Consultation

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Further consultation on the cap rate for the cap and floor regime for Window 3 electricity interconnectors

Publication date:	12 July 2024
Response deadline:	19 August 2024 (Revised)
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We consulted on certain of the financial parameters of the cap and floor regime for electricity interconnectors in our third application window (**Window 3**) in September 2023 (the **September 2023 Consultation**). However, before reaching our decision on the parameters in the September 2023 Consultation we are consulting further on the detailed parameters for the cap rate of the regime.

We would like to receive views from people with an interest in this topic. We particularly welcome responses from developers and key counterparties of these projects. We would also welcome responses from other stakeholders and the public.

This document outlines the scope, purpose and questions of the consultation and how you can get involved. Once the consultation is closed, we will consider all responses. We want to be transparent in our consultations. We will publish the non-confidential responses we receive alongside a decision on next steps on our website at ofgem.gov.uk/consultations. If you want your response – in whole or in part – to be considered confidential, please tell us in your response and explain why. Please clearly mark the parts of your response that you consider to be confidential, and if possible, put the confidential material in separate appendices to your response.

Any enquiries related to the text of this publication should be sent to Ofgem at:

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This publication is available at www.ofgem.gov.uk. Any enquiries regarding the use and re-use of this information resource should be sent to: psi@nationalarchives.gsi.gov.uk

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Executive Summary

We consulted on certain financial parameters of the cap and floor regime for electricity interconnectors in our third application window (**Window 3**) in September 2023 (the **September 2023 Consultation**)[1]. However, before reaching our decision on those parameters in the September 2023 Consultation, we are now consulting further on the approach to setting financial parameters used to establish the cap level for licensees in the Window 3.

What we are consulting on

We are consulting further to develop our proposals based on our further analysis and the feedback received on the questions about the cap rate in the September 2023 Consultation. We present our analysis and propose a specific methodology for estimating the equity beta parameter in Window 3. We have also updated the proposed methodology for estimating Total Market Return (TMR) and addressed some issues regarding our proposed methodology for calculating the Risk-free Rate (RFR) parameter. These details are described in section 3. The questions in this consultation are as follows (see also at the start of section 3).

Questions

Q1. Do you agree with our methodology for calculating equity beta for Window 3 interconnectors? If not, could you please explain why, provide evidence for your reasons and suggest alternatives?

Q2. Do you agree with the comparators we are proposing to use to calculate the beta parameter? If not, could you please explain why, provide evidence for your reasons and suggest alternative methods?

Q3. Do you agree with the proposed approach for determining the Total Market Return parameter? If not, could you explain why, provide evidence for your reasons and suggest alternative methods?

Next steps

We will consider stakeholders' views in making our final decision on the regime parameters for Window 3 interconnectors. This decision will also address other parameters for which we sought feedback in the September 2023 Consultation.

[1] Ofgem (2023), Consultation on changes to the financial parameters of the cap and floor regime for window 3 electricity interconnectors and risk considerations for offshore hybrid assets

1. Introduction

The cap and floor regime for electricity interconnectors

1.1 The cap and floor regime is the regulated route for electricity interconnector development in Great Britain (**GB**). It is a market-based approach which aims to incentivise developers to deliver interconnector capacity by limiting developers' exposure to electricity market price risk. The regime sets a yearly maximum (**cap**) and minimum (**floor**) level for the revenues that the interconnector can earn over a 25-year period.[2] Revenues above the cap are passed back to network users, benefitting consumers, while revenues below the floor are topped-up by consumers.

1.2 Project-specific cap and floor levels are set based on a building-blocks approach. These building blocks consist of operating expenditure and decommissioning costs, depreciation of the Regulatory Asset Value (**RAV**), return on the RAV and tax. RAV is calculated based on the project's investment capital costs.

1.3 The allowed return at the cap is calculated by applying a rate of return set to reflect the cost of equity to 100% of the RAV. The allowed return at the floor is calculated by applying a rate of return set to reflect the cost of debt to 100% of the RAV.

1.4 The cap return rate used to determine allowed returns at the cap represents the cost of equity during operations, which is estimated using a Capital Asset Pricing Model (**CAPM**) approach.

1.5 This consultation follows the September 2023 Consultation[3] and focuses on the approach to setting financial parameters used to establish the cap level for licensees of projects in Window 3.

The Interconnector Policy Review (ICPR)

1.6 In August 2020, Ofgem launched a review of its regulatory policy and approach to new electricity interconnectors – our ICPR.[4]

[2] Ofgem (2021), Interconnector Cap and Floor Regime Handbook, page 6.
[3] Ofgem (2023), Consultation on changes to the financial parameters of the cap and floor regime for Window 3 electricity interconnectors and risk considerations for Offshore Hybrid Assets.
[4] Ofgem (2020), Open letter: Notification to interested stakeholders of our interconnector policy review

1.7 In the ICPR decision we concluded that future interconnector investment is likely to be beneficial, and that we would explore adjustments to the cap and floor regime. We found that the principles of the cap and floor remain appropriate to incentivise further interconnector development, however, we noted that we would review our approach to enable the regime to become simpler, more consistent, and more flexible.

1.8 The approaches we use to set parameters and to calculate return rates in the regime are designed to adhere to the following principles[5]:

- Reflect the risk-reward balance between consumers and developers;
- Incentivise investment by providing certainty and clarity to developers and investors;
- Incentivise developers to deliver high-quality projects on time and to maximise interconnector capacity availability for electricity flows; and
- Reflect the prevailing market conditions.

Implementation of the Interconnector Policy Review

1.9 Since January 2022, Ofgem has refined and implemented the decisions outlined in the ICPR decision. For the Window 3 interconnector applications, we have adjusted the regime's eligibility criteria and decided on adjusting the timelines and incentives mechanism.

