings is to consider regulatory precedent. Table 2.10 below provides a summary of regulatory precedent on the TMR in recent Ireland and UK price control decisions.

Table 2.10: Recent precedent in Ireland and the UK on approach to calculating TMR

	Approach	Range (CPIH-real)
Ofwat PR24 (2024)	Historical ex-post; and Historical ex-ante[39]	6.68% to 6.98%
CRU PC5 (2023)	Historical ex-post; Historical ex-ante; and Regulatory Precedent	6.4% to 6.75%
CAA NATS (2023)	Regulatory Precedent	6.1% to 7.4%[40]
UR Gas Distribution (2023)	Regulatory Precedent	6.50%
IAA Dublin Airport (2022)	Historical averages using DMS (Blume's method); Forward looking DDM.	5.70% to 6.81%
ComReg Mobile, Fixed Line & Broadband (2022)	Historical averages using DMS; weight on arithmetic mean; Regulatory precedent (as a cross check)	6.1% to 7.0%
Ofgem RIIO ED2 (2020)	Historical ex-post; Forward-looking approaches (cross-check only)	6.25% to 6.75%

[37] This has been deflated using a DMS inflation series, which may need further adjustment.

[38] We consider that historical ex-ante approaches are less robust than ex-post approaches due to the need for judgment to determine not just whether future equity returns will differ from the outturn.

[39] DMS Decompositional and Fama-French DGM approaches based on DMS dataset

[40] Used CMA's PR19 range

	Approach	Range (CPIH-real)
UR Gas TSO SRP20 (2022)	Regulatory Precedent	6.50%
CMA PR19 (2021)	Historical ex-post; Historical ex-ante; and Forward looking approaches (with no weight placed)	6.1% to 7.4%[41]
UR TSO (2020)	Historical averages; Regulatory precedent	6.7%[42]
Ofgem GD2 & T2 (2020)	Historical averages; Forward looking returns; Regulatory precedent; Investor studies	6.25% to 6.75%
CRU PR5 (2020)	Historical averages; DGM; Regulatory precedent (as a cross check)	5.70% to 6.75%
Ofwat PR19 (2019)	Historical averages; Forward looking returns; and Regulatory precedent (as a cross check)	6.50%

Source: UKRN (2024) Cost of Capital report - October 2024 and CEPA review of published regulatory reports.

We note the TMR range was relatively wide at PR5 (5.70% to 6.75%), our proposed range for PR6 is narrower but the upper bound is close to the PR5 upper bound. We proposed a similar lower bound for PC5 with new GB regulatory precedent / regulatory guidance. The proposed PR6 range is much closer to the PC5 determination.

2.2.4. Summary

We propose a TMR range of **6.40% to 6.80%**. This sits very close to the range proposed in ESBN's submission (6.45% to 6.80%) but is a wider range than proposed by EirGrid (6.68% to 6.72%).

[41] RPI-deflated: a range of 5.2% to 6.5% in RPI-stripped terms converts into a CPIH-stripped range of 6.1% to 7.4%

[42] Mid-point of CMA's provisional findings in PR19 redetermination - CPIH-real basis

2.3. INFLATION ADJUSTMENT

As part of their expected returns, investors require compensation to account for changes in the underlying purchasing power of their investment. Under a RAB-based price control framework, investors in the electricity network licensees will receive their total nominal allowed return through a real cash return and inflation indexation of the RAB (tied to Irish HICP inflation).

Some WACC parameters can be estimated directly in real terms, while others must first be calculated in nominal terms and then deflated using an inflation index. Where we deduct expected inflation using a different data source to what the RAB will be uplifted by, there is a scope for a mismatch. In this case, the RAB is indexed to Irish HICP inflation, whilst our use of Eurozone market data has meant that the consistent inflation measure is Eurozone inflation (at times proxied by German inflation expectations).

We therefore assess whether long-term German inflation expectations are likely to be consistent with long-term inflation expectations of Irish HICP. We consider whether there is a structural difference between German and Irish inflation expectations (e.g. if Irish inflation is expected to be structurally higher or lower than German inflation), that necessitates an adjustment to the allowed real cost of capital. Failure to make an adjustment could lead to expected over- or under-compensation for investors.

2.3.1. EirGrid Submission

For EirGrid, KPMG analysed historic and forecast inflation in the Eurozone, Ireland and Germany.

For historic data, the paper shows inflation spreads (for Ireland relative to both the Eurozone and Germany) across different averaging periods. KPMG found historical inflation data as of June 2024 shows consistently lower inflation for Ireland across 1-year, 2-year, 5-year, 10-year and 15-year averaging periods, compared to German inflation.

For forecast evidence, KPMG considered the following:

- European Central Bank (ECB) forecasts for CPI for 2024, 2025 and 2026, for the Eurozone and the member states of Germany and Ireland.
    - This data showed Irish HICP inflation was projected lower than German and Eurozone HICP by 0.77 percentage points and 0.40 percentage points respectively over the three-year ECB forecast period.
    - It was also noted that the three-year Central Bank of Ireland (CBI) forecast for Irish HICP trends 0.10 percentage points below the ECB forecast.
    - KPMG conclude that the implied average spreads of GER-IRE and EUR-IRE inflation are therefore 0.87 percentage points and 0.50 percentage points respectively (i.e. Ireland has lower expected inflation).
- In the short term, the International Monetary Fund (IMF) also provide inflation forecasts but the forecast used by EirGrid aligns back to ECB survey five-year estimates beyond those years. Using IMF forecasts for 2024-2026, the data shows an average EUR-IRE inflation spread of 0.27 percentage points.
- Bloomberg analyst forecasts estimates of CPI inflation between Ireland and Germany. This shows a GER-IRE spread of is 0.10 percentage points, over the 3-year forecast period.
- Breakeven inflation using 20yr nominal and index linked gilt data. As at June 2024, the data showed Irish spot breakeven inflation is 0.03 percentage points lower than German breakeven inflation. KPMG note here that *"breakeven inflation should be interpreted with caution, as it is highly susceptible to distortions resulting from illiquidity of underlying nominal and inflation-linked bonds".*[43]

[43] KPMG (2024) Cost of capital estimation for EirGrid's onshore activities at PR6 (part of EirGrid's business plan submission)

KPMG conclude that using German break-even inflation results in real values that are too low for the Irish context, and an average inflation adjustment of 0.30 percentage points is an appropriate uplift to the WACC. A summary of the data points and evidence that they use in their analysis is provided in the table below.

Table 2.11: EirGrid's estimation of an inflation adjustment to apply for the TSO

Source	Average GER-IRE and EUR-IRE inflation spreads
ECB historical (1y average)	0.46%
ECB/CBI forecast	0.63%
IMF	0.27%
Bloomberg	0.10%
Breakeven	0.03%
Average[44]	**0.30%**

Source: KPMG (2024) Cost of capital estimation for EirGrid's onshore activities at PR6 (part of EirGrid's business plan submission).

2.3.2. ESBN Submission

Frontier Economics consider historic and forecast evidence of inflation in Ireland and Germany to inform their proposals for ESBN on the required size of the inflation adjustment.

For historic data, annual outturn data is used with a cut-off date of August 2024. Frontier found German inflation has consistently been above Irish inflation during the past 10 years (2014 to 2024) which persisted through Covid-19, and noted that this was more stable between 2014 and 2020 where the spread is an average of 0.79 percentage points. Frontier did not focus on the decreasing size of this gap between 2020 and 2024.

Frontier found a similar spread present in ECB forecasts.

Frontier proposed three approaches to determine an inflation uplift, choosing the last of the three as their proposal, as follows:

- Average the historic and outturn difference between German and Irish inflation across the period 2014 to 2026 - this approach provides an inflation uplift of 0.78%;
- Take the minimum and maximum inflation difference observed in the same period to determine the inflation uplift range – this approach would provide inflation uplift range of 0.46% - 1.45%; and
- Take the lower and upper quartile of the inflation difference observed in each year from 2014 to 2026 – this would provide a range of 0.58% to 0.83%.

The final option was used to determine a recommended adjustment.

Table 2.12: ESBN's estimation of the inflation adjustment to apply for the TAO/DSO

	Lower bound	Upper bound
Inflation adjustment	0.58%	0.83%

Source: Frontier Economics (2024) PR6 WACC and Target Rating (part of ESBN's business plan submission)

[44] Rounded from 0.32

2.3.3. CEPA approach

For PR5 and PC5, some WACC parameters relied on German bonds and European corporate debt, which were preferred as benchmarks for their liquidity and stability over Irish equivalents. When estimated in nominal terms, these parameters were deflated using German breakeven inflation.

For the PR5 decision, an adjustment of zero to 0.40 percentage points was applied in the WACC range for higher assumed Eurozone HICP inflation relative to Irish HICP inflation. However, subsequent to that decision, the CRU chose not to apply any premium to the rate of return parameters used in the Greenlink interconnector (between Great Britain and Ireland) cap and floor decision in light of updated evidence.

For the Greenlink interconnector, the CRU found Irish HICP inflation had been consistently lower than other Eurozone economies for several years. However, as post-lockdown inflation expectations rose, comparisons of HICP forecasts by the CBI and the ECB suggested that the historical relationship between Eurozone inflation and Irish inflation should not necessarily be assumed to continue in future years. As such, the CRU did not make any adjustment to the rate of return parameters of Greenlink's regulatory regime.

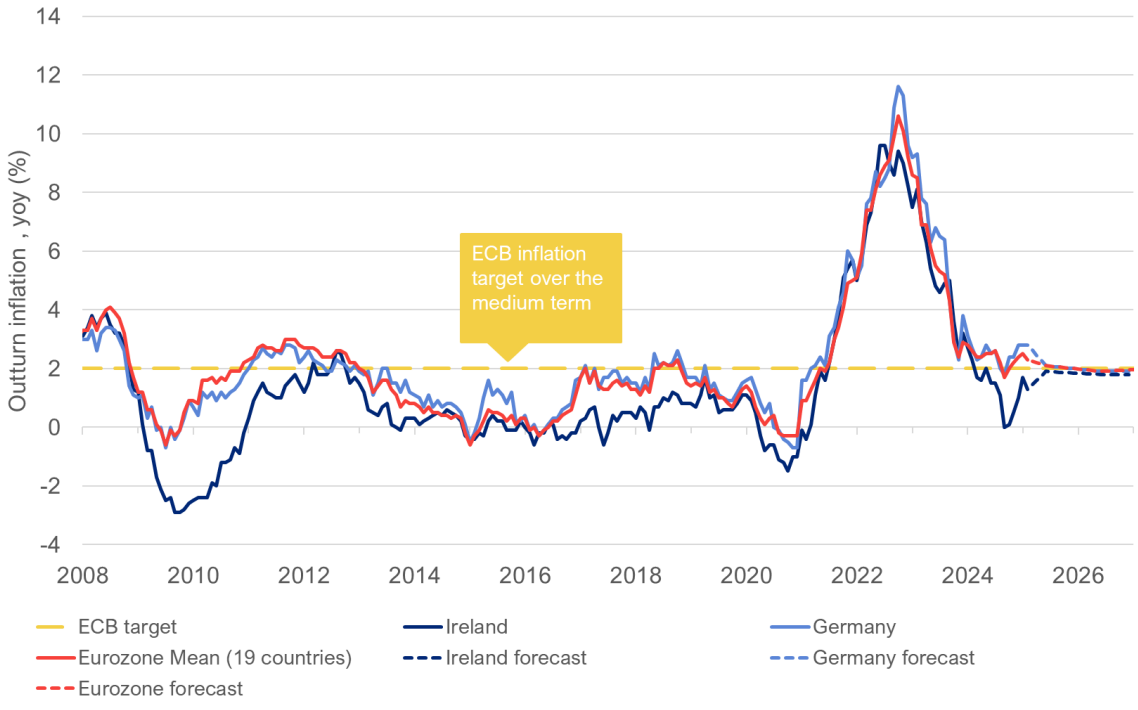
For PC5 – the more recent decision for Irish gas networks, CRU analysed both historical and forecast inflation data. The forecast evidence was less supportive of a positive adjustment than historical data. The CRU looked at the convergence between Irish and German break-even inflation in late 2022 (PC5 cut-off), and the forecast by ECB and CBI where Irish HICP was expected to exceed German HICP by 2024, and in the round concluded on use of a 0 to 0.40 percentage points inflation adjustment, consistent with the range adopted for PR5.

Comparison of outturn inflation evidence

To understand the difference between German and Irish inflation, we have taken a similar approach to ESBN to look at historical ECB outturn data, but we have looked specifically at annual inflation updated on a monthly basis as opposed to the annual series that we understand ESBN have used. Overall,

Figure 2.3 shows that at the point of setting the PR5 determination, the evidence showed Irish inflation trending at an overall lower rate than German inflation. Recent outturn data in PR5 (i.e. to late 2024), might indicate a larger gap than at the time of the previous decision, but expectations based on recent forecasts are that this gap may reduce over time and converge.

Figure 2.3: Comparison of outturn inflation for Ireland and the Eurozone



Source: CEPA analysis of ECB outturn data, Q1 2025 ECB SPF forecasts, and November 2024 Central Bank of Ireland (CBI) forecasts. Forecasts are denoted in dotted lines.

Looking more closely at the data, we can identify some trends. There are three clear trends up to late 2020:

- both Irish and Eurozone inflation were low and generally below the ECB's target;
- Irish inflation was typically below Eurozone inflation, and at times Ireland experienced deflation; and
- German and Eurozone outturn closely matched across this period.

These trends however did not persist through 2021, with the rate of inflation being very closely aligned for Ireland, Germany and the Eurozone. At a peak of mid-2022, we observe that Germany and the Eurozone's inflation were again a step above Ireland's (c.2%). Irish and German inflation converged in late 2023, but then similarly German inflation exceeded Irish inflation by 2% in summer/ autumn 2024.

At the time of the PR5 decision, there were the following observations between Irish and Eurozone data[45]:

- 0.2% difference for 19yr period to December 2019.
- 1.0% difference for 10yr period to December 2019.
- 0.7% difference for 5yr period to December 2019.

Using updated data to our new cut-off date of 7th March (the latest available outturn inflation data is for February-March 2025), we find the following observations between Ireland and Germany:

- 0.78% difference for 19yr period to February 2025.
- 0.88% difference for 10yr period to February 2025[46].
- 0.86% difference for 5yr period to February 2025.

The inter-quartile range of the data across the 2015-2025 period is 0.40% to 1.30% (we find it to be wider than ESBN's estimate but this is based primarily on using monthly data containing more data points than ESBN's use of annual data in their analysis).

