

Decision

RIO-2 Sector Specific Methodology Decision – Finance

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Contact: RIO Team

Team: Network Price Controls

Tel: 020 7901 7000

Email: RIO2@ofgem.gov.uk

In December 2018, we consulted on proposals to set the sector-specific methodologies for the Electricity Transmission, Gas Transmission, Gas Distribution and the Electricity System Operator RIO-2 price controls starting on 1 April 2021. This document sets out our decisions in relation to the finance proposals set out in that consultation.

Further information on decisions for each sector are set out in separate annexes. Network companies will use this information to develop their Business Plans over the remainder of 2019.

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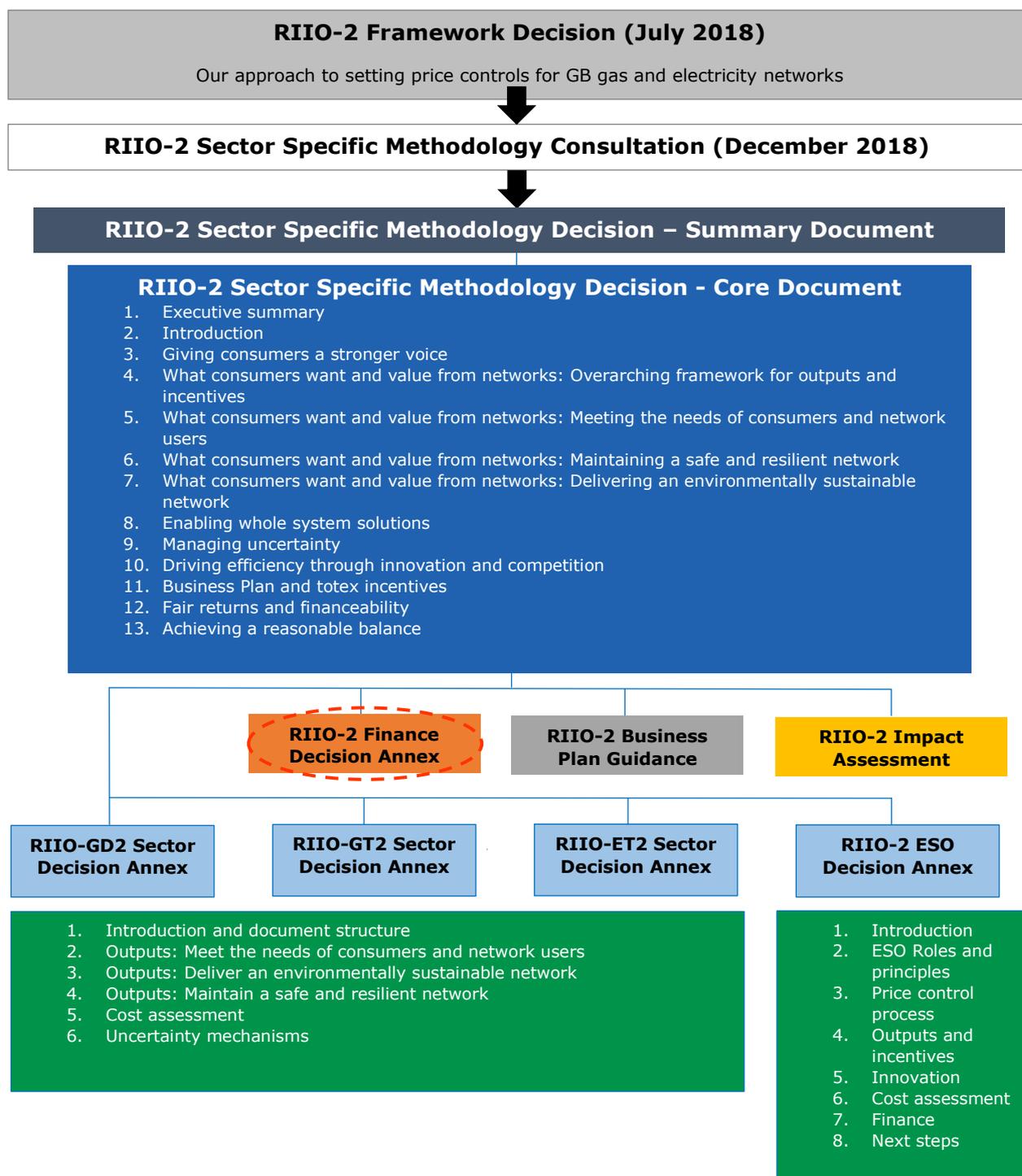
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1. Introduction

Introduction

- 1.1 In this chapter, we set out:
 - The structure of the decision documents
 - The background to the finance issues we consulted on,
 - Updated inflation expectations as per the Office for Budget Responsibility, and
 - An updated working assumption for the allowed return on capital.
- 1.2 In December 2018, we consulted on our proposals for applying the RIIIO-2 Framework to the specific network sectors - the RIIIO-2 Sector Specific Methodology consultation (December Consultation). The RIIIO-2 Sector Specific Methodology Decision is comprised of a Core Document, Finance Annex, and sector specific annex documents for gas transmission (GT), gas distribution (GD), electricity transmission (ET), and the electricity system operator (ESO).
- 1.3 The decisions in the Core Document apply across the GD, GT and ET networks, and some elements apply to the ESO. It also includes a summary of the Finance Annex and response summaries for the cross sector related decisions.
- 1.4 The following figure describes the set of documents related to the Sector Specific Methodology Decision.



Background to our finance work

- 1.5 In the finance annex to the Sector Specific Consultation, we set out our proposals to the financial elements of the network company price controls (for gas distribution, gas transmission and electricity transmission) that are due to begin on 1st April 2021 (together referred to as RIIO-2). Financing of the ESO is discussed in the ESO Annex and is not duplicated here.
- 1.6 We asked stakeholders for their views on 37 distinct finance questions. We received substantial responses to this consultation from Citizens Advice, Centrica, the RIIO-2 Challenge Group, investors and the network companies.

- 1.7 Responses from network companies in addition to providing their own comments, also referred us to the following 21 consultancy reports, that had been conducted individually or collectively.

Table 1: Debt and financeability focused consultancy reports

Report	Author	Prepared for	Report reference