1.10 In July 2022 (with updated text in October 2022), we set out the policy direction for the Cap and Floor Financial Models (**CFFMs**) and updates for input parameters in our Application Guidance for the Third Cap and Floor Window for Electricity Interconnectors.[6] Since then, we have further reviewed our approach to the determination of input parameters for the CFFM[7] such as inflation rate, taxes, interest during construction (**IDC**), and cap and floor levels.

[5] Ofgem (2021), Interconnector Policy Review: Decision Interconnector Policy Review: Decision (ofgem.gov.uk) Section 3.51

[6] Ofgem (2022), Application Guidance for the Third Cap and Floor Window for Electricity Interconnectors

[7] The Cap and Floor Financial Models (CFFMs) are Microsoft excel based models that Ofgem uses to transform cost and other inputs into the cap and floor levels. There are two CFFMs, model 1 (CFFM1) and model 2 (CFFM2). The earlier is updated for each project at the FPA and PCR stages, whilst the latter is used for our assessment of revenues and any allowed adjustments to cap and floor levels during the operational period.

1.11 In the September 2023 Consultation we consulted on the following regime financial parameters and considerations for Window 3 interconnectors:

- Inflation index
- Floor rate
- Cap rate
- Equity transaction cost.

1.12 Our September 2023 Consultation flagged that we intend to align where appropriate our methodology for setting financial parameters for Window 3 across the cap and floor regime, other regulatory regimes applied by Ofgem, and regimes applied by other utility regulators in GB where appropriate. We also flagged that we would incorporate the relevant UK Regulators Network (**UKRN**) Guidance[8] recommendations with regards to estimating the cost of capital into our methodology.

1.13 This further consultation follows the September 2023 Consultation. After this consultation closes, we will evaluate the feedback from both this and the September 2023 Consultation, and subsequently publish our decision on all the topics covered in both consultations.

1.14 In November 2023 we published our decision on timelines and incentives[9] for Window 3 interconnectors. On 1 March 2024 we published our minded-to consultation[10] on the Initial Project Assessment of the Window 3 interconnector projects.

1.15 This consultation applies to Window 3 interconnectors and potentially also future point-to-point interconnectors. The regime parameters for the projects in the Offshore Hybrid Asset Pilot Scheme are being treated separately.

Context and related publications

Open letter: Notification to interested stakeholders of our interconnector policy review

Interconnector policy review: Working paper for Workstream 1 – review of the cap and floor regime | Ofgem

[8] UKRN (2023), UKRN guidance for regulators on the methodology for setting the cost of capital.
[9] Ofgem (2023), Decision on Timelines and Incentives changes for the Third Cap and Floor Window for Interconnectors
[10] Ofgem (2024), Initial Project Assessment of the third cap and floor window for electricity interconnectors

Interconnector Policy Review - Decision | Ofgem

Application Guidance for the Third Cap and Floor Window for Electricity Interconnectors | Ofgem

Consultation on changes to the financial parameters of the cap and floor regime for window 3 electricity interconnectors and risk considerations for offshore hybrid assets | Ofgem

Consultation stages

Table 1: Consultation stages

Stage 1	Stage 2	Stage 3	Stage 4
Consultation open	Consultation closes (awaiting decision). Deadline for responses	Responses reviewed and published	Consultation decision/policy statement
12/07/2024	09/08/2024	September/October 2024	October/November 2024

How to respond

1.16 We want to hear from anyone interested in this consultation. Please send your response to the person or team named on this document's front page.

1.17 We've asked for your feedback in each of the questions throughout. Please respond to each one as fully as you can.

1.18 We will publish non-confidential responses on our website at www.ofgem.gov.uk/consultations.

Your response, data and confidentiality

1.19 You can ask us to keep your response, or parts of your response, confidential. We'll respect this, subject to obligations to disclose information, for example, under the Freedom of Information Act 2000, the Environmental Information Regulations 2004, statutory directions, court orders, government regulations or where you give us explicit permission to disclose. If you do want us to keep your response confidential, please clearly mark this on your response and explain why.

1.20 If you wish us to keep part of your response confidential, please clearly mark those parts of your response that you do wish to be kept confidential and those that you do not wish to be kept confidential. Please put the confidential material in a separate appendix to your response. If necessary, we'll get in touch with you

to discuss which parts of the information in your response should be kept confidential, and which can be published. We might ask for reasons why.

1.21 If the information you give in your response contains personal data under the General Data Protection Regulation (Regulation (EU) 2016/679) as retained in domestic law following the UK's withdrawal from the European Union, the Gas and Electricity Markets Authority will be the data controller for the purposes of GDPR. Ofgem uses the information in responses in performing its statutory functions and in accordance with section 105 of the Utilities Act 2000. Please refer to our Privacy Notice on consultations, see Appendix 4.

1.22 If you wish to respond confidentially, we'll keep your response itself confidential, but we will publish the number (but not the names) of confidential responses we receive. We won't link responses to respondents if we publish a summary of responses, and we will evaluate each response on its own merits without undermining your right to confidentiality.