We consider that outturn inflation is supportive of a sustained difference between German and Ireland inflation. The case is similar, if slightly stronger than was the case at PR5.

Comparison of forecast inflation expectations and data

In this sub-section, we consider evidence on inflation expectations and forecasts over PR6.

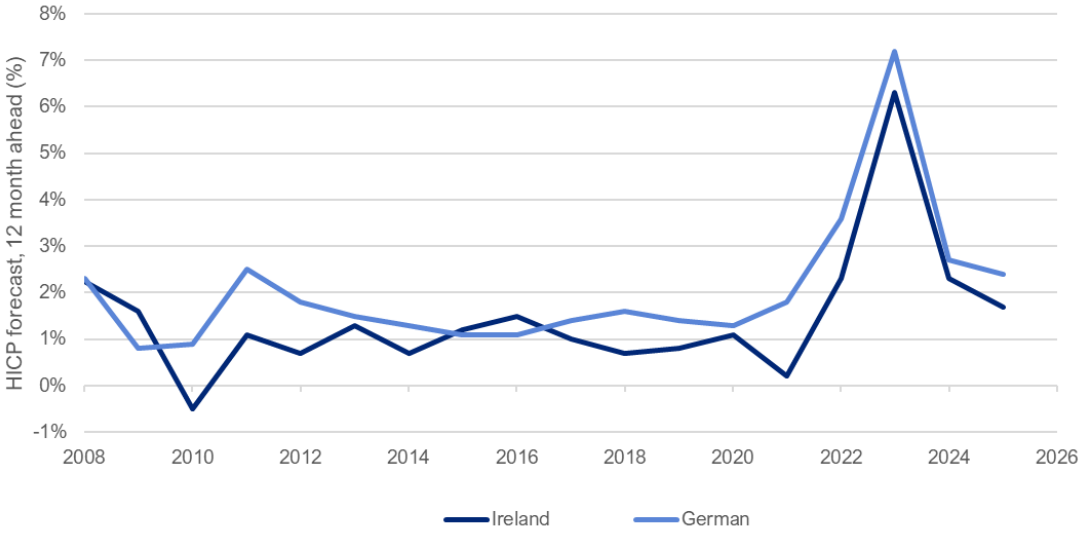
Figure *2.4* below compares 12-month ahead HICP forecasts for Germany and 12-month ahead forecasts for Ireland HICP[47] using German Bundesbank and Irish Central Bank forecasts, for as consistent a time period as possible based on latest publications by both institutions.

[45] Note for PR5 the results were presented comparing Irish to Eurozone data, but for PR6 we compare Irish to Germany data. For PR5, differences between Germany and Eurozone were 0-20bps.

[46] The date range we have selected runs from end of February 2015 to end of February 2025. ESBN have instead used just one data point per year for the historical outturn, whereas we have used 12 data points for each year which explains the small differences here.

[47] For Irish HICP, the CBI's quarterly bulletins include forecasts for the calendar ahead at different points in the year. We have derived 12-month ahead forecasts using the Irish Central Bank's December bulletins for Q1 for each year for the calendar year ahead – these are published in Jnauary, and hence we consider that they represent a 12-month ahead forecast of HICP.

Figure 2.4: Comparison of 12-month HICP forecast for German and 12 month forecast for Ireland (12-month forecast from December to December)



Source: CEPA analysis of German Bundesbank and CBI quarterly bulletin data

Using this series, Irish inflation expectations appear lower, and more volatile than the German equivalent. Irish inflation expectations are on average 0.66% lower than German inflation expectations over the 2016 to 2025 period. The 10yr equivalent difference at PR5 was estimated at 0.5%, so this has increased slightly.

We have also looked at long-term market-based breakeven inflation estimates, as forecasts over a relevant horizon. Data is available for both Ireland and Germany over a 25yr horizon, as shown in Figure 2.5.

Figure 2.5: 25yr breakeven inflation expectations for Ireland and Germany[48]

Source: CEPA analysis of Bloomberg data

A persistent differential is less well supported by the latest evidence available from breakeven inflation measures, as we see the larger differentials exiting in 2020 diminishing over 2021, and being very limited in 2022. A differential

[48] This chart displays the GILGBE25 Index for Ireland and the DEGGBE25 Index for Germany.

reappears again from 2023 onwards, but it is much smaller in magnitude compared to 2020. The mean differential in the past 6 months to the cut-off date is that German rates trended at 0.11% above Irish rates. At PR5 the differential available over the prior six months was 0.20% for 25yr breakeven inflation.

2.3.4. Summary

In a monetary union such at the Eurozone, it might be reasonable to expect countries to converge onto a central value of long-term inflation expectations. This would typically be anchored by the ECB's inflation target. However, in the shorter-term, countries may diverge owing to macroeconomic factors that are specific to them. Given the data available to us on both outturn HICP and inflation expectation differentials, we consider that some structural difference between Eurozone and Irish long-term inflation expectations may be expected to persist in PR6.

We conclude that German 10yr breakeven inflation rate remains the appropriate inflation measure to convert from nominal to real yields given our approach to estimating the risk-free rate and cost of debt, and so a small adjustment to the WACC to reflect the difference between German and Irish Inflation is needed. This is consistent with other parts of our cost of capital estimation and consistent with the proposals from the licensees' economic advisors.

Bringing together our three sources of data:

- **Outturn inflation data** would imply an adjustment above the 0-0.4 percentage point range used in recent CRU regulatory decisions.
- **Current inflation forecasts** suggest that Irish and German inflation will converge, and therefore suggest no or a more limited adjustment is needed (see Figure 2.3 above); and
- A comparison of **breakeven inflation expectations** implies a gap of in the low-to-middle part of the inflation adjustment range used by the CRU historically.

Ultimately, this adjustment requires a judgement of an ultimately imperfect evidence base. Overall, we consider that the evidence for an inflation adjustment uplift is largely similar to PR5 and PC5, and that on balance the range adopted for those determinations remains appropriate as an estimate for PR6.[49] While the historical data might imply a larger adjustment is required, we are cautious in placing to much weight on this data given it may have been influenced by macroeconomic events that may not apply in future.[50]

However, the evidence on a German inflation expectation premium is now more enduring and there is less support for a zero adjustment. **We propose that an inflation expectation adjustment in the range 0.1% to 0.4%.** This is based on a combination of evidence from outturn inflation, inflation forecasts and breakeven inflation.

This proposed range is significantly below ESBN's proposed range for PR6 (0.58% to 0.83%), but EirGrid's proposal (0.30%) is at the 67th percentile of this adjustment range.

[49] In placing more weight on the Irish evidence in the TMR, we also believe may we have at least partly accounted for some of the adjustment already within our TMR range.

[50] For example, the impact of Brexit on Irish inflation.

3. NETWORK SPECIFIC PARAMETERS

In this section of the report, we consider cost of capital parameters that could differ between the TSO and DSO / TAO. We consider the cost of debt, beta and notional gearing parameters in turn.

3.1. Cost of Debt

3.1.1. Approach in PR6

Context and CRU regulatory precedent

The cost of debt component of the cost of capital allowance is intended to capture an efficient notional network operator or system operator's costs of raising debt finance.

At prior price reviews, CRU has used market benchmarks, rather than directly using the companies' actual cost of debt, to calculate a notional cost of debt. This is intended to ensure that consumers only pay for efficient debt costs. At the same time, it incentivises ESBN and EirGrid to seek efficient low-cost financing (without incurring undue risk). The notional debt portfolio is necessarily an abstraction – it would not be possible for a regulator to perfectly match the complexities of a company's actual debt portfolio, which is managed in real time.

In prior electricity network price reviews, the same allowed cost of debt has been applied for both EirGrid and ESBN. The data used for the benchmark at PR5 was long-term market rates based on a 10-year trailing average of Euro iBoxx non-financial corporate A and BBB 10yr+ debt indices. The lower bound was calculated as the average of the iBoxx indices with an uplift based on estimated future movements in yields (projected forward using expected changes in German 10yr government bonds). The upper bound was calculated as the 10yr trailing average at the data cut-off date. The figures were uplifted by 10 to 20 basis points to account for debt issuance costs.

For PC5, the CRU relied on iBoxx EUR 10yr+ indices and data for A and BBB credit rating levels. As with PR5, the CRU used a 10-year rolling trailing average to estimate the cost of debt, but cross checked those results against non-rolling estimates (i.e. values at the start of the price control) of the selected iBoxx indices. Consistent with PR5, upper and lower bounds were uplifted by 10 to 20 basis point uplift to account for debt issuance costs.

Proposed approach for PR6

For PR6, we propose to assess the cost of debt separately for EirGrid TSO and ESBN (DSO/TAO). The cost of debt allowance should reflect the cost of raising debt finance for an efficient notional company which we expect could be materially different for a network asset owner compared to an asset light system operator. We consider that the new offshore function within EirGrid necessitates an approach for the TSO cost of debt that going forward means there is less of a direct link between ESBN's 'network WACC' and EirGrid's price controls (not least because of the expected external scrutiny of its regulatory framework as part of its expected credit rating assessment).

Our assumptions for the efficient notional network owner company's (i.e., TAO and DSO) debt portfolio are:

- The notional company enters PR6 with existing debt, raised in the preceding years. A share of that existing debt would be replaced / refinanced over the course of PR6.
- We make an assumption that 25% to 40% share of ESBN's debt would be 'new', i.e. raised in PR6. The 25% share is the average share of new debt over a five-year price control with an assumed 10yr debt tenor[51]. The 40% figure reflects a growing investment programme and a need to issue debt to invest not just refinance[52]. This latter figure is dependent on the size of the investment programme determined by the

[51] An average share of new debt of 25% implies c.50% new debt by the end of the PR6 price control. With 10yr debt, under a constant RAB, 50% matures by the end of a five-year price control.

[52] An average share of new debt of 40% implies c.80% new debt by the end of the PR6 price control. This is consistent with a RAB that is more than doubling (and above the CRU's estimated RAB over PR6), so we consider this a conservative assumption.

CRU, therefore this assumption may be revised ahead of the PR6 final decision when there may be greater certainty of the expected size of the investment programme.

- Debt raised would be in the form of fixed-rate bonds matching the currency of the related asset / income stream – i.e. we focus on EUR-denominated fixed-rate bonds. This is a pragmatic assumption as there is a far larger and more liquid data set for EUR fixed-rate bonds than for alternatives such as EUR index-linked bonds or non-EUR bonds issues by European utilities.
- The notional company would seek to align the tenor of its debt with the average economic life, to the extent that debt of such maturity could be raised efficiently. The latter point depends on the typical investment horizon of investors in regulated assets.
- The notional company would issue debt at a 'comfortable investment grade' credit rating – i.e. at least BBB.
- The coupon on the notional company's debt would be in line with the prevailing market benchmarks at the time of issue.

For an efficient system operator company (i.e., TSO), we make the following assumptions:

- The notional company would seek to align the tenor of its debt with the average economic asset life. The system operator company has shorter asset lives, around 5-7 years, and tying their debt tenor to asset lives, we anticipate that much of the company's debt in PR6 will be new debt.
- We have assumed a 50% share of new debt for EirGrid TSO in both our lower and upper bounds. The 50% figure reflects that over the price control, the majority of EirGrid's existing debt will be refinanced and a growing RAB leads to debt issuance above refinancing.
- The notional company would issue debt at a comfortable 'investment grade' consistent level of credit risk as issuer.

On this basis, we estimate the notional company's cost of debt based on the yields of relevant benchmark indices that reflect the credit rating of the notional operator and the assumed average tenor.[53] We construct trailing averages that match the assumed issuance profile (including rolling the trailing averages forward over the PR6 period to incorporate new debt issuance).

We have also considered whether there is any evidence to suggest the debt taken out by Irish utility companies differs from the debt taken out by European counterparts, as is suggested by KPMG for EirGrid. We have also looked at EirGrid's actual debt profile – which has been using bank debt rather than bond finance.

3.1.2. EirGrid TSO's submission

Benchmark

EirGrid, in its submission, set out that it has short asset lives of 5-7 years and so its expected financing arrangements comprise a significant proportion of new debt by the end of PR6. EirGrid propose that allowances for debt costs should be estimated based on market benchmarks.

EirGrid argues in its submissions that the CRU face several challenges in estimating the appropriate cost of debt for EirGrid on an ex-ante basis because:

[53] This is known as the 'all-in' approach to cost of debt estimation. Historically, the CRU has used one (or both) of two approaches for estimating the cost of debt of the notional operator: (1) a debt premium + risk-free rate approach based on debt issued by a set of comparators (as per the CRU's PR4 determination), or (2) the 'all-in' approach based on suitable corporate debt indices (included in the CRU's RC3 determination). In principle both approaches to estimating the cost of debt should result in the same estimate. The choice of approach can be primarily informed by the quality of available data.

- EirGrid does not have current fixed term debt and relies on credit facilities with floating rates linked to EURIBOR rates. Rates will therefore vary over the price control period.
- EirGrid may obtain an investment grade credit rating which may change borrowing options and in turn affect debt pricing.
- The increase in offshore activities may change the credit risk of the business and affect borrowing rates for EirGrid's onshore activities.

KPMG, in its report for EirGrid, proposes a series of options for setting the cost of debt allowance for the TSO:

- An annual indexation approach against a defined benchmark index as used, for example, by Ofgem in its RIIO price controls. However, it states "*with uncertainty over which credit rating EirGrid will obtain and without any substantive track record of issuing bonds, it is unclear which benchmark index would be most appropriate to use and to underpin indexation".*
- Therefore, a second proposed approach, and EirGrid's favoured approach, is to set an ex-ante costs estimate based on a "solid" investment grade credit rating with an ex-post adjustment for the difference between the ex-ante estimate and outturn costs.

For the ex-ante allowance, EirGrid proposes to set a benchmark in line with the yield on an index of Eurozone investment grade bonds, which is then adjusted for: (a) gearing and small company size; (b) variance to the benchmark for Irish utilities; and (c) issuance fees and other borrowing costs associated with debt issuance. The adjustments that EirGrid and KPMG propose are set out in the subsection which follows.

For the benchmark cost of debt, the iBoxx non-financials benchmark index is proposed by EirGrid, considering six Euro-denominated indices:

- A-rated and BBB-rated indices: the benchmark company is assumed to exhibit an investment grade credit rating with more weight placed on yields on BBB-rated indices; at
- 5-7 year, 7-10 year and 10+ year maturities, aligned with the average asset life.

The average nominal yield on BBB-rated 5-7 year and 7-10 year bonds was 4.01% for a spot value on the cut-off date of 31 May 2024. As a cross-check, KPMG also looked at the yields, maturity dates and remaining tenors of publicly issued EUR denominated debt issued by National Grid, Terna and Elia Group resulting in a range of 3.7-4.2% (nominal). The 10-year German breakeven inflation rate (spot rate) was used to deflate these values (as was adopted in PR5).

Adjustments

KPMG's analysis of the cost of debt for EirGrid makes the following adjustments to the benchmark estimate provided above:

(a) **Small company size** - EirGrid requested an adjustment to reflect the size and frequency of issuance for a company sharing those characteristics. KPMG look to regulatory precedent for this and propose 0.30 percentage points inline with the CMA adjustment given to Bristol Water.

(b) **Variance to the benchmark for Irish utilities** – KPMG compared issuances of Irish debt for regulated entities against relevant iBoxx indices to determine whether investors incorporate a 'risk premium' for regulated Irish debt compared to similar Eurozone counterparts. They find the risk premium for regulated Irish issuers ranges from 0.20 to 0.24 percentage points.

(c) **Additional borrowing costs** – KPMG state that the traded price of debt instruments used in the benchmark yields does not reflect the cost of raising debt finance or fees paid by the issuer, which needs to be added to derive the all-in cost of debt. From a regulatory precedent range of 0.05% to 0.37%, KPMG

select an issuance cost adjustment of 0.25% plus an additional 0.05% consistent with the CMA PR19 redetermination for Bristol Water.[54]

Overall

The table below provides a summary of EirGrid's proposed cost of debt for its TSO price control for PR6 – i.e., excluding its offshore role.

Table 3.1: EirGrid's proposed Cost of Debt for PR6

Benchmark (nominal)	Spot yield on BBB-rated 5-7 year and 7-10 year bonds	4.01%
Breakeven inflation adjustment	The 10-year German breakeven inflation rate (spot rate)	2.10%
Benchmark (real)	**-**	**1.91%**
Small company premium	Regulatory precedent (CMA for Bristol Water) of 0.30 percentage points	0.30%
Variance to the benchmark for Irish utilities	Comparison of Irish issued debt for regulated utilities against iBoxx indices for Europe.	0.21%
Additional borrowing costs	Regulatory precedent (CMA for Bristol) of 0.30 percentage points.	0.30%
Overall cost of debt (real)	**-**	**2.73%**

Source: KPMG (2024) Cost of capital estimation for EirGrid's onshore activities at PR6 (part of EirGrid's business plan submission)

3.1.3. CEPA proposed approach for EirGrid

Benchmark – Embedded debt

For the embedded debt allowance we use a EUR corporate debt (bond) benchmark – specifically, the iBoxx EUR non-financial corporate company index. We use the 5-7yr index (i.e. debt with 5-7 years to maturity).

As the starting point for calculating the embedded debt allowance, we use rolling 5-7yr averages over the PR6 period (i.e. assuming that some embedded debt matures over time).

We assume our latest spot estimate from these indices is appropriate to roll-forward from now until the start of the price control, as an assumption is required to estimate an embedded debt cost accurately.

Table 3.2: Proposed embedded debt rates based on historical iBoxx rates for A and BBB rated non-financial corporate indices- 5-7yrs.

Index value	Real yield	Nominal yield
5yr average approach	1.37%	3.38%
7yr average approach	1.02%	2.97%

Source: CEPA analysis of iBoxx data

We use the real yields as the basis for our embedded cost of debt benchmark – namely 1.02% to 1.37%.

[54] This redetermination is the CMA's decision following a water company's appeal of its price control decision as proposed by Ofwat.

Benchmark – New debt

For the new debt allowance, we have used the spot rate at 07/03/2025 as well as the 12-month average of the same corporate debt indices which we used to calculate an embedded debt allowance (iBoxx A/BBB European non-financial corporates 5-7yr index).

This ensures that the estimate is reflective of prevailing market conditions, but looks to balance this against volatility in recent rate movements and using periods that may be less representative for the forecast PR6 period.

We have taken the nominal yield series reported for EUR iBoxx 5-7yr+ corporate non-financials, and deflated this using German 10yr breakeven inflation index over the same period[55].

Table 3.3: Estimate of cost of new debt rates for PR6

iBoxx A/BBB European non-financial corporate indices 5-7yr+	Real yield	Nominal yield
Spot rate (07/03/2025) - real	1.48%	3.41%
12-month average (08/03/2024 to 07/03/2025)	1.47%	3.43%

Source: CEPA analysis of iBoxx data

To calculate an overall average benchmark cost of debt, we assume that EirGrid (TSO) will require 50% new debt (i.e. 50% embedded debt) in PR6.

This results in a range for the **average real cost of debt benchmark of 1.23% to 1.63%** before issuance costs.

Table 3.4: Calculations for EirGrid PR6 allowed cost of debt

	Lower bound		Upper bound	
Embedded	7yr rolling avg of 5-7yr index	1.02%	5yr rolling avg of 5-7yr index	1.37%
	Weighting	*50%	Weighting	*50%
New	12-month average of spot rates	1.47%	Spot rate on 07/03/25	1.48%
	Weighting	*50%	Weighting	*50%
Real cost of debt range, exc fees		1.24%		1.43%
Fees		0.10%		0.20%
Real cost of debt range, inc fees		1.34%		1.63%

Source: CEPA analysis

Adjustments

Small company premium

EirGrid has requested a small company premium on its debt. There is precedent – in the UK – of allowing a small company premium though it varies by circumstance and has not been included in the context of a single company determination.

[55] DEGGBE10 – 10 year index from Bloomberg. There are missing data points in 5yr series and 7yr series, hence selection of 10yr series.

- For example, Ofgem in the RIIO-2 price controls related an adjustment to an infrequent issuer premium because of (relatively small) networks not raising debt in public bond markets frequently (which can lead to higher cost to the company to manage risk, for example through hedging).[56]
- For Bristol Water at PR14 (based on the CMA 2015 redetermination), the allowance related to Water Only Company (WOC) bond debt being higher cost than the benchmark index, suggesting more limited access to debt markets.[57]

We consider that in principle there could be a justification for EirGrid TSO requiring a small company premium. However, the allowed cost of debt for the notional company should reflect the most efficient cost of debt and it is not clear that EirGrid has demonstrated that this criterion has been met. We have not applied a small company premium, given the adjustment has not, in our view, been sufficiently justified.

- EirGrid does not have long-term debt to consider the equivalent argument to the Bristol Water PR14 case.
- The read-across from the Ofgem decision implies that the TSO will raise less flexible public bond debt financing and either incur additional costs for sub-benchmark issuance size or to compensate for risk for not been able to match a notional allowance set using a trailing average. There are several reasons to be cautious in concluding that an adjustment is needed to the TSO's cost of debt on this basis:
    - We consider that alternative financing solutions – e.g. the use of long-term bank debt – exist that are more flexible, and may be more aligned with financing requirements of TSOs.
    - While public bond finance information is readily available, the same does not hold for private bank debt. However, this does not mean that bank debt is necessarily more expensive (especially if the assumed tenor is short-dated).
    - EirGrid have not demonstrated that their own debt costs – raised using bank debt – has either been more expensive than the basis for the allowance, or has exposed them to higher risk.
    - There are also not examples of small company premia being included for other recent asset light system operator regulatory determinations.
- EirGrid have also argued that a bond solution is more appropriate for the TSO given its offshore debt raising programme. However, EirGrid have not assumed a small company premium for its offshore debt due to the size of issuance. We consider that the logic is inconsistent and does not justify a premium.

Cost of carry and issuance costs

Cost of carry reflects the cost of issuing debt ahead of need (for example early re-financing of maturing debt, ahead of capital expenditures, or generally for working capital requirements). For the TSO, under the WACC, we only consider the cost of carry for debt related to RAB expenditure. For working capital requirements, we would consider any applicable remuneration through the additional margins outside of the WACC – we note that EirGrid utilises Working Capital Facilities (WCFs), with commitment fees for these being included as pass-through in the regulatory framework. The purpose of the WCFs may be explicitly defined, e.g. for use in market operator functions.

We propose an allowance of 0.10 to 0.20% for issuance costs, consistent with the allowance in recent CRU energy network price control decisions. This proposed range is also broadly consistent with the range that EirGrid has proposed in their WACC submission.

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[56] Ofgem (2022) RIIO-ED2 Final Determinations Finance Annex

[57] The CMA compared how the cost of water only company bonds relative to an iBoxx index compared to the cost of water and sewerage company bonds. Informed by this analysis the CMA concluded a small company premium of 0.40% was appropriate.

CMA (2015) Bristol Water plc – A reference under section 12(3)(a) of the Water Industry Act 1991 – Report.

Variance to the benchmark for Irish utilities

KPMG have suggested an uplift of 0.21 percentage points due to the difference in bond yields for Irish utility companies compared to similar European companies (iBoxx A rated non-financial corporates 10+ index). The purpose of this section is to see if evidence is consistent with KPMG's conclusion that Irish utility bond rates are structurally higher than rates achieved by their European counterparts.

Our benchmark is based on a combination of A and BBB non-financial corporates, with the KPMG analysis focusing on a broad A series only. In addition, the bonds referenced are callable bonds, which themselves may carry a higher yield than bullet bonds to compensate for that feature.

EirGrid has not issued public bonds and so we do not have actual data to empirically confirm or rebut EirGrid's proposal for an Irish utility company uplift. We do not apply any adjustment to our evidence for an Irish premium, consistent with CRU precedent.

Overall

Our proposed allowed cost of debt for the TSO is 1.24% to 1.43%, including transaction costs of 0.10 to 0.20%. Our overall range is 1.34% to 1.63%. This range is below EirGrid's proposal of 2.73% which reflects the absence of requested premia and a different approach to utilising benchmarks.

3.1.4. ESBN Submission

Benchmark

In its submission, Frontier Economics (on behalf of ESBN) look at four approaches for estimating an allowed cost of debt for the DSO and TAO in PR6.

- Firstly, Frontier look at a roll-forward of the PR5 approach. Their analysis shows that the 10-year trailing average of iBoxx EUR A and BBB rated 10yr+ indices from late 2022 onwards are materially lower than the spot rates. The 10-year trailing average applies equal weight to both historical and current market rates and therefore assumes stable debt issuance over the price control. Frontier note, however, that ESBN propose to raise substantial new debt over the PR6 period in addition to refinancing debt, therefore, they have a concern that a benchmark based on a simple trailing 10-year average will not be sufficient to remunerate expected debt costs on an ex-ante basis.
- Secondly, Frontier also point to regulatory precedent where the cost of debt allowance is linked to a market benchmark, rather than applying a fixed ex-ante approach (RIIO-ET2 and ED2). Under this approach, the cost of debt is updated annually in line with a trailing average of the iBoxx Utilities 10-year+ index throughout the price control period. The length of the trailing average differs – 17-years for ED2 and 10-14 years for ET and GD&T. Frontier note the additional regulatory burden with this approach due to regular updates.
- Thirdly, the RIIO-3 Sector Specific Methodology Decision sets out that given the significant increase in infrastructure investment to meet net-zero targets, Ofgem are considering a weighted cost of debt approach for electricity transmission that adjusts depending on the company's RAB.
- Lastly, Frontier reference that for PR24, Ofwat is proposing to use a weighted embedded and new debt approach to calculate an average overall cost of debt. Ofwat estimate embedded debt costs based on a benchmark of actual sector-wide company costs and new debt costs based on a one-month trailing average of the 6-12 month average of iBoxx A and BBB 10-year+ indices. Frontier note this approach is not suitable as industry data cannot be used to assess embedded debt, nor can actual embedded debt costs be easily observed as ESBN do not raise debt as a standalone network company.

Frontier and ESBN's proposed approach is therefore:

- **Bottom end of the range**: adopt CRU's ex-ante fixed approach as used at PC5, which provides a stable cost of debt allowance for the PR6 period, i.e. use long-term non-financial iBoxx A and BBB 10yr+ bonds to estimate the 10-year trailing average as of the spot date, which are projected forward over the PR6 period adjusting for changes in spot rates inferred from German sovereign forward-curve. The average of the 10-year trailing figures for each year of PR6 is then calculated to provide a cost of debt estimate. 10-year German breakeven inflation is then used to estimate the real cost of debt.
- **Upper bound:** Use nominal spot yields from the iBoxx EUR non-financial A and BBB 10yr+ indices, projected forward over PR6 and deflated using 10-year German breakeven index. The upper bound is calculated by Frontier using the weighted 10-year trailing average for each year of PR6, using RAB additions as weights.

Adjustments

In line with CRU precedent, ESBN propose an issuance costs uplift of 0.1% to 0.2%

Overall

Frontier and ESBN's proposal for the allowed cost of debt is summarised in the table below.

Table 3.5: ESBN proposed Cost of Debt for PR6

Lower bound			Upper bound	
Cost of debt (real)	10-year trailing average of iBoxx EUR A and BBB rated 10yr+ indices deflated using 10-year German breakeven index	1.15%	10-year trailing average of iBoxx EUR A and BBB rated 10yr+ indices deflated using 10-year German breakeven index plus RAB weightings	1.49%
Issuance costs	CRU precedent	0.10%	CRU precedent	0.20%
Proposed PR6 range		**1.25%**		**1.69%**

Source: Frontier Economics (2024) PR6 WACC and Target Rating (part of ESBN's business plan submission)

3.1.5. CEPA proposed approach for ESBN

For ESBN (DSO and TAO) we propose to calculate the overall cost of debt by calculating separate allowances for the embedded cost of debt and for the new cost of debt. Such an assumption gives us the capacity to change the weights on the proportions of debt, given that the regulatory process may see differences in the size of the approved investment programme.

As discussed in the introduction, embedded refers to debt that is assumed – on a notional basis – to exist on ESBN's balance sheet prior to the start of the PR6 price control period (i.e. any debt raised in PR5 or earlier periods[58]), and therefore new debt is any debt raised during the PR6 period for new investment.

Benchmark – Embedded debt

For the embedded debt allowance, we seek to proxy the notional companies' cost of debt by using a EUR corporate debt benchmark – specifically, the iBoxx EUR non-financial corporate company index. We use the 10 yr+ index (i.e. debt with at least ten years' time to maturity) as the basis for this benchmark, consistent with the approach that was used in PR5 and PC5 regulatory determinations.

As the starting point for calculating the embedded debt allowance, we use a 10-year trailing average of the 10yr+ benchmark from 01/01/2016 to 31/12/2025. We then roll forward this 10-year average, to account for some of the

[58] Which would include any refinancing of existing debt during PR6.

older embedded debt being assumed to drop out (which may be refinanced as new debt), by the notional company during the price control.