General feedback

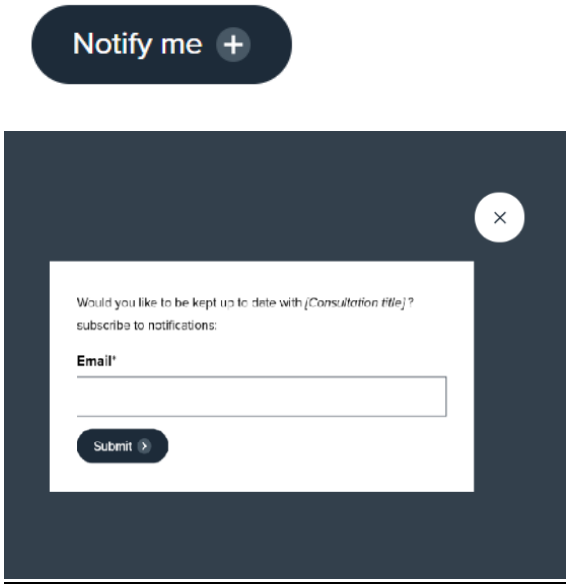
1.23 We believe that consultation is at the heart of good policy development. We welcome any comments about how we've run this consultation. We'd also like to get your answers to these questions:

1. Do you have any comments about the overall process of this consultation?
2. Do you have any comments about its tone and content?
3. Was it easy to read and understand? Or could it have been better written?
4. Were its conclusions balanced?
5. Did it make reasoned recommendations for improvement?
6. Any further comments?

Please send any general feedback comments to stakeholders@ofgem.gov.uk

How to track the progress of the consultation

You can track the progress of a consultation from upcoming to decision status using the 'notify me' function on a consultation page when published on our website.
Ofgem.gov.uk/consultations



Once subscribed to the notifications for a particular consultation, you will receive an email to notify you when it has changed status. Our consultation stages are:

Upcoming > **Open** > **Closed** (awaiting decision) > **Closed** (with decision)

2. Feedback from the September 2023 Consultation and Ofgem's response to feedback

Feedback sought in the September 2023 Consultation regarding the regime parameters for the cap rate

2.1 In the September 2023 Consultation we sought feedback on the following matters about the cap rate (see the start of section 1 of that consultation):

- The notional equity beta of 1.25 can be traced back to our NEMO (now Nemo Link) decision[11] in December 2014: paragraphs 5.15 and 5.16 together imply a debt beta of zero and unlevered/asset beta of 0.625, given the gearing assumption of 50%. By contrast, RIIO-2 final determinations[12] for electricity transmission networks use a debt beta of 0.075;
- Drax's risk profile, and related beta estimates, may rise and fall over time, in particular given changes over time in generation type and subsidy landscape;
- New evidence may emerge that helps us to better estimate the risk of an electricity interconnector;
- A notional equity beta of 1.25 is very sensitive to our gearing assumption of 50%: a lower gearing value would suggest a lower notional equity beta;
- The equity beta of 1.25 has been applied to 100% of the RAV [13], which suggests 0% gearing rather than 50% gearing; and
- Cambridge Economic Policy Associates (**CEPA**)[14] estimated a cap equity beta of 1.07.

2.2 In relation to the above aspects of the cap rate, in the September 2023 Consultation we asked the following questions to seek feedback (Question 5 also covered broader matters but certain respondents included comments about the cap rate in their responses to it):

[11] Ofgem (2014), Decision on the Cap and Floor Regime for the GB-Belgium Interconnector Project Nemo page 39
[12] Ofgem (2021), RIIO-2 Final Determinations - Finance Annex (REVISED) page 40
[13] This approach has been intentionally adopted in Windows 1 and 2. See Ofgem (2014), Decision on the Cap and Floor Regime for the GB-Belgium Interconnector Project Nemo section 5.9 and Ofgem (2018), Cap and Floor Regime Summary for the Second Window Annex 1, Table 2(f) Approach to returns
[14] CEPA, (2013), Financeability Study on the Development of a Regulatory Regime for Interconnector Investment based on a Cap and Floor Approach

- Q4: Do you agree with the issues raised and the proposed changes to the cost of equity? If not, could you please explain why and provide evidence for your reasons as well as provide alternatives?
- Q5: Do you agree with our analysis on impacts related to the risk-reward balance?

Summary of responses to the September 2023 Consultation relevant to the cap rate

2.3 We received seven responses to Q4 (or relevant to its content) and two responses (with content relevant to the cap rate) to Q5 of the September 2023 Consultation. We provide examples of the key points from these responses below. In general, the respondents were concerned that:

- Alignment of the Window 3 cap and floor regime with the RIIO-2 networks regime in the manner proposed in the September 2023 Consultation was not appropriate. This was primarily due to changes in market conditions since the relevant RIIO-2 parameters, i.e. RFR and TMR, were set. These changes potentially make these parameters unsuitable for determining the cap rate for the Windows 3 interconnectors;
- There was no new proposal for calculating beta, nor was there adequate justification for changing the beta from 1.25. This level, derived from Drax Power plc as the sole comparator, was used in the previous Windows 1 and 2; and
- A reduction in the potential equity returns at the cap level would reduce the incentive for developers to proceed with Window 3, and other future, interconnector projects. This reduction, it was claimed, makes it less likely that UK Government targets for interconnector capacity will be met.

No new beta analysis or suggestions for relevant comparator companies were put forward in the consultation responses.

2.4 Examples of the responses to ***Question 4: Do you agree with the issues raised and the proposed changes to the cost of equity? If not, could you please explain why and provide evidence for your reasons as well as provide alternatives?*** and also comments in covering letters relevant to Question 4 are provided below.

2.5 A financial investor sought to have a principle of a lower cost of capital apply to sponsors who finance projects on balance sheet than for sponsors that finance

projects on a standalone/project financed basis. This was because, they contended, the new build assets of developers using balance sheet financing benefitted from credit enhancement from the existing asset base.

2.6 They considered that the RIIO-2 cost of capital applies mainly to operational assets and that it underprices construction risk and so it was inappropriate to use RIIO-2 for project financed projects. They also noted that RIIO-2 pricing was set in spring 2021, towards the end of a 13-year period during which interest rates were near zero and that therefore it was inappropriate to use the RIIO-2 regime.

2.7 Regarding the TMR and RFR they considered that there would be an increase in the uncertainty of these values if RFR shifted from a fixed value of 1.60% to a variable benchmark based on index-linked gilts and considered that the long period of averaging (since 1900) in the existing methodology of setting TMR contributed to stability in its value. They agreed with what they described as "*CEPA's proposal of leaving the equity beta at 1.25*" for the cap rate.

2.8 Another developer said that they were concerned that the cumulative effect of the changes proposed may, intentionally or not, be to reduce the project returns at the cap below levels that will provide sufficient risk mitigation at the floor to lenders or attractive returns at the cap to equity. They continued to state that if so "*this will almost certainly result in insufficient projects being advanced to meet the government's target of at least 18GW of interconnector capacity by 2030 …*". They suggested that Ofgem needs to make credible estimates of the overall equity and debt returns to projects it expects to result from the cumulative effect of its proposals and then assess those against market expectations with developers and lenders.

2.9 A different developer noted the 2013 and 2018 CEPA reports and said that new information would be needed to propose a move away from the value of 1.25 for beta for the cap rate. They commented on the matter of applying the cap rate to 100% of the RAV for the cap that "*as noted in the CEPA report, the calculation of the cap return is calculated 'as though' it was equity financed, not assuming it is solely equity financed. CEPA assumes that the appropriate (levered) estimated return on equity is applied to the whole project to form an appropriate incentive cap.*"

2.10 This developer supported the proposed change to setting RFR based on index-linked gilts near financial close rather than using the fixed value as before.

2.11 They also advocated for TMR to be set close to financial close rather than taking the RIIO-2 point in time estimate. They commented that "*the selection of revenues at the cap and floor form an incentive and should not be confused with setting the appropriate cost of capital (for equity and debt) for the interconnector business.*" They considered that Drax probably remained the best available comparator for beta although they acknowledged that it may now be a less "clean" comparator.

2.12 A developer that has used a balance sheet approach for interconnector projects commented that the proposal to align the TMR with a range estimated for the RIIO-2 price controls that was decided more than 3 years ago was of particular concern. They added that "*It is worth noting that this range remains disputed following the CMA PR19 Water Re-determination ruling. Also, based on recent movements in interest rates in combination with other recent market evidence, … the TMR needs to be increased….*" They stated that a TMR of 5.47% (in RPI-real terms) of those RIIO-2 price controls is c. 173 basis points lower than the TMR levels for application Window 1 and Window 2 interconnectors which were c. 7.2% (in real RPI terms). This respondent also queried the sole use of index-linked gilts in the measure of RFR rather than any other proxies for a riskless asset.

2.13 Regarding asset beta, they considered that there was insufficient evidence to merit a lowering of the equity beta estimate for Window 3 and referred back to the CEPA reports of 2018 and 2013. They considered that the debt beta set on RIIO-2 mentioned in the consultation is not relevant for setting the beta for Window 3. They added that the financing of single assets is markedly different to the financing of a portfolio of assets, as is the case for network businesses, "*which provide an element of coinsurance*".

2.14 A transmission sector corporate with interests both in networks under RIIO regulation and interconnectors commented that the use of index-linked gilts in estimating the RFR would produce too low an estimate due to the convenience premium in the prices of these instruments in comparison with other virtually risk-free instruments. They also suggested that a forward curve adjustment, based on the average shape of the forward curve over the relevant 20-day period, should also be added to the average spot rate of index-linked gilt yields.

2.15 Regarding the TMR, they considered that the RIIO-2 TMR range from 6.25% to 6.75% (with amid-point of 6.50%) on a CPIH-real basis is not an appropriate range or value to use for new calculations of interconnector cap rates for Window

3 projects. They stated that both the range and the mid-point should be higher, because we are no longer in a period of low returns as was the case when setting the range for RIIO-2. They also noted the availability from the Office of National Statistics of a new CPIH (and CPI) modelled back-series covering the years 1950 to 1988 and the effect that this would have, if used, in increasing the estimate of TMR.

2.16 Another transmission developer was not supportive of the proposed change to align with the RIIO-2 price controls. They stated that RIIO-2 focuses on the regulation of a portfolio of mature, onshore assets located in the United Kingdom, held by a few large well-capitalised organisations. They commented that interconnectors operate in an environment with significantly different risk characteristics. Regarding beta, they pointed back to CEPA's reports of 2018 and 2013 and cited CEPA's conclusion in 2018 that "*We are therefore inclined to take the evidence from 2010-14, which Ofgem used to set an equity beta of 1.25 at 50% gearing, as the best available evidence, and do not propose a change to the equity beta parameter.*" They also highlighted areas they considered to be of higher risk for interconnectors than found in transmission and distribution network businesses, including risks to maintain or repair HVDC cables offshore, operating in two or more jurisdictions, and ownership in "most" cases by single asset companies rather than benefiting from being part of a broad diverse group of comparable assets.

2.17 Examples of the responses to **Question 5: *Do you agree with our analysis on impacts related to the risk-reward balance?*** relevant to the cap rate are provided below.

2.18 A financial investor agreed that setting the RfR at each project's financial close will better reflect market conditions at that time. However, their view was that the proposed changes at the cap increase uncertainty which runs counter to the desire of their investor and that the inherent differences between the RIIO regime and the cap and floor regime mean that it is inappropriate to try to align the cost of debt and equity of these two regimes. It should be noted that in the September 2023 Consultation we stated that we would align our approach to the cap and floor and other regimes "where appropriate" and were not proposing a full alignment.