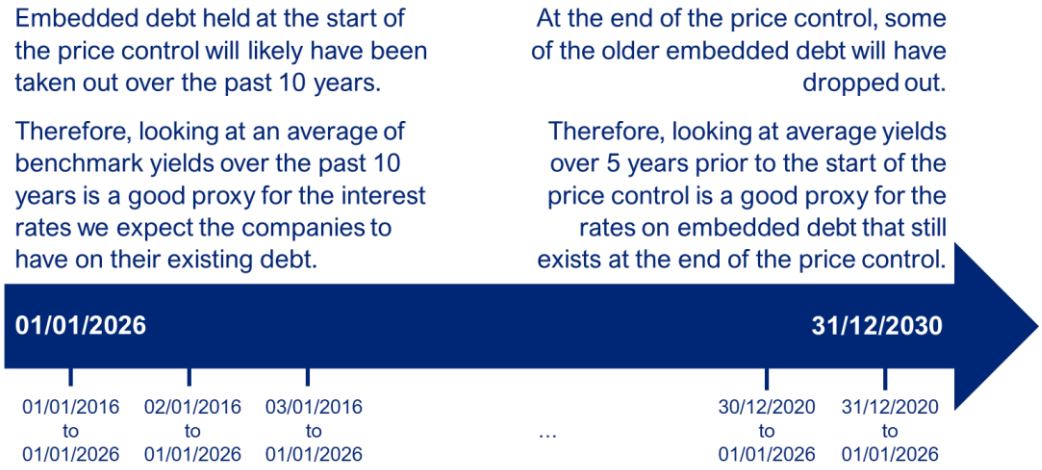
We assume our latest spot estimate is appropriate to roll-forward the cost of embedded debt from now until the start of the price control. As discussed under the risk-free rate section, recent regulatory decisions have typically considered that recent yields have more predictive power, and we consider that rolling forward a spot rate is consistent with that assumption[59].

As an alternative to this benchmark, we have also considered using a 15-year average rather than 10-year trailing average. Under this approach:

- We include debt issued up to the start of the price control, i.e. from 1 January 2026.
- At the start of the price control, we assume that the notional entity (ESBN) will have debt that has been equally issued over the relevant trailing average (e.g. for the 15yr average, it is the 2011-2025 period).
- By the end of the PR6 price control (5 years later), some of that embedded debt will have matured and the embedded cost of debt is estimated using the trailing average length minus the length of the price control, i.e. 10yrs in this case. The assumed cost of embedded debt at the end of the price control is, therefore, a simple average of benchmark yield values between 2016-2025.

Figure 3.1 illustrates diagrammatically our approach based on a 10yr averaging approach – for each date range shown in the diagram, an average yield is calculated over that time period.

Figure 3.1: Change in the average yields of embedded debt over the PR6 period - 10 years



Source: CEPA analysis

We repeat the above analysis for a 15-year averaging period as well, meaning the first data point in our range is an average yield between 01/01/2011 and 01/01/2026, and the last data point in an average yield between 31/12/2015 and 01/01/2026.

The table below summarises the resulting (real) cost of embedded debt if using a 10-year or 15-year trailing average period.

[59] The real spot yield rolled forward is 2.14%%.

Table 3.6: Proposed embedded debt rates based on historical iBoxx rates for A and BBB rated non-financial corporate indices

Index value	Real yield	Nominal yield
10yr average approach	0.99%	2.64%
15yr average approach	1.06%	1.46%

Source: CEPA analysis of iBoxx data

We use the real figures to set our proposed cost of embedded debt for ESBN, prior to the application of issuance costs and fees.

Benchmark – New debt

For the new debt allowance, we have used the spot rate at 07/03/2025 as well as the 12-month average of the same corporate debt indices which we used to calculate an embedded debt allowance (iBoxx A/BBB European non-financial corporates).

This ensures that the estimate is reflective of prevailing market conditions, but looks to balance this against volatility in recent rate movements and using periods that may be less representative for the forecast PR6 period.

We have taken the nominal yield series reported for EUR iBoxx 10yr + corporate non-financials, and deflated this using German 10yr breakeven inflation index over the same period[60].

Table 3.7: Estimate of cost of new debt rates for PR6

iBoxx A/BBB European non-financial corporate indices 10yr+	Real yield	Nominal yield
Spot rate (07/03/2025) - real	2.14%	3.99%
12-month average (08/03/2024 to 07/03/2025)	1.76%	3.71%

Source: CEPA analysis of iBoxx data

Overall

To calculate an overall average benchmark cost of debt, we assume that ESBN (DSO and TAO) will require 25% new debt (i.e. 75% embedded debt) and 40% new debt (i.e. 60% embedded debt) in PR6.

The basis for these assumptions is as follows:

- The **lower 25% new debt assumption** is consistent with the PC5 approach which assumed a notional ten-year rolling average cost of debt. As the start of the price control the company has 0% new debt, and by the end of the price control will have 50% new debt. This implies 25% on average over PR6.
- The **higher 40% new debt assumption** assumes the notional company will need to raise more new debt than a simple rolling average. This figure can be set more definitively once allowed expenditure and movements in the RAB in PR6 are finalised.

This results in a range for the **average real cost of debt benchmark of 1.18% to 1.50%**, before issuance costs.

Issuance costs

In line with CRU precedent, we allow an issuance cost adjustment in the range of **0.10 to 0.20%** uplift to the benchmark real cost of debt. This is consistent with ESBN's proposal, consistent with the assumptions used in PC5 and PR5 and broadly consistent with estimates used in recent UK price control decisions.

[60] DEGGBE10 – 10 year index from Bloomberg.

Summary

Our initial range for the **average cost of debt allowance for ESBN is 1.28% and 1.70%**.

At PR5, the real allowed cost of debt was 1.0-1.7%, so a similar if broader range than our initial proposed range for PR6. ESBN's PR6 proposal is 1.25% to 1.69%. With portfolios of debt raised over time, spot rates are only part of the driver of the notional company all in cost of debt for PR6. We can see in Figure 3.2 that spot rates on our benchmark index (the blue line) have increased. However, the trailing average of 15yr debt (yellow line) is continuing to fall despite the increase in spot rates. This is because the mix of debt raised over the previous 10-15yrs is on average more expensive than the spot rate.

Figure 3.2: iBoxx A/BBB European non-financial corporate yields over time

Source: CEPA analysis of iBoxx data.

We present our initial range for ESBN's allowed cost of debt in Table 3.8.

Table 3.8: Cost of Debt allowance for PR6 for ESBN

	Bottom of range	Top of range
Cost of embedded debt	0.99%	1.06%
Cost of new debt	1.76%	2.14%
Proportion of new debt	25%	40%
Cost of Debt (real) – benchmark	**1.18%**	**1.50%**
Issuance cost	0.10%	0.20%
Total Cost of debt	**1.28%**	**1.70%**

Source: CEPA Analysis of iBoxx data

3.2. BETA

What is beta?

The beta term is a measure of an investor's exposure to systematic risk in a business that cannot be reduced by holding a diversified portfolio of investments. In the context of PR6, it reflects how risky the TAO/DSO and TSO are considered to be compared to the broader market portfolio of investments. Within the CAPM framework, only risk which cannot be eliminated through diversification – systematic risk – is relevant for determining an investor's required return on equity. This definition of risk is captured by the beta term, which measures the covariance of changes in an asset's value and changes in the value of the market index.[61]

A beta of 1 means the stock is as risky as the overall market, a beta of greater than one means the stock is riskier than the market, and a beta of below one is less risky that the overall market.

Terminology

The equity beta (β_E) measures a company's systematic risk but accounting for the effect of capital structure on equity returns, and so it reflects both business and financial risk. This can also be called levered beta.

The asset beta (β_A) measures the riskiness of a company's assets without considering how the company is financed.

It is useful to distinguish these definitions as an asset beta is useful for comparing companies with different capital structures, while equity beta provides insight into the overall risk faced by equity investors.

To go between the asset and equity betas, a debt beta is required (β_D). Debt beta quantifies the risk associated with a company's debt relative to the market. The asset beta is typically calculated in a UK and Ireland regulatory context as: $(\beta e \times (1 - gearing)) + (gearing \times \beta_D)$. An 'unlevered beta' assumes that the debt beta is zero.

This report uses the term asset beta and unlevered beta interchangeably, as this is consistent with CRU's standard practice in price controls of assuming a zero debt beta. We note that ESBN in its submissions also assumes a zero debt beta, but EirGrid assume a positive debt beta in their submissions. As a result, comparisons between submissions are not always like for like.

Beta for PR6

To arrive at a suitable asset and equity beta range for PR6, we adopt an empirical approach. We estimate the beta based on market evidence from a sample of European comparators, given that neither licensee is publicly listed, and we cannot observe movements in their valuations relative to an equity stock market.

For ESBN, to calculate market evidence on beta we need to:

- Select a relevant comparator set;
- Select the market index used to compare these comparator stocks to; and
- Determine the data frequency, estimation windows and averaging periods to be used.

For EirGrid, our approach focuses heavily on precedent of asset beta that have been used in regulatory decisions for other system operators, in the absence of suitable listed asset light comparators.

We adopt a standard approach by focusing on an asset beta to remove impacts of gearing, using re-levering and de-levering to convert from raw estimated equity betas.

[61] Defined more formally, the beta of security i is calculated as the ratio of the covariance of security i's return and the market portfolio return, and the variance of the market portfolio return over a specified period. The beta therefore measures the contribution of a security to portfolio risk.

Consistent with our approach to other WACC parameters, we briefly describe the approach that the companies have proposed in their PR6 submissions, before setting out our proposals for an initial PR6 range.

3.2.1. EirGrid TSO

Comparator set

EirGrid has highlighted the risks it faces as a business due to its asset light nature. It highlights how its relatively small RAB means that the allowed return is less able to absorb shocks to its returns; sometimes referred to as 'operational gearing'. EirGrid also has highlighted collection agent risk it faces. These features are compensated in PR5 through the use of additional financial margins (i.e., allowed returns over and above the allowed return on the RAB), rather than being compensated for relative risk differentials to ESBN through the cost of capital.

EirGrid propose the following comparators for estimating beta for its TSO price control. This comparator set do not share the same asset light characteristics; instead they are used to create a benchmark, prior to the application of separate margins under CRU's current financial framework for the TSO which EirGrid propose the CRU should retain in their current form for PR6.

Table 3.9: Comparator set of similar European utility companies proposed by EirGrid for the calculation of beta

	Comparator	Network Type	Country
Core	National Grid	ET	GB
	Terna Rete	ET	Italy
	Redeia Corporació	ET and SO	Spain
Extended set	Snam	GT	Italy
	Italgas	GD	Italy
	Enagas	GT	Spain
	United Utilities Group	Water	UK
	Pennon Group	Water	UK
	Severn Trent	Water	UK

Source: KPMG (2024) Cost of capital estimation for EirGrid's onshore activities at PR6 (part of EirGrid's business plan submission)

EirGrid also considered Elia SA/NV as a comparator, but their adviser, KPMG, discounts the company given the large public shareholding which they argue reduces the firm's exposure to systematic risk.

Market indices

KPMG primarily use a European portfolio of equities (i.e. the Eurostoxx 600 index), and use local indices as a cross check for their beta estimates.

Data frequency, estimation window and averaging periods

KPMG adopt the following decisions in estimating beta for their analysis:

- Use daily frequencies, i.e. looking at daily return series for the listed company and stock market.
- Use 5yr and 10yr estimation windows, placing more weight on the longer time periods.

- Focus on spot beta evidence and only use rolling averages as a cross check, noting the CMA's PR19 view that *"rolling averages place different weight on the various underlying data points and that this can give rise to potential distortions in the figures"*[62]
- KPMG identified that the Covid-19 pandemic and Russia-Ukraine war and their economic repercussions may have a distortionary impact on the beta estimates due to the "flight to safety" phenomenon. To address this, they propose weight is placed on both current beta estimates and those calculated prior to the onset of the pandemic to ensure a balanced assessment.

The table below summarises KPMG's beta estimates which inform their recommendations for EirGrid TSO in PR6.

Table 3.10: KPMG's asset betas estimates over 5 and 10 year estimation period windows

Estimation Window	Cut-off date	All comparator companies		Core comparator companies	
		Local	Pan-European	Local	Pan-European
5Y	31 May 2024	0.33	0.37	0.32	0.40
5Y	28 Feb 2020	0.37	0.40	0.36	0.40
10Y	31 May 2024	0.35	0.39	0.35	0.40
10Y	28 Feb 2020	0.34	0.39	0.33	0.40

Source: Table 6-3 in KPMG (2024) Cost of capital estimation for EirGrid's onshore activities at PR6 (part of EirGrid's business plan submission)

Summary

Bringing this evidence together to estimate EirGrid's asset beta, KPMG calculate 5yr and 10yr estimation windows with May 2024 and pre-Covid (28th Feb 2020) cut off dates, using local and pan-European indices, for their core comparator set as well as the wider comparator set. The resulting estimates range from 0.32 to 0.40. Notably, they conclude that betas as of May 2024 are generally lower than those from February 2020.

KPMG state that a selection of recent regulatory precedent also supports their initial range, although they note this precedent ranges between 0.35 to 0.55, with the Ofgem RIIO-2 ESO decision at the top end of the range.

EirGrid and KPMG's proposed asset beta range is 0.35 to 0.40, primarily informed by empirical estimates of comparator betas and further supported by recent regulatory precedents from energy networks. For debt beta, KPMG use analysis from Schwert and Strebulaev (linking debt beta to credit rating levels) and regulatory precedent. KPMG conclude it is reasonable to assume a solid investment-grade rating between BBB and A for EirGrid and, therefore, a debt beta range of 0.05-0.10 is deemed appropriate. KPMG use 0.075 as a point estimate.

The table below summarises KPMG's calculations and proposed range for the TSO equity beta n PR6.

Table 3.11: Calculation of equity beta from asset and debt beta information from KPMG's paper

	Lower bound	Upper bound
(A) Debt beta	0.075	0.075
(B) Asset beta	0.35	0.40
(C) Notional Gearing	55%	55%
(D) Equity beta (D= [B- C*A] / [1-C]	0.69	0.80

Source: CEPA summary of information from KPMG (2024) Cost of capital estimation for EirGrid's onshore activities at PR6 (part of EirGrid's business plan submission)

[62] From KPMG WACC appendix, but quoted as from CMA (2021), PR19 Final Determination, para. 9.473

3.2.2. CEPA proposed approach for TSO

EirGrid TSO has been referred to as having relatively high 'operational gearing' compared to standard regulated network companies. As noted previously, EirGrid argue that this creates additional risk that requires remuneration. We agree that this risk should be reflected in the financial framework developed for EirGrid.

In previous price controls, the CRU has set the same WACC for the TSO as the TAO, therefore not providing compensation for TSO's operational gearing being higher relative to the TAO through beta. This additional remuneration has historically been provided through a margin on transmission revenues. However, it could instead be remunerated through using a higher beta in the allowed cost of capital.

Instead of the additional margin approach applied for PR4 and PR5, for PR6 we provisionally favour reflecting the impact of operational gearing through the equity risk parameter in the WACC directly, namely through the beta component. This approach is consistent with the approach applied by the CMA in the appeal process for SONI TSO's 2015-2020 price control (see discussion below) and we consider it is better suited to the TSO in PR6[63] (whilst being of similar magnitude overall and therefore not impacting negatively on financeability)[64].

However, the drawback of this approach is that the compensation scales with the RAB, which means that compensation falls as operational gearing becomes more severe. We consider total compensation through both approaches to check the impacts of a potential change.

Precedent

Following SONI's appeal of its 2015 – 2020 price controls, the CMA concluded that the Northern Ireland Utility Regulator (UR) made three errors in relation to ensuring the financeability of SONI TSO over the 2015-20 period:

> "(a) The UR failed to provide an allowance for the Parent Company Guarantee (PCG) provided by EirGrid, and this was wrong as the amount assumed in the SEMO control, which was relied on by the UR, did not reflect the additional risks taken by EirGrid in providing a guarantee to SONI in addition to SEMO.
>
> (b) The approach to determining the level of return for SONI, in particular the way in which the UR applied a RAB/WACC approach, was wrong, as it did not remunerate SONI for the asymmetric risk it faced, and therefore it was not suitable for ensuring SONI's financeability.
>
> (c) The approach to determining the level of return for SONI, in particular the way in which the UR applied a RAB/WACC approach, was wrong, as it did not reflect the risks faced by SONI in respect of the management of industry revenue, and therefore it was not suitable for ensuring SONI's financeability."[65]

Source: CMA

The CMA concluded that the adjustment that the UR had originally made for SONI's operational gearing in its allowed WACC did not take into account other factors that had been identified by SONI in its appeal i.e., its collection agent risk and asymmetric risks SONI considered were associated with its Network Planning and certain other functions. The CMA upheld UR's uplifted asset beta assumption of 0.60 primarily based on the system operator's higher operational gearing, but concluded further remuneration was required for these other activities.

This suggests that the UR's original beta can provide a potential reference point for the TSO in PR6 if seeking to account for the impacts of operational gearing within the allowed cost of capital.

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[63] SONI is the TSO for Northern Ireland.

[64] Applying a 0.25% margin to EirGrid's TSO revenues in PR5 resulted in EirGrid receiving around €1.63m (nominal) per annum for the margin compensation in PR5. An asset beta of 0.55 is 0.22 higher than the mid-point of our 0.31-0.35 asset beta range for ESBN that would otherwise apply for EirGrid. This increases the pre-tax WACC by 1.64 percentage points, using our other parameters. Based on the average PR5 RAB, this would give compensation of €1.54m per annum under this alternative approach.

[65] CMA (2017): 'SONI Limited v Northern Ireland Authority for Utility Regulation – Final Determination'

The electricity system operator in GB (NESO, formerly National Grid ESO) was regulated under price control arrangements before being nationalised as part of the RIIO-2 price controls.[66] The cost of capital at RIIO-2 for the ESO was differentiated to that of the onshore Transmission Owners[67], with a higher asset beta (0.55) allowed to reflect, amongst a number of factors, the ESO's higher operational gearing.[68]

Proposal for PR6

We propose an asset beta of 0.50 to 0.55 for PR6, informed by regulatory decisions (with an assumed zero debt beta) for electricity system operators with similar characteristics. This is higher than the asset beta used for the onshore network owner (ESBN), and also higher than EirGrid's proposal.

In order to compare this proposal for EirGrid TSO to the betas of SONI and NESO, we adjust for different debt beta assumptions used in each of these price review processes and compare the unlevered betas.

Table 3.12: Calculation of Equity beta and Unlevered beta using asset and debt beta estimates - comparing CEPA proposal for PR6 to EirGrid proposal for PR6 and to SONI and NESO precedents

	SONI 2020-25	NESO RIIO-2 2021-26	CEPA TSO PR6 low	CEPA TSO PR6 high
(A) Debt beta β_D	0.075	0.075	0.000	0.000
(B) Asset beta β_A	0.50	0.55	0.5	0.55
(C) Notional Gearing *G*	40%	55%	55%	55%
(D) Equity beta β_E(D= [B- C*A] / [1-C]	0.783	1.131	1.111	1.222
(E) Unlevered beta β_{UL}(E=B-(C*A))	0.470	0.509	0.500	0.550

Source: CEPA analysis

As we have noted above, where the debt beta is assumed to be zero, the asset beta is equivalent to the unlevered beta. The upper bound of our proposed unlevered beta range (0.55) is, therefore, higher than the unlevered beta adopted in the referenced price controls for SONI and NESO. The SONI decision is below our lower bound, whilst the NESO decision is slightly higher.

In the subsections below we provide a brief comparison of EirGrid TSO's business characteristics and whether this in principle might justify the range for beta we have proposed relative to other system operator price control decisions in the Northern Ireland and Great Britain.

Comparison of system operator businesses

To help inform how comparable other price regulated system operator businesses are to EirGrid TSO in PR6, we undertook a comparison of the regulated companies' characteristics and regulatory frameworks. A summary of analysis has been provided in Table B.1 in Appendix B.

Comparing EirGrid TSO in PR5 with the ESO in RIIO-2 and SONI in its current price control (2020-2025), we note that all three companies are subject to a "hybrid RAB" regime (RAB x WACC with additional margins) and similar revenue risk and financing cost recovery frameworks. All three system operators are subject to a form of performance incentive framework. Although there are some differences between each regime, overall, we consider the regulatory frameworks are substantially similar.

[66] Ofgem (2021) RIIO-2 Final Determinations – Electricity System Operator (REVISED)

[67] Equivalent to the TAO in Ireland.

[68] Consistent with the CMA determination for SONI (2015-20), although Ofgem allowed a lower asset beta than 0.6. Similarly, this also included a positive debt beta.

Over PR5 and PR6, the TSO's RAB fluctuates year on year given the relatively short life of the assets, and EirGrid TSO has also reported how measures of its operational gearing risk – e.g., operating costs to RAB – also fluctuates. EirGrid argues in its business plan submission that it faces a higher totex to RAB ratio in PR6 relative to other recent asset light regulated company determinations increasing its relative risk.

Combined these arguments could be interpreted to suggest that EirGrid's TSO business carries a higher level of risk in PR6, and therefore requires a higher asset beta in the allowed WACC, compared to other asset-light system operators in recent price controls (including PR5). While it is true that EirGrid displays characteristics of a company with high operational gearing, there are several reasons to question whether this justifies a materially higher asset beta than those applied to comparable system operators.

Firstly, EirGrid operate under a regulatory framework that provides a significant degree of certainty regarding cost recovery. The allowance mechanism is designed to reflect actual incurred costs, subject to ex-post review. EirGrid has high operational gearing, but there is also constrained underlying P&L risk arising from this as its regulatory framework does not expose the company to volume risk and the CRU facilitates the company recovering its costs via a K-factor and ex post review process. While some ex-post cost recovery risk remains, this is not unique to EirGrid and is similarly present in other recent system operator price control structures.

Secondly, key factors typically influencing regulated utility betas such as changes in asset value driven by variations in discount rates used to convert these future cash flows to a present value are not directly linked to operational gearing. Given the protections in EirGrid's regulatory regime, there is a risk of overstating the impact of high operating leverage on the betas of asset light TSOs.

Thirdly, Ofgem's RIIO-2 determination included a higher beta partly based on the 'newness' of the ESO regime. As such, the figure used may have been set with a degree of conservatism and could reflect a temporary uplift rather than a long-term view of asset beta of system operators.

Given these factors, the proposed range of 0.50 to 0.55 for EirGrid at PR6, representing an unlevered beta, is considered to suitably account for EirGrid's high investment intensity and operational gearing in PR6.

Comparison of other asset-light companies

In addition to our reliance on regulatory precedent, we have also sought to identify comparator companies that can be used as a cross check against our range of 0.50 to 0.55.

ENAV (a listed Italian company) operate a relatively asset light regulated business similar to the TSO, by providing Air Traffic Control Services (ATCS). ENAV's ATCS activities generate regulated revenue by charging the users of its airspace (planes departing and arriving at Italian airports, as well as flights crossing the Italian airspace) a regulated tariff on the volume of airspace used. [69,70] Outside of these regulated activities, ENAV has plans to expand its non-regulate businesses, seeking worldwide opportunities to develop innovative technologies for ATCS. Its current non-regulated businesses include IDS AirNav, Techno Sky, Aireon and D-Flight.

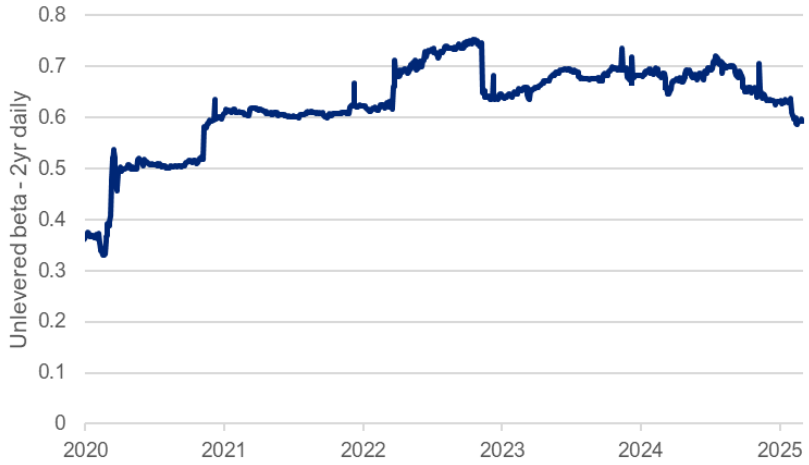
Importantly, as part of both its regulated and non-regulated businesses, ENAV is exposed to revenue risk and operates in a sector of the economy (aviation) that is typically viewed as being subject to higher systematic risk than regulated utilities such as electricity networks or system operators. ENAV's recent investor presentation highlights that the company's core regulated business is supported by a protective regulatory framework, but both its en-route and terminal services revenues are subject to traffic risk. Assuming that the company has a largely fixed operating cost base, this means ENAV's returns will be subject to high operational gearing: changes in traffic volumes will amplify volatility on profits, because ENAV's costs will not change accordingly.

[69] ENAV (2024) Investor Presentation. Available online

[70] Traffic volume is expressed in service units, which are a function of distance travelled within the airspace and certified aircraft weight for en-route services [formula: (d/100)*√(p/50), where d is the distance travelled and p is the certified weight] and of aircraft certified weight for terminal services [formula: (p/50) ^0.7, where p is the certified weight].

These factors above would suggest that the TSO's beta would not be expected to exceed ENAV's (as a regulated asset light company subject to revenue risk), and therefore we can use ENAV's beta as a cross check on the upper limit of our range. The figure below shows ENAV's asset beta over time. This shows that its asset beta has been roughly in the range 0.6-0.8. Given the relative risks investors in the company are exposed to, this would suggest that an asset beta greater than 0.60 for the TSO would not be aligned with the risks the company is exposed to.

Figure 3.3: ENAV unlevered beta[71]



Source: CEPA analysis of Bloomberg data

3.2.3. ESBN – DSO and TAO

Frontier Economics, on behalf of ESBN, estimate an unlevered beta from a sample of publicly listed companies comparable to ESBN. This comparator set covers listed companies used in PR5 and PC5 determinations to estimate beta (this is discussed further under the CEPA proposals below).

Comparator set

The comparator set proposed by Frontier Economics is shown in the table below.

Table 3.13: Comparator set of similar European utility companies proposed by ESBN for the calculation of beta

Comparator	Network Type	Country
Endesa	ED	Spain
Elia	ET	Germany
Enel	ED	Italy
REN	ET	Portugal
Enagas	GT	Spain
National Grid	ET	GB
Red Electrica	ET	Spain
Snam	GT	Italy
Terna Rete	ET	Italy
Italgas	GD	Italy

Source: Frontier Economics (2024) PR6 WACC and Target Rating (part of ESBN's business plan submission)

[71] 2-year asset betas estimated against the Stoxx 600, unlevered with net debt and including a zero debt beta.

Frontier also consider the company comparator set Ofgem has proposed for RIIO-3, however they do not find England Wales water companies to be comparable to the risks faced by energy networks, and additionally Frontier also propose to include European electricity distribution companies given their relevance to ESBN. Therefore, Frontier's proposed comparator set is the same as used by the CRU at PC5, with the addition of Italgas.

Market indices

Frontier propose to use national indices of the respective countries the utilities are located and traded in to estimate betas. Frontier use a pan-European index as a cross check (and find broadly consistent results).

Data frequency, estimation window and averaging periods

Frontier Economics' choices on estimating beta are as follows:

- Data frequency: daily estimates (i.e. look at daily returns for listed companies and the stock market).
- Estimation window: consider all estimation windows (2, 5 and 10 year), place more weight on long-term (10 year) estimates.
- Averaging period: consider spot, 2, 5 and 10-year.

The mean average of these values is 0.34, with Frontier concluding on an unlevered beta range of 0.31-0.35.

Table 3.14: Frontier's average betas calculated using comparator set data over 2, 5 and 10 year estimation windows

Sample average	Spot	2-year average	5-year average	10-year average
2-year window	0.34	0.31	0.34	0.34
5-year window	0.34	0.34	0.35	0.34
10-year window	0.34	0.34	0.34	0.32

Source: Table 7 of Frontier Economics (2024) PR6 WACC and Target Rating (part of ESBN's business plan submission)

Frontier use the CRU precedent of 0 for debt beta, therefore asset beta is equal to the unlevered beta. Combining with notional gearing of 55%, Frontier conclude an overall equity beta of 0.68 to 0.77.