2.19 A developer that has used a balance sheet approach for interconnector projects commented that the proposed changes reduce the capped returns without evidence to any changes and/or reduction to the risk profile or allocation, hence

the proposals are not in line with the cost and revenue alignment principle. They also commented that there was lack of clarity of how precisely the RFR will be expressed in CPIH terms and that because for interconnectors this value is set only once for the 25-year period rather than resetting every five years as for networks this adds further uncertainty for investors at this stage of the Window 3 process.

Ofgem's response to the consultation feedback

2.20 We have considered the above feedback in the responses to the September 2023 Consultation on regime parameters for the cap rate. Based on the feedback received and our further analysis, we have developed the proposals set out in section 3 to address the concerns of respondents about:

- how a suitable degree of alignment of certain regime parameters calculation for Window 3 with relevant aspects of RIIO network regulation can be achieved;
- the absence of a specific proposal for how beta for the cap rate should be calculated for Window 3 and its potential level and effect on the level of the cap; and
- the adequacy of potential returns to equity at the cap rate under our proposals.

3. Proposed approach for setting rate of return at the cap for Window 3 projects

Questions

Q1. Do you agree with our methodology for calculating equity beta for Window 3 interconnector projects? If not, could you please explain why, provide evidence for your reasons and suggest alternatives?

Q2. Do you agree with the comparators we are proposing to use to calculate the beta parameter? If not, could you please explain why, provide evidence for your reasons and suggest alternative methods?

Q3. Do you agree with the proposed approach for determining the Total Market Return parameter? If not, could you explain why, provide evidence for your reasons and suggest alternative methods?

Background

3.1 In the September 2023 Consultation we proposed a methodology for setting allowed return parameters for the Window 3 projects. As a part of that consultation, we asked stakeholders for their views on the financial parameters used to calculate cost of equity. In particular, we asked for views and evidence regarding the beta parameter used to estimate allowed rate of return at the cap.

3.2 In this document we present our analysis and propose a specific methodology for estimating the equity beta parameter for projects in Window 3. We have also updated the proposed methodology for estimating TMR and address some issues regarding our proposed methodology for calculating the RFR parameter.

3.3 In March 2023, the UKRN published guidance[15] for regulators on the methodology for setting the cost of capital (the **UKRN Guidance**) driven by an aim to create greater consistency and predictability. The UKRN Guidance makes nine recommendations for application in future cost of capital decisions.

3.4 The recommendations within the UKRN Guidance are closely aligned with the approach taken by Ofgem in price controls such as RIIO-2. For improved regulatory consistency, we consider it appropriate to incorporate best practice from the UKRN Guidance when estimating the cost of equity for Window 3.

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

3.5 The calculation method proposed in this document represents a change to the methodology used in the regime design for the Window 2 interconnector projects. Any changes to the regime design that are decided upon will be reflected in the CFFM at the relevant cap and floor project assessment stages.

3.6 The changes we are proposing in this document will be applicable for successful projects in Window 3 and potentially also to future windows. They will not be retrospectively applied to projects that were approved through earlier application windows. These proposed changes supersede and replace those described in sections 1.41-1.51 of the September 2023 Consultation.

Proposed approach for Window 3

Primary cost of equity estimation methodology

3.7 Recommendation 5 of the UKRN Guidance suggests that regulators should continue to use the CAPM as their primary approach for estimating the cost of equity.

3.8 The CAPM has three inputs, all of which need to be estimated to calculate the estimated cost of equity for interconnectors and set an appropriate allowed return at the cap for these projects:

- the Equity Beta (β)
- the RFR
- the TMR.

3.9 These inputs are combined in the following way to estimate the cost of equity:

$$COE = RFR + \beta * (TMR - RFR)$$

3.10 We discuss our anticipated approach to calculating these metrics below, focusing on the detailed approach to estimating beta.

Estimating Beta (β)

3.11 The CAPM that we use to estimate the cost of equity assumes that risks that are specific to an investment (or set of investments) can be diversified away - meaning that investors do not require compensation for exposure to these 'specific' or 'non-systematic' risks. The risk exposure that remains is unavoidable or 'systematic' and cannot be diversified away and so investors require compensation for exposure to this risk. The most commonly referenced systematic risk is exposure to the general performance of the economy.

3.12 Beta is the measure of an asset's exposure to undiversifiable systematic risk, relative to the average exposure of assets in the market. The average exposure to systematic risk is defined as a beta of 1. Regulators typically use the covariance of price movement of listed companies' shares and the average price movement of relevant equities indices to estimate beta (either directly for listed companies or indirectly where listed companies are used as proxies for unlisted companies).

Asset Beta (βa)

3.13 The relative systematic risk faced by investors in an asset is called the asset beta. In practical terms, investors typically invest in debt and equity securities which can call on the returns earned by a firm's assets (rather than investing directly into the assets themselves). As a result, the asset beta (βa) can be split into equity beta (βe), the exposure of shareholders to systematic risk, and debt beta (βd), the exposure of debt investors to systematic risk. To calculate the asset beta, we weight the debt beta by the proportion of debt (g) or 'gearing' in the capital structure and the equity by the proportion of equity (1-g) in the capital structure, as shown below.

$$\beta_a = (g.\beta_d) + (1-g).\beta_e$$

Equity Beta

3.14 We can rearrange the asset beta formula to solve for equity beta.

$$\beta_e = (\beta_a - (\,g.\beta_d))/(1-g)$$

3.15 As shown by this reformulation, and supported by financial theory, adding debt to the capital structure of an asset increases equity holders' exposure to systematic risks. Combining asset beta and the impact of gearing gives us the equity beta, a measure of the exposure of shareholders in a firm to systematic risk. Equity beta is the input required within the CAPM. Equity betas are typically the most straightforward to observe, while asset beta is generally inferred from equity beta by adjusting for gearing and making an assumption about debt beta (discussed further below at paragraphs 3.19 and 3.20).