Table 3.15: Asset and Equity betas proposed by ESBN

	Lower bound	Upper bound
(A) Unlevered beta	0.31	0.35
(B) Observed Gearing	46%	54%
(C) Debt beta	0	0
(D) Asset beta (D = A + B*C)	0.31	0.35
(E) Notional Gearing	55%	55%
(F) Equity beta (F= [D- E*C] / [1-E]	0.68	0.77

Source: Frontier Economics (2024) PR6 WACC and Target Rating (part of ESBN's business plan submission)

3.2.4. CEPA proposed approach for ESBN

For ESBN, we have rolled forward the same comparator set as was used in PR5. We continue with a broader comparator set and a narrower pure-play set. We include England and Wales water companies in our wider

comparator set, but similar to Frontier we have excluded these water companies from our 'pure-play' comparator set, as they are less comparable to a Eurozone-based energy network.[72]

Frontier have included Enel and Italgas in their preferred comparator set but we consider that these are not pure play comparators and limit their inclusion to the wider comparator set[73].

We consider that the betas from the pure-play comparator set are more likely to reflect the systematic risk of a regulated energy network in PR6 as they are not distorted by other activities in businesses that do not relate to networks. Some companies in our wider comparator set have significant activities in energy trading / generation operations that have a different risk profile to regulated transmission and distribution networks.[74]

The CRU has made the distinction between pure play comparators and a wider comparator set at both the PR5 and PC5 decisions on the cost of capital. We continue with that distinction in our recommendations.

Table 3.16: Comparator set of similar European utility companies proposed by CEPA for the calculation of beta

Pure play comparators		Wider comparator set	
Comparator	**Country**	**Comparator**	**Country**
National Grid	GB	HERA	Italy
Terna	Italy	A2A	Italy
Snam Rete	Italy	Pennon	UK
Enagas	Spain	Severn Trent	UK
Elia	Germany	United Utilities	UK
Red Electrica	Spain	Enel	Italy
REN	Portugal	SSE	UK
		RWE	Germany
		EDP	Portugal
		Naturgy (Gas Natural)	Spain
		EDF	France
		Engie (GDF Suez)	France
		Veolia	France
		E.on	Germany
		Italgas	Italy
		Fluxys	Belgium

Source: CEPA analysis

For each company in our comparator set, we calculate a 2yr asset beta, using an observed equity beta and a two year average of observed gearing, and assume a zero debt beta (consistent with CRU's regulatory precedent).

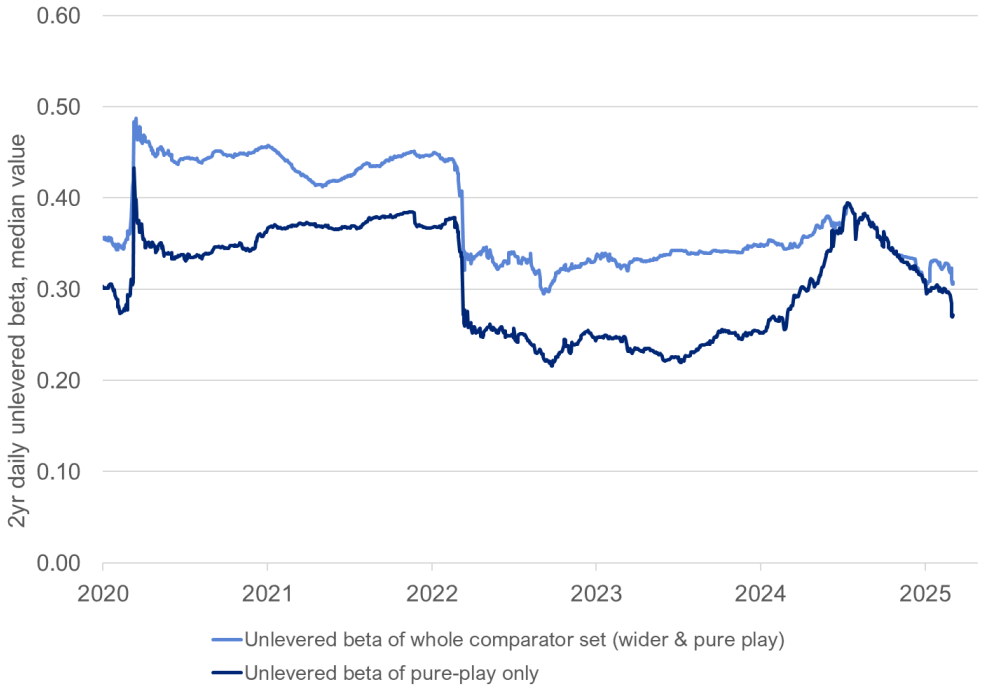
[72] Although both sets of companies share many common features, including RAB based regulation.

[73] We do not include Endesa in our sample. We consider that the share of regulated activities is small, its operations are international, and we consider it is less relevant as a comparator than other companies in our sample.

[74] Examples include Engie and E.on.

We use STOXX Europe 600 for European comparators and the FTSE All-share Index for GB based comparator companies to estimate the equity beta for our analysis. We calculate the median values for each working day across the pure-play set and all companies' sample. The two series are plotted belowFigure 3.4 with the pure-play sample illustrated in light blue and full company sample illustrated in dark blue.

Figure 3.4: 2yr rolling asset beta from 2020 to 2025 - comparators



Source: CEPA analysis of Bloomberg data

The asset betas for both samples have been driven higher in the 2020 to 2022 period by the shock event of the Covid pandemic. When this drops out of the estimation window of 2yr betas (around March 2022), the median asset beta returns to levels comparable to pre-Covid. The increased asset beta value for part of the period of PR5 was driven by a small number of daily observations, which have significant power in the OLS regression used to derive the beta statistic.

To develop a range for the asset beta for ESBN in PR6, we have looked at 2-year daily betas over different averaging windows, including spot through to 10-year rolling averages. We also place most weight on the smaller pure-play group compared to our wider list, from the table below.

Table 3.17: Unlevered asset betas for the PR6 comparator set for ESBN

Unlevered Asset betas	Spot	1-year	2-year	5-year	10-year
2-year estimation window - Pure play comparator set	0.27	0.33	0.29	0.31	0.33
2-year estimation window - Wider & pure-play comparator set	0.31	0.35	0.35	0.38	0.38

Source: CEPA analysis of Bloomberg data

The wider comparator set suggests a range of 0.31 to 0.38, versus 0.27 to 0.33 for the pure play comparator set.

We consider that there is an argument to place some limited weight on the wider comparator set, rather than rely solely on the narrower core pure-play group. This is based on the potential for increased risk at PR6 across the overall regulatory package, but this is subject to ongoing review.

We therefore assume an initial range of 0.31 to 0.35, which is in line with ESBN's asset beta proposal.

3.3. NOTIONAL GEARING

Notional gearing is the assumed proportion of debt financing in the capital structure of an efficient notional company. It is used to weight the cost of debt and equity to estimate the weighted average cost of capital (WACC). It is also used to convert the asset beta to an equity beta for the calculation of the cost of equity.

We consider that the optimal approach to estimating gearing within the cost of equity is to use observed gearing levels in the market of a set of publicly-listed utility comparators (the same set utilised for determining the appropriate asset beta). The CRU have consistently used a stable approach to notional gearing over time, based on an assumption of 55% reflecting a prudent optimal level of gearing for the licensee.

The CRU's standard assumption of 55% notional gearing is not inconsistent with the levels assumed in other regulatory determinations; for example, Ofgem used 55% for the ESO at RIIO-2, and 60% for electricity distribution. Ofwat for PR24, have used a 55% notional gearing assumption noting that the level of notional gearing should reflect a capital structure sufficient to provide a suitable buffer against the level of risk in the price control.

We consider that different levels of notional gearing are possible for EirGrid and ESBN, and therefore consider each individual licensee separately below.

3.3.1. EirGrid Submission

EirGrid (and KPMG) in its business plan submission[75] consider evidence of gearing of comparator companies as well as regulatory precedent. Their list of comparators is the same set that they use for their asset beta estimation, with the addition of Elia. The reported gearing levels for this sample range from 35.1% to 65.3% in their list of comparable utilities, with a median of 52.9%.

EirGrid also report regulatory precedent on gearing, not just in Ireland but also Northern Ireland and GB, across Electricity, Gas, and Telecoms. From the regulatory precedent set, there is a range of 40% to 60%.

EirGrid conclude that *"comparable network companies and recent regulatory precedent suggests that a notional gearing assumption of 55% remains a reasonable assumption for EirGrid's onshore activities".*

3.3.2. CEPA proposed approach for EirGrid

We propose a notional gearing assumption of 55% in line with regulatory precedent and consistent with the evidence on comparator company gearing presented by EirGrid.

Our financeability assessment also indicates that 55% notional gearing is consistent with financeability and continues to be an appropriate assumption for PR6.

3.3.3. ESBN Submission

Frontier (on behalf of ESBN) review a list of regulatory determinations in Ireland (Electricity, Gas, Aviation, Water) as well as Ofgem RIIO-2 and water in England and Wales (CMA PR19 and Ofwat PR24) to help inform their judgement on an appropriate notional gearing level for PR6. Frontier argue this supports a range of 55-65%. Frontier propose to retain the 55% notional gearing level that was used in PR4 and PR5.

3.3.4. CEPA proposed approach for ESBN

To inform the appropriate gearing level for the DSO and TAO in PR6, we have considered gearing from the two company comparator sets used to estimate beta. This is summarised in the table below.

[75] KPMG (2024) Cost of Capital estimation for EirGrid's onshore activities at PR6

Table 3.18: CEPA's calculation of average gearing from comparator set

	Spot	1-year	2-year	5-year	10-year
2-year net-debt gearing – Pure play comparator set	49.4%	46.6%	45.5%	45.2%	45.7%
2-year net-debt gearing – Wider comparator set	47.8%	48.0%	47.4%	45.7%	45.6%

Source: CEPA analysis of Bloomberg data

The observed gearing levels for the comparator data set could suggest a range for notional gearing of 45.2% to 49.4% for the notional licensee in PR6.

Notwithstanding the ranges suggested by our comparator set, we have also undertaken a review of regulatory precedent including CRU's recent electricity and gas determinations (PR5 and PC5) which both used a notional gearing level of 55%. Adopting a consistent notional gearing assumption across price controls helps to provide stability and signals consistency across the price control regimes. Given ESBN's proposal is in line with this, we propose to use 55% as our notional gearing assumption for PR6.

As with the TSO, we propose to revisit our assumption as part of the financeability assessment, to test whether 55% continues to be an appropriate assumption within the context of PR6.

4. OVERALL WACC ESTIMATES

In this section we bring together the conclusions reached in previous section, to develop a proposed range for the PR6 WACC. We also discuss how the CRU might approach selecting a point estimate from that range, and provide a simple international cross-check that might be used to inform this judgement.

4.1. INITIAL COST OF CAPITAL RANGE FOR PR6

Table 4.1 and Table 4.2 below presents our overall WACC calculations based on the range of estimates for the WACC components produced in the earlier sections of this paper. In each case, these are compared to the company's submissions for PR6 and the CRU's PR5 decision on cost of capital.

Table 4.1: Initial WACC range for the TSO for PR6 compared to EirGrid's proposal and the PR5 allowance

	CRU PR5	EirGrid PR6 proposal (no aiming up)	CEPA PR6
Benchmark CoD	0.8% to 1.5%	1.91%	1.24% to 1.43%
Small company premium	Not given	0.30%	N/A
Premium on Irish utilities		0.21%	N/A
Issuance costs	0.1% to 0.2%	0.30%	0.10% to 0.20%
Cost of debt	**0.9% to 1.7%**	**2.73%**	**1.34% to 1.63%**
Risk-free rate	-1.2% to -0.8%	0.80% to 1.2%	0.50% to 0.60%
Total Market Return (TMR)	5.70% to 6.75%	6.68% to 6.72%	6.40% to 6.80%
Equity Market Risk Premium	6.90% to 7.55%	5.53% to 5.93%	5.90% to 6.20%
Asset beta	0.35 to 0.4	0.35 to 0.40	0.50 to 0.55
Equity beta	0.78 to 0.89	0.69 to 0.80	1.11 to 1.22
Cost of equity (post-tax)	4.12% to 5.91%	4.58% to 5.93%	7.06% to 8.18%
Tax	12.5%	15%	12.5% to 15%
Cost of equity (pre-tax)	**4.76% to 6.76%**	**5.38% to 6.97%[76]**	**8.06% to 9.62%**
Notional Gearing	55%	55%	55%
WACC (pre-tax)	2.64% to 3.98%	3.92% to 4.64%	4.37% to 5.23%
Inflation adjustment[77]	0.00% to 0.40%	0.30%	0.10% to 0.40%
WACC (pre-tax) after inflation expectations adjustment	**2.64% to 4.38%**	**4.22% to 4.92%**	**4.47% to 5.63%**
WACC Point estimate	**P67= 3.80%**	**No explicit point estimate chosen**	**P67=5.23%**

Source: CEPA calculations

[76] The overall calculated range for the Cost of Equity (pre-tax) is 5.38% to 6.97%. However, EirGrid propose a reduced range (after aiming up) of 6.7% to 6.9%. From here onwards, as well as in the waterfall chart Figure 1.1, we present the WACC based on the full range without aiming up.

[77] To account for differences in inflation between European comparators and Irish inflation as opposed to a real/nominal adjustment

At a component-by-component level, our initial position is quite different to EirGrid's proposal. Two key differences are: the asset beta estimate where we have concluded on a larger value to provide remuneration to reflect the asset light nature (higher operational gearing) of the business, whereas EirGrid have included this as a separate operational gearing margin in their submission; and no adjustment for the premiums requested on the cost of debt.

Our range for ESBN is largely consistent with their proposals, with the exception of the inflation adjustment, as discussed in Section 2.

Table 4.2: Initial WACC range for the TAO/DSO for PR6 compared to ESBN's proposal and the PR5 allowance

	ESBN PR5	ESBN PR6 proposal	CEPA PR6
Benchmark CoD	0.8% to 1.5%	1.15% to 1.49%	1.18% to 1.50%
Small company premium	Not given	N/A	N/A
Issuance costs	0.1% to 0.2%	0.10% to 0.30%	0.10%-0.20%
Cost of debt	**0.9% to 1.7%**	**1.25% to 1.69%**	**1.28% to 1.70%**
Risk-free rate	-1.2% to -0.8%	0.36% to 0.65%	0.50% to 0.60%
Total Market Return (TMR)	5.70% to 6.75%	6.45% to 6.80%	6.40% to 6.80%
Equity Market Risk Premium	6.90% to 7.55%	6.09% to 6.15%	5.90% to 6.20%
Asset beta	0.35 to 0.4	0.31 to 0.35	0.31 to 0.35
Equity beta	0.78 to 0.89	0.68 to 0.77	0.69 to 0.78
Cost of equity (post-tax)	4.12% to 5.91%	4.52% to 5.41%	4.56% to 5.42%
Tax	12.5%	12.5%	12.5% to 15.0%
Cost of equity (pre-tax)	**4.76% to 6.76%**	**5.17% to 6.18%**	**5.22% to 6.38%**
Notional Gearing	55%	55%	55%
WACC (pre-tax)	2.64% to 3.98%	3.01% to 3.71%	3.05% to 3.81%
Inflation adjustment	0.00% to 0.40%	0.58% to 0.83%	0.10% to 0.40%
WACC (pre-tax) after adjustment for inflation expectations	**2.64% to 4.38%**	**3.60% to 4.54%**	**3.15% to 4.21%**
WACC Point estimate	**P67= 3.80%**	**P67= 4.23%**	**P67= 3.85%**

Source: CEPA calculations

4.2. AIMING UP

The cost of capital cannot be directly observed, in particular the cost of equity and therefore assumptions need to be used to build up a value for the cost of capital. Estimating a utility company's cost of capital over a price control is therefore inherently subject to uncertainty. In this paper we build up our best current estimate of a WACC resulting in a WACC range from which we need to select a point estimate.

Regulators may deal with uncertainty in the cost of capital by weighing up the relative risks of over/under-estimating the WACC. There are risks with setting a WACC that is both too high and too low, but many regulators (and appeal bodies) have tended to emphasise the asymmetry of the risks, in that setting a WACC that is too low is likely to be more harmful for consumers than one that is too high:

- Setting a WACC that is too low could mean that the revenue collected from customers to cover financing costs is not large enough to cover the companies actual cost of debt and equity.

  In this case, the regulated company may be in a position where they cannot undertake the capital investment programmes that they had planned, and ultimately this may lead to under-investment in the

network. This ultimately results in unfavourable long-term outcomes and could lead to disruption in the delivery of electricity to current consumers as well as future consumers.

- Setting a higher WACC essentially provides some extra assurance /allowance to the regulated companies that they can finance their debt and equity costs even if rates become higher than the regulator expected. It could result in consumers paying more than is strictly required to support investment in the network, but it also limits the risk of under-investment.

In PR4, PR5 and PC5, the CRU deviated from using the midpoint in favour of the 67th percentile, in part reflecting such considerations. The CRU cost of capital guidance document (CRU20/029), however, does not mandate use of the 67th percentile. It states that:

> *"The CRU may also consider the context of the sector and any unique characteristics associated with the utility when coming to a decision on aiming-up. For example, the nature of the capital programme, the utility's funding model, and levels of uncertainty may be amongst the factors that the CRU takes into account when setting the aiming-up level for the WACC, if any."*

The funding model is unchanged for the TSO and DSO/TAO in PR6. The case for aiming up to or beyond the 67th percentile is most likely reflected in the large investment programmes that both licensees are expected to deliver during PR6 and challenges and uncertainties associated with the execution of these programmes.

There is also precedent for regulator's aiming up in other jurisdictions:

- The UK CMA for its PR19 redetermination, decided to aim up in the WACC by selecting the midpoint for most parameters, but adding 0.25% to the post-tax cost of equity mid-point.
- Ofgem sought to not aim-up in its RIIO-2 determinations, and chose the mid-point citing that the price control has other mechanisms to protect customers from uncertainty. This carries through to its proposed methodology for RIIO-3 (the current ongoing energy network price review process), though Ofgem has increasingly made reference to the 'investability' of its price controls and ensuring that returns are sufficient in its publications for RIIO-3.

While there may be a practical and theoretical rationale for the CRU considering aiming up beyond the 67th percentile in PR6, it is important to note that this could create precedent for the CRU in future decisions, as well of course increasing costs for consumers during the PR6 period. It is, therefore, a decision that requires careful consideration and also needs to be made in looking at the price control package in the round.[78]

4.2.1. EirGrid submission

KPMG in their report for EirGrid propose that the CRU should aim up within the cost of equity parameter. Their initial cost of equity range is 5.38% to 6.97%, but they narrow this down to 6.7% to 6.9% inclusive of aiming up above the 67th percentile. This represents a 0.62 percentage points uplift to the cost of equity and a 0.30 percentage points uplift from the overall WACC range midpoint.

KPMG cite a number of reasons why aiming up may be needed including:

- incentivising/attracting investment at a time of significant capital investment for EirGrid, as well as EirGrid remaining competitive when many countries are also stepping up investment for Net Zero targets;
- concern that CAPM underestimates the cost of equity at one point in time;
- reduction in the equity risk premium compared to levels of the previous 10 years; and

[78] For example, where the regulatory framework is supportive for financeability (for example, in its impact of timing of cashflows), then this may help to reduce the requirement for aiming up in the allowed WACC.

- the need for EirGrid's onshore activities to be financially resilient as a standalone set of activities, while affecting the credit rating and project financing for the offshore activities.

The approach to the cost of capital is part of a broader financial framework for EirGrid, with the cost of capital representing a much smaller part of allowed revenues at PR5 than for ESBN.

4.2.2. ESBN submission

For ESBN's WACC, Frontier Economics propose aiming up to the 67th percentile in the overall WACC estimate, and state there are arguments in favour of aiming up further supported by CMA precedent. They propose a point estimate of 4.23% in a range of 3.60% to 4.54%, which is 0.16 percentage points above the midpoint.

Frontier state that for ESBN, *"Given the significant capital expenditure programme required for PR6 and the asymmetric risks associated with underestimating the WACC, we consider aiming up to be not only appropriate but necessary".*

4.2.3. CEPA discussion

For both EirGrid and ESBN we do not propose to apply aiming up or aiming down at the parameter level[79]. We have presented estimates in this report that uses the CRU's standard practice of using the 67th percentile, for both EirGrid and ESBN.

We present here some of the reasons why aiming up could be considered at PR6 and what the CRU would need to take into account in reaching this decision:

- Given the large expansion in investment requested for the PR6 period by the companies, the allowed WACC needs to ensure allowed returns are sufficient to secure investment via required debt and equity. We would need to be confident that any the welfare impacts from aiming up outweigh the higher cost to consumers through the cost of capital.
    - The CRU would need to be confident that aiming up will better incentivise investment and that aiming up would be the most appropriate tool to give effect to that.
- Concern that CAPM underestimates the cost of equity at a given point in time.
    - We consider we have addressed CAPM parameter uncertainty 'at source', by selecting individual ranges for each parameter. If the CRU considers that the ranges presented are balanced, then there is less of a case to aim up on this basis.
- To ensure debt and equity financeability are delivered, with potential constraints faced.
    - Debt financeability will be addressed subsequent to this report drafting, through a well-established method for assessing both individual metrics and overall financeability.
    - On equity financeability, the growth in the RAB necessitates equity inflows on a notional basis (i.e. assuming 55% notional gearing is maintained through the price control – the issue referred to as the 'equity gap' in ESBN's business plan submissions). The sufficiency of the cost of equity / cost of capital may be more relevant in the case of injections, rather than being able to fund investment through retained earnings.

We also emphasise that price controls are also a repeated action with estimates to balance over time meaning the regulator should be willing to aim-down when in circumstances where it is required, if it wishes to aim up at other times.

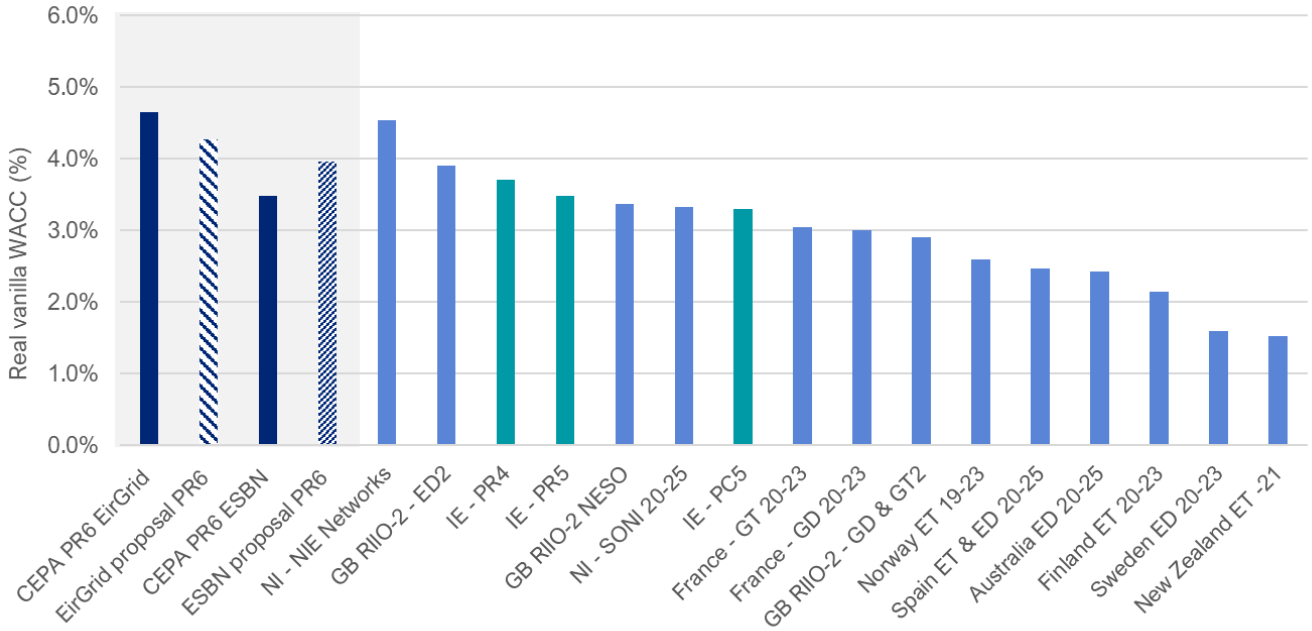
[79] As discussed in Section 2, on the TMR, we consider that historical ex-ante approaches are less robust than ex-post approaches due to the need for judgment to determine not just whether future equity returns will differ from the outturn. The TMR range may be closest to implicit aiming up.

4.3. INTERNATIONAL CROSS-CHECKS

As an initial cross-check to our findings, we have benchmarked the 67th percentile point estimate in the EirGrid TSO proposal, ESBN proposal, and the 67th percentile of our initial PR6 range for both companies, against recent regulatory determinations on the WACC across Europe, Australia and New Zealand.

While there are factors that mean these determinations in other jurisdictions cannot be considered perfect like-for-like comparisons with EirGrid and ESBN – in particular, current differences in debt costs – we find that the individual components of the WACC in our range are generally consistent with recent regulatory decisions or draft decisions in the UK and European shown in Figure 4.1.

Figure 4.1: Comparison of PR6 WACCs (real, vanilla) with WACCs in similar jurisdictions



Source: CEPA analysis of regulator final determination publications

Note that Figure 4.1 presents all the determinations on a real 'vanilla' WACC basis, rather than the real pre-tax basis as is used within the CRU's price controls. As a result, the reported WACC allowance varies slightly from the actual determination allowance. In Appendix A, we provide the calculations for how we have derived the real vanilla WACC from our initial range and from the companies' own proposals for PR6.

In addition, it is important to note that one of the reasons why the proposed range for PR6 is lower than some of the UK regulatory precedent is that real interest rates in the Eurozone are lower than in the UK. This is one of the reasons why the headline allowed rate of return is less comparable with UK precedent that at prior price reviews. All else equal, regulatory decisions in the Eurozone on allowed debt costs might be expected to be lower than the UK because of recent trends in corporate debt costs.

ESTIMATING VANILLA WACC

In the main report, we presented different decisions made by European regulators. We presented this in real vanilla WACC terms. This differs from the real pre-tax WACC quoted by the CRU, in that it uses a post-tax rather than pre-tax cost of equity.

Real vanilla WACC refers to a post-tax cost of equity[80], with a pre-tax cost of debt. The following shows the real vanilla WACC for PR6 for additional context.

Table A.1: Real Vanilla WACCs proposed by EirGrid and ESBN and CEPA's proposals

	EirGrid proposal PR6		CEPA PR6 EirGrid		ESBN proposal PR6		CEPA PR6 ESBN	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
(A) Pre-tax Cost of Debt (real)	2.72%	2.72%	1.34%	1.63%	1.25%	1.79%	1.28%	1.70%
(B) Post-tax Cost of Equity (real)	4.58%	5.93%	7.06%	8.18%	4.56%	5.43%	4.56%	5.42%
(C) Gearing	55.00%	55.00%	55.00%	55.00%	55.00%	55.00%	55.00%	55.00%
(D) Vanilla WACC (real) D=(A*C)+(B*(1-C))	3.56%	4.16%	3.91%	4.58%	2.74%	3.43%	2.76%	3.38%
Inflation adjustment	0.30%	0.30%	0.10%	0.40%	0.58%	0.83%	0.10%	0.40%
Vanilla WACC post inflation adjustment	3.86%	4.46%	4.01%	4.98%	3.32%	4.26%	2.86%	3.78%
Vanilla WACC 67th percentile	**4.26%**		**4.67%**		**3.95%**		**3.47%**	

[80] The assessment of likely corporation tax liabilities for a regulated company is managed as a cash-flow item and added to the operating costs of a business

COMPARISON OF SYSTEM OPERATOR CHARACTERISTICS

Table B.1: Comparison of System Operator business characteristics

	EirGrid – PR5	EirGrid - PR6 [81]	ESO – RIIO-2	SONI – 2020-2025
Form of regime	Hybrid RAB regime	Hybrid RAB regime	Hybrid RAB regime	Hybrid RAB regime
Revenue risk	None – revenue cap	None – revenue cap	None – revenue cap	None – revenue cap
Cost recovery framework / risk	Ex post, with discretionary rewards or penalties	Ex post, with discretionary rewards or penalties	Ex post – with Demonstrably Inefficient or Wasteful Expenditure (DIWE)	Hybrid of cost sharing and outturn cost, subject to caps and DIWE [82]
Performance incentive framework / risk	Range of PIs – asymmetric, upside weighted	Range of PIs – asymmetric, upside weighted	Evaluative performance framework	Evaluative performance framework with cap on rewards / penalties [83]
Financing cost recovery / risk	Fixed WACC allowance plus additional margins Pass-through of WCF fees and interest costs for external costs K-factor TvM adjustment for cost recovery delay Some mismatch risk of financing costs being higher than funded revenues	As per PR5.	Fixed WACC allowance plus additional remuneration Pass through of the WCF costs Some mismatch risk of financing costs being higher than funded revenues	Fixed WACC allowance plus additional margins Allowance for PCG provided Some mismatch risk of financing costs being higher than funded revenues

Source: CEPA

[81] Working proposals / assumptions.