3.16 Regulators typically measure 'raw' equity betas from market data of comparator companies that either individually or collectively are assumed to have a similar underlying exposure to systematic risk (i.e., a similar asset beta). In line with common regulatory practice, this raw equity beta data is then 'de-geared' (based on net debt to enterprise value) to strip out the impact of the level of debt within the capital structure of each firm (assuming a debt beta of zero) to find an

unlevered asset beta. This unlevered asset beta is then combined with an assumption around debt beta to allow regulators to compare the asset betas of relevant comparators.

3.17 This asset beta is then 're-geared' to assumed levels of debt in line with the notional capital structure used in the price control (based on the regulatory gearing definition). This gives us the equity beta at the notional capital structure that is a required input of the CAPM when estimating the cost of equity.

3.18 Recommendation 5 of the UKRN Guidance suggests that regulators should estimate equity beta for the notionally capitalised company using comparable listed companies and standard regression techniques (i.e., ordinary least squares (**OLS**)). The UKRN Guidance also notes that where the listed comparator has different gearing to the notional company, regulators should continue to de-lever and re-lever the raw equity beta.

Debt beta

3.19 Debt beta is a measure of the exposure of debt holders in a firm to systematic risk. Debt beta is generally more difficult to measure than equity beta. Debt securities do not tend to trade in the same liquid fashion as listed equities and so the quality of bond return data is likely to make accurate debt beta analysis difficult.

3.20 Regulators, economic advisors and financial market participants have used a range of direct and indirect ways to estimate debt beta. Recent precedent indicates that regulators have generally incorporated a relatively small debt beta figure in their cost of equity analysis. Since 2019, debt beta assumptions in regulatory price controls have ranged from 0.05 to 0.125.[16]

Approach to estimating equity beta for Nemo Link, and Windows 1 and 2

3.21 At the time of our assessment for Nemo Link in 2013, there were no directly listed interconnector companies to measure an appropriate beta. CEPA's view at that time was that the risks faced at the cap are akin to those faced by a peaking power plant generator. While we shared this view, we considered that an electricity generator would be more appropriate comparator to estimate the level of systematic risks faced by interconnector projects. Our assessment was that a generator company comparator reflected developers exposed to revenue risk,

[16] UKRN (2023), UKRN 2023 Cost of Capital - Annual Update Report, Tables 2 and 3

offset by the floor reducing cost risk and providing some revenue risk protection.[17]

3.22 We decided to use Drax Group plc as the sole basis of our estimate. Drax is the only UK-listed company that is solely focused (a 'pure play') on generation activities. In 2013 CEPA estimated a Drax asset beta of 0.64 after considering two-year daily returns rolling raw beta (versus the FTSE 100 share index) and taking account of the net cash position at Drax over much of the estimation period. CEPA assumed 40% notional gearing and suggested a cap equity beta of 1.07. Later, for Window 1, Ofgem's 2014 decision stated an equity beta at 1.25 after regearing Drax's asset beta to 50%. Ofgem assumed debt beta to be zero.

3.23 In 2018, Ofgem commissioned CEPA to provide support in reviewing the component parts of the cost of capital estimates used when setting allowed returns, including in relation to interconnectors. The report considered whether Ofgem's approach to estimating rate of return used to calculate the cap was still appropriate. In its report, CEPA recommended investigating whether an equity beta of 1.25 remained a reasonable reflection of rates of return for electricity generators or similar asset classes.[18]

3.24 To achieve an appropriate risk-reward balance between consumers and developers, incentivise investment, and reflect the prevailing market conditions it is important that we set allowed returns that reflect the balance of evidence. We are taking this opportunity to reassess our beta comparator approach and update our estimate of the beta for Window 3.

[17] Ofgem (2013), Cap and Floor Regime for Regulated Electricity Interconnector Investment for application to project NEMO, pages 30-31
[18] CEPA (2018), Review of Cost of Capital Ranges for New Assets for Ofgem's Networks Division

Consultation position and rationale

Table 2: Consultation position on unlevered beta and notional equity beta

Allowance parameter	Consultation position
Unlevered beta and notional equity beta	Unlevered beta based on group of comparators to which equal weightings are applied based on daily observations over a 5-year estimation window. Notional equity beta based on 50% gearing assumption. Debt beta of 0.075 to be included in the methodology. See section 3.26 for timing of setting of beta parameters.

3.25 We note the UKRN Guidance recommendation in relation to estimating betas and that the recommendations directly overlap with the approach used to estimate beta in our energy network price controls.[19] We propose to base our beta analysis on OLS regressions of relevant listed comparators, de-gearing data to make asset beta comparisons before re-gearing to the notional capital structure to estimate an appropriate equity beta input for the cap return for interconnectors calculated based on CAPM.

3.26 We propose to set an appropriate beta parameter at the time of publication of the decision on regime parameters for Window 3 and apply this for all Window 3 projects reaching Final Investment Decision (**FID**)/Financial Close (**FC**) within a specified number of years.

Listed Comparators

3.27 In the light of developments in the electricity sector as GB progresses towards Net Zero, we believe that having a broader range of listed company comparators is likely to result in a more accurate estimate of the beta applicable to the Window 3.

3.28 We continue consider the risks for a cap and floor interconnector operating up to and at the cap to be broadly similar to those faced by a generator. Both are capital intensive and face competition and hence significant demand risk exposure for their capital bases. However, we also recognise that the floor provides some downside protection for cap and floor interconnector revenues.

[19] Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation – Finance Annex

3.29 We have proposed a set of listed comparators in the electricity sector which are capital intensive and which either (i) include significant levels of demand risk, or (ii) have existing interconnector businesses with risk profiles similar to the Ofgem cap and floor. In practice, this means a set of companies with substantial generation businesses in GB and National Grid plc which has a substantial cap and floor interconnector business. We consider the capital intensity and demand risk to be significant relevant features for the comparator businesses which affect their capital structures.

3.30 We believe that by applying this approach we can better capture the risks that Window 3 interconnector(s) face at the cap than by relying solely on one comparator company.

3.31 The listed comparator companies we consider to be relevant for the estimation of beta for the Window 3 interconnector(s) are Drax Power (DRX LN), SSE (SSE LN), RWE (RWE GR), Iberdrola (IBE SM), Orsted (Orsted DC) and National Grid (NG/ LN).

3.32 While Drax Power is in our view still a relevant comparator, its business operations have changed significantly from what we observed in 2014 when the Decision on the cap and floor regime for the GB-Belgium Nemo interconnector project was published.[20] Drax Power, at the time a peaking power plant, has transitioned as a business from coal to biomass fuel and its strategy is to be a UK leader in dispatchable, renewable generation. These changes have contributed to our view that the analysis of the beta for Window 3 interconnector(s) would benefit from a wider range of comparators.

3.33 We consider SSE a relevant comparator because in addition to a significant renewable energy portfolio, it also operates conventional generation assets including gas-fired power plants and owns a regulated transmission network business.

3.34 We consider RWE a relevant comparator as it is the largest power producer with a total installed capacity of around 7.3GW in the UK, and a leading renewable generator supplying around 15% of UK electricity with diverse operational portfolio of onshore wind, offshore wind, hydro, biomass and gas. We consider Iberdrola a relevant comparator. In 2023, renewables accounted for the highest

[20] Ofgem (2014), Decision on the cap and floor regime for the GB-Belgium interconnector project Nemo

share in Iberdrola's net electricity generation, with wind representing around 30 percent of the share.

3.35 We consider Orsted a relevant comparator because of the scale of its GB offshore wind power generation business, with 5.6GW of total offshore wind capacity.

3.36 We also propose to use National Grid as one of our comparators. Whilst National Grid beta may be an imperfect proxy for a pure-play GB electricity interconnectors, given its US operations and exposure to networks, National Grid is heavily involved in interconnector development through the National Grid Ventures (**NGV**) division which manages six operational interconnectors, four of which fall under a cap and floor regime (IFA2, NSL, Viking Link and Nemo Link). With NGV representing a significant portion of NG's business we consider it a relevant comparator. NGV accounted for approximately 11% of underlying operating profit and 19% of statutory operating profit in 2022/2023.[21]

3.37 We considered a range of other potential comparators from listed energy companies. We have not included Centrica in the set because it includes a significant upstream gas business which we consider has a significantly different and higher risk profile than an interconnector business, and we have not included E.ON because it has disposed of most of its GB generation interests.

Estimation window and data frequency

3.38 According to the UKRN Guidance, estimation window length should be sufficient to balance the dual objectives of minimising unrepresentative noise from small samples of data and recent data relevant to a forecast.

3.39 We propose to base our methodology for estimating beta for interconnectors on simple average of daily returns data based on 5-year estimation window. We note that there are potential trade-offs when setting an estimation window. Shorter windows may be most reflective of current risk perceptions but provide limited data to analyse and may not be reflective of betas through different market cycles. Longer term betas may provide a better reflection of a 'through cycle' risk exposure, but potentially suffer from deteriorating accuracy in sectors where business models and exposures can change significantly over time. On balance, we consider a 5-year estimation window will provide a sufficiently accurate assessment of beta for the coming window.

[21] National Grid (2023), Bring energy to life. Annual Report and Accounts 2022/23, page 5

Debt beta

3.40 Debt betas are required to convert the unlevered equity beta to an asset beta, which is the measure of business risk with the effect of financial gearing removed.

3.41 In its redetermination of the PR19 price controls, the CMA suggested an appropriate range for debt beta of 0.0 to 0.15. We took this evidence into account when we decided to use a debt beta value of 0.075 at RIIO-2 Final Determinations.[22] We found the midpoint of the range appropriate given wide range of possible values from different approaches.

3.42 To appropriately align the regime with wider best practice, we propose to introduce a debt beta of 0.075 into the methodology for estimating beta for interconnectors.

Gearing

3.43 Consistent with the other parameters of the cost of capital, we set the gearing level within the notional capital structure using a range of evidence such as company risk profile, financial resilience, trends in actual gearing, external benchmarks and relationship with the allowed return. As a result, the gearing level used in the notional capital structure will not necessarily be equal to the actual gearing of the regulated company (or companies). This approach protects customers from exposure to the risk of companies' actual financing decisions. While companies are free to deviate from the gearing level in the notional capital structure, they do so at their own risk.

3.44 The floor level of return in the cap and floor financial regime helps to ensure that companies can service efficient debt costs. If this were the only factor to be considered, the gearing level in the notional capital structure would be most likely higher than 50%, as the risks at the floor are similar to a transmission company (notional gearing was at a level of 55% for National Grid Electricity Transmission Plc in RIIO-2 price controls).[23]

3.45 The floor payment is only guaranteed every 5 years in the default cap and floor regime, rather than every year with an onshore price control, so a larger equity buffer or higher cost of debt is required to cover this cost of carry.[24] However, a

[22] Ofgem (2021), RIIO-2 Final Determinations – Finance Annex (REVISED), page 41
[23] Ofgem (2021), RIIO-2 Final Determinations – Finance Annex (REVISED), page 141
[24] Ofgem (2013), Cap and Floor Regime for Regulated Electricity Interconnector Investment for application to project NEMO, page 33

regime variation can provide assessments of the cap and floor every year, as has been provided for the NeuConnect and Greenlink interconnector projects in connection with their limited recourse project financing arrangements.

3.46 We continue to consider a 50% notional gearing to be appropriate, and we propose maintaining our current level of notional gearing.

Illustrative example

3.47 In the table below, we present an illustrative example of calculated betas using the comparators and methodologies described above. This illustrative example is based on a reference date of 15 May 2024.

3.48 In our analysis we included six comparators: Drax Power (DRX LN), SSE (SSE LN), RWE (RWE GR), Iberdrola (IBE SM), Orsted (Orsted DC) and National Grid (NG/ LN). We gave each comparator equal weighting.

3.49 Our analysis uses FTSE All-Share index data for the UK comparators: Drax, SSE and National Grid and on STOXX Europe 600 index data for RWE, Iberdrola and Orsted.

3.50 Raw equity betas for each comparator are 'de-geared' (based on the average net debt to enterprise value over 5-year period) to strip out the impact of the level of debt within the capital structure of each firm (assuming a zero-debt beta) to find an unlevered asset beta.

3.51 This unlevered asset beta for each comparator is combined with our 0.075 debt beta assumption to allow us to compare the asset betas of relevant comparators.

3.52 By calculating the asset betas for relevant comparators and 're-gearing' to assumed levels of debt in line with the notional capital structure, we are able to calculate the equity beta for each comparator at a 50% notional level of gearing.

3.53 We apply equal weighting to each comparator to calculate the appropriate equity beta for interconnectors, the parameter which is the required input to the CAPM when estimating cost of equity for Window 3 projects. The table overleaf shows an example calculation of the beta using this methodology based on recent market data.

Table 3: Beta calculation illustrative example

Component	DRX LN	SSE LN	RWE GR	IBE SM	Orsted DC	NG/LN	Ref	Equation
Spot raw beta	0.893	0.961	0.851	0.752	0.718	0.598	A	
Observed gearing over period	37.96%	33.35%	20.68%	36.39%	8.66%	50.04%	B	
Unlevered beta	0.554	0.641	0.675	0.478	0.656	0.299	C	=A*(1-B)
Debt beta	0.075	0.075	0.075	0.075	0.075	0.075	D	
Asset beta	0.582	0.666	0.690	0.506	0.662	0.336	E	=C+(B*D)
Notional gearing	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	F	
Notional equity beta	1.090	1.256	1.305	0.936	1.250	0.598	G	=(E–(D*F))/(1-F)

Source: Bloomberg, companies' financial statements, Ofgem's analysis

3.54 The weighted average, with equal weights, of the notional equity betas in the table above is 1.07.

Estimating Risk-free Rate (RFR)

3.55 The RFR is, in theory, the rate of return required to invest at zero risk. In practice, no investment is truly risk-free, so this hypothetical risk-free rate of return must be estimated.

3.56 In our September 2023 Consultation we proposed using 20-day simple trailing average of the 20-year index-linked gilts, expressed in CPIH-real terms.

3.57 As the RFR is a market-wide rather than asset specific parameter, we propose that the methodology of selecting the instruments used to estimating RFR as well as converting rates to CPIH-real terms are aligned with the methodology following Ofgem's latest thinking in our latest public position regarding RIIO price controls for gas and electricity transmission networks as updated from time to time. The RFR rates will be calculated at FID or FC, as appropriate.

Estimating Total Market Return (TMR)

3.58 The TMR is an estimate of the return that investors expect for taking the market average level of risk. The TMR is an estimate and cannot be definitively calculated in advance.

3.59 As the TMR is a market-wide rather than asset specific parameter, we propose that the TMR range is aligned with the range estimated using the Ofgem's latest thinking regarding RIIO price controls for gas and electricity transmission networks as updated from time to time. This TMR range will be taken and used at FID or FC, as appropriate.

Appendices

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Appendix 1 – Privacy notice on consultations

Personal data

The following explains your rights and gives you the information you are entitled to under the General Data Protection Regulation (GDPR).

Note that this section only refers to your personal data (your name address and anything that could be used to identify you personally) not the content of your response to the consultation.

1. The identity of the controller and contact details of our Data Protection Officer

The Gas and Electricity Markets Authority is the controller, (for ease of reference, "Ofgem"). The Data Protection Officer can be contacted at dpo@ofgem.gov.uk

2. Why we are collecting your personal data

Your personal data is being collected as an essential part of the consultation process, so that we can contact you regarding your response and for statistical purposes. We may also use it to contact you about related matters.

3. Our legal basis for processing your personal data

As a public authority, the GDPR makes provision for Ofgem to process personal data as necessary for the effective performance of a task carried out in the public interest. i.e., a consultation.

4. For how long we will keep your personal data, or criteria used to determine the retention period.

Your personal data will be held for *six months after the relevant decision has been published.*

5. Your rights

The data we are collecting is your personal data, and you have considerable say over what happens to it. You have the right to:

- know how we use your personal data
- access your personal data
- have personal data corrected if it is inaccurate or incomplete
- ask us to delete personal data when we no longer need it
- ask us to restrict how we process your data

- get your data from us and re-use it across other services
- object to certain ways we use your data
- be safeguarded against risks where decisions based on your data are taken entirely automatically
- tell us if we can share your information with 3rd parties
- tell us your preferred frequency, content and format of our communications with you
- to lodge a complaint with the independent Information Commissioner (ICO) if you think we are not handling your data fairly or in accordance with the law. You can contact the ICO at https://ico.org.uk/, or telephone 0303 123 1113.

6. Your personal data will not be sent overseas

7. Your personal data will not be used for any automated decision making.

8. Your personal data will be stored in a secure government IT system.

9. More information

For more information on how Ofgem processes your data, click on the link to our "ofgem privacy promise".