[82] The majority of TSO 'internal' costs are subject to what the UR described in its decision as a 'conditional cost sharing' approach. Planning costs are as incurred, up to a cap and subject to a DIWE standard.

[83] Maximum financial upside £1.25m per year. Maximum financial downside of -£0.75m per year.

CELTIC INTERCONNECTOR COST OF CAPITAL

In this Appendix, we set out the proposed cost of capital for the Celtic Interconnector, as set for the PR6 price control.

CONTEXT

Appendix C

The Celtic Interconnector is a planned 700MW subsea power cable that will connect the electricity grids of Ireland and France. This is currently under construction, with an expectation that it will become operational in 2026.

C.1 EirGrid are working with the French TSO, RTE, to deliver the project – which is defined as a Project of Common Interest and has been in receipt of grand funding. The relevant costs of the interconnector have been allocated based on the net benefits expected for each end of the interconnector.

Further information on the process is covered in Figure C.1.

Figure C.1: Timeline for Celtic Interconnector

The CRU has approved a fully regulated model for EirGrid for the Celtic Interconnector (i.e. no merchant risk is faced) with pre-operational and operational phases.

The return during the pre-operational phase is limited to covering efficient debt costs; this applies at both the Irish and French sides of the interconnector.

C.2 The indication in CRU/2022/13 was that the CRU would set a separate allowed WACC for the Celtic Interconnector's operational phase, but indicated that "*[f]uture price reviews will take into account EirGrid's overall asset base to determine a relevant notional gearing and cost of equity for the TSO, taking into account the Celtic interconnector, along with the latest market information on the WACC parameters. The WACC applied to the TSO's RAB in that case would implicitly account for differences in the financial structure of the Celtic Interconnector and the TSO's existing asset base.*"

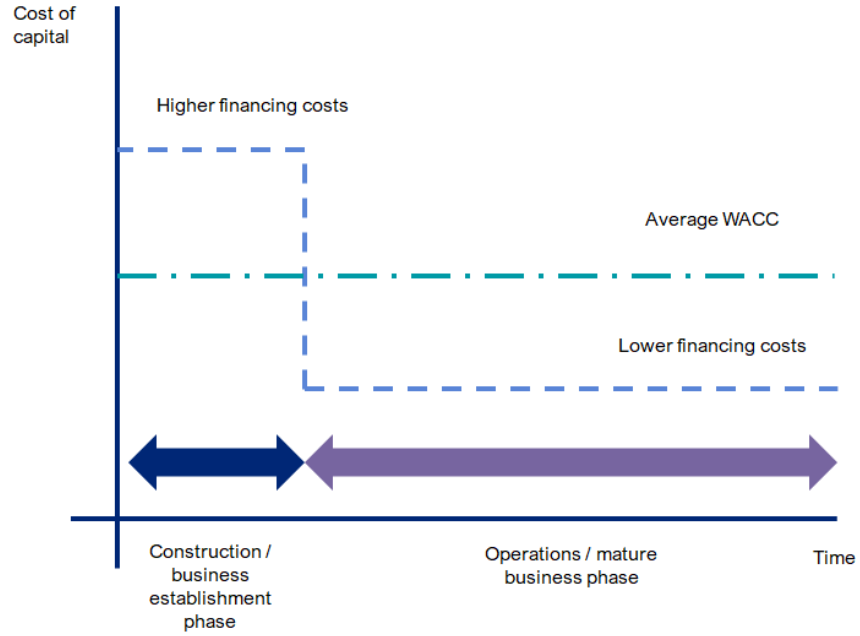
The CRU had also stated that a nominal WACC would be applied for the Celtic Interconnector, rather than the real WACC with inflation-indexed RAB.

PROPOSED APPROACH

There are defined construction and operational periods for the interconnector. We set out in Figure C.2 different potential approaches to setting the cost of capital. We consider that the construction phase is likely to face higher financing costs than the operational phase for a notional company. In principle, the CRU could reflect this in its allowed WACC via a higher rate of return during construction and then a lower rate of return during operations.

However, no equity return was provided on the RAB during construction in practice, to mitigate risks faced by the Irish consumer, so an approach that reflected a lower operational phase cost of capital would undercompensate investors in the Celtic Interconnector. As a result, we consider that the allowed rate of return for the Celtic interconnector for an equity returns perspective, needs to reflect a full project life approach.

Figure C.2: Proposed approaches to setting the cost of capital over time



Source: CEPA analysis

REGULATORY PRECEDENT

C.3. We have considered a range of other regulatory decisions on interconnector cost of capital to inform our initial proposal for the Celtic interconnector.

The first regulatory decision we consider is the approach adopted by RTE for the French side of the Celtic Interconnector. The regime operates under a RAB framework, with application of a nominal cost of capital. As previously discussed, the return during the construction period was similarly limited to debt costs. The nominal WACC is set in line with the onshore network cost of capital for RTE, under TURPE7 – the electricity grid tariff set by the French Energy Regulatory Commission (CRE) for the 2025-28 period.

We also consider the CRU's decision for the EWIC interconnector, as set out in CER/12/049. The approach set out involves utilising the onshore cost of capital for the interconnector, rather than developing a bespoke regime.

C.4. We also considered the regulatory approach for interconnectors under cap and floor frameworks. However, this regulatory framework naturally involves a different risk profile for investors, and consequently a different approach to the cost of capital is necessary for the Celtic interconnector. As a result, we do not consider precedent or benchmarks for cap and floor interconnectors have a strong read across to Celtic.

COMMON PARAMETERS

C.5. We consider that the analysis and recommendations in our main report for onshore networks on the common parameters of the WACC hold for the Celtic Interconnector at PR6. This includes the risk-free rate and Total Market Return (TMR). We discuss the relevance of the inflation adjustment later in the appendix when discussing a conversion of these parameters to nominal terms.

ASSET BETA

For the asset beta, we have considered factors that may influence the relative risk of the Celtic interconnector compared to the onshore TAO at PR6 and for cap and floor interconnectors (see Table C.1).

Table C.1: Relative risk assessment

	Celtic I/C	Onshore TAO (PR6)	Cap & Floor Interconnectors
Revenue risk	**Low** – Celtic has a fixed revenue entitlement (subject to post construction review) under its RAB x WACC framework	**Low** – fixed revenue entitlement subject to periodic price reviews	**Medium / high** – project subject to merchant risk within the cap and floor 'corridor'
Payment / bad debt risk	**Low** – Celtic's primary revenue source is from capacity sales (and CRM revenues), with true-up to allowed revenues via TUoS	**Low** – allowed revenues are recovered from network tariffs	**Low / medium** – primary source of revenue from capacity sales (and CRM revenues), with true-up at cap and floor via TUoS
Expenditure risks	**Medium** – Construction cost is subject to a post construction review and a target cost incentive Construction cost risk focused in a single project during construction, thereafter, low ongoing expenditure is required	**Medium/high** – Large investment programme to deliver in PR6 with timing and cost risks. The onshore TAO will be managing a portfolio of projects across the network	**Medium/high** – Construction cost subject to a post construction review Construction cost risk focused in a single project during construction, thereafter, low ongoing expenditure is required
Performance risks	**Medium** – Celtic has a timely delivery incentive and will have an availability incentive in operation	**Medium** – the onshore TAO is expected to be subject to a range of performance incentives and delivery obligations (DOs) in PR6, with the overall value at risk capped	**Medium / high** – availability incentive at the cap and the floor
Financing risks	**Medium** – proposal is to set a fixed cost of debt allowance, exposing the company to interest rate risk	**Medium** – the onshore TAO will be set a fixed cost of debt allowance, exposing the company to interest rate risk	**Medium -** fixed cost of capital allowances at the floor help reduce the risk of debt cost recovery but still expose the company to interest rate risk
Regulatory risks	**Medium/low** – costs will be reviewed at the post construction review and allowed revenues revisited at regular price review cycles, but ongoing regulatory risk (post the post construction review) should be limited	**Medium** – PR6 is expected to place a higher reliance on the regulatory framework to vary revenues to match required costs, alongside the usual 5-year price review cycles, although this builds on the established AIF mechanism in PR5	**Medium** – costs will be reviewed at the post construction review and then ongoing regulatory risk (post the post construction review) should be limited

Source: CEPA analysis

We find in Table C.1 that the risk profile is closest to the onshore electricity network, with many similar features. There are arguments why the Celtic Interconnector is less risky (e.g. less exposure to long-term market risk) and arguments why it is more risky (e.g. higher future operational gearing, investment intensity for a new single asset).

Overall, we consider that the Celtic Interconnector asset beta should be the same as for the onshore TAO – as set out in the main body of this report. We use the 67th percentile for establishing estimates of individual parameters.

Given that we have proposed that the economy wide parameters of the cost of equity (risk free rate and TMR) should also be consistent with the onshore price controls, this means that we propose the allowed cost of equity for the Celtic interconnector during PR6 should be aligned with the cost of equity allowed for the TAO during PR6.

COST OF DEBT AND GEARING

Celtic is a single interconnector asset with visible information on actual debt costs. In principle, therefore, there is an option for the Celtic regulatory framework to set a cost of debt allowance and gearing ratio when calculating its allowed rate of return using 'actual' debt costs and gearing information, rather than using a fully notional approach as is proposed for the onshore network price controls in PR6 (see main report).

C.6

A pure 'actual' approach would involve a pass-through of incurred debt costs for the quantum of debt taken out for the Celtic Interconnector project (i.e., using the actual level of gearing). This would have the benefit that it ensures EirGrid fully recovers its debt costs and would allow consumers to benefit should EirGrid be able to achieve effective interest charges that are below a notional cost of debt benchmark.

There are also several challenges and issues with this approach.

First, there is currently not perfect information to set an actual cost of debt allowance as we understand that debt is continuing to be drawn down on ahead of the project becoming operational. Second, an approach based on actual gearing and debt costs over the project life of the interconnector would move away from CRU's standard regulatory practice for RAB-based regulatory frameworks which is to set cost of capital allowances based on notional financing structures and costs. Third, if a full pass-through of debt costs was allowed, then in principle[84] this would weaken incentives on EirGrid to raise debt efficiently.

Another option would be to align Celtic's allowed cost of debt and gearing with the notional allowed rate for the onshore TAO in PR6, consistent with the proposed approach for the cost of equity. We do not consider this approach is justified as it increases scope for windfall gains and losses that an investor in Celtic would not be exposed to, given that the onshore network allowed cost of debt reflects both embedded and new costs of debt. We also consider such an approach is inconsistent with the intent set out by the CRU in developing its original revenue recovery framework for the Celtic interconnector (see above).

Our proposal is therefore that the CRU adopt an adapted notional approach for setting the cost of debt and gearing ratio for the Celtic interconnector.

For gearing, we propose a notional gearing assumption of 55%, consistent with the onshore network. We consider that over the life of the investment this reflects a suitable capital structure, with the ability to absorb risks through sufficient equity being present in the business.

For the cost of debt, we propose an approach that is based on a RAB-build up approach to issuing debt. Under this approach, we assume that the notional company raises debt at an interest rate that is consistent with profile of spend that is reflected in the RAB over its construction period. We then assume no refinancing takes place once the project is in its operation period and that 10yr+ debt is issued at a A/BBB credit rating.

The table below summarises how we have calculated a notional allowed cost of debt on this basis.

[84] Putting to one side that EirGrid has already put in place its financing arrangements for the interconnector.

Table C.2: Weighted average cost of debt approach

Time period – 6 months to …	Expected spend (€)	Nominal cost of debt (%)
Mar-23	2.6	3.97%
Sep-23	52.2	4.13%
Mar-24	86.9	3.91%
Sep-24	118.6	3.77%
Expected total future spend	1,326.7	3.99%
Total/ weighted average	**1,623.0**	**3.97%**

Source: CEPA analysis, EirGrid data from Supplementary Questions

The proposed cost of debt is very close to the current spot rate with nominal interest rates relatively stable over the period concerned and spot rates close to the weighted average of actual spend. We include issuance costs of 0.17%, consistent with the onshore network recommendations of 0.10-0.20% at the 67th percentile, i.e. the proposed allowance is 4.14% nominal.

We propose to update estimates ahead of the final decision, but consider that the allowance for debt costs might then remain fixed thereafter for the project.

Conversion to nominal terms

C.7. As discussed above, the Celtic interconnector will operate under a nominal returns framework which requires the CRU to determine a nominal rather than real allowed rate of return.

We have a real cost of equity that we, therefore, need to convert into a nominal equivalent. For the cost of debt, we directly estimate this in nominal terms, so do not need to apply any conversion.

For the real cost of equity for the onshore regime, that we mirror for the Celtic Interconnector, we have a real Eurozone cost of equity, with an inflation adjustment applied for potential structural differences between Eurozone (proxied by German evidence) and Irish inflation. We do not need to use the inflation adjustment for obtaining a nominal cost of equity – instead our conversion can focus on expected Eurozone (i.e. German) inflation.

C.8. Recent German 10yr breakeven inflation has been around 2.0%. This figure is equal to the ECB Survey of Professional Forecasters HICP inflation expectations in the Eurozone in the longer-term. The ECB also has a 2.0% inflation target. We therefore adopt a 2.0% inflation assumption for conversion purposes.

Conclusions

We present the proposed nominal cost of capital for the Celtic interconnector implied by this approach in the table below. Overall, this results in a nominal allowed pre-tax WACC of 5.92%.

Table C.3: Nominal cost of capital estimates for Celtic Interconnector

	Estimate
Benchmark CoD	3.97%
Issuance costs	0.17%
Nominal cost of debt	**4.14%**
Real risk-free rate	0.57%
Real Total Market Return (TMR)	6.67%
Equity Market Risk Premium	6.10%
Asset beta	0.34
Equity beta	0.75
Real cost of equity (post-tax)	5.13%
Tax	14.18%[85]
Real cost of equity (pre-tax)	5.98%
Assumed inflation	2.0%
Nominal cost of equity (pre-tax)	**8.10%**
Notional Gearing	55%
Nominal pre-tax WACC	**5.92%**

Source: CEPA calculations

[85] This assumption reflects the 67th percentile of a potential effective corporate tax rate of 12.5-15%. In finalizing our proposal for Final Determinations, we expect to confirm whether a single rate is more appropriate.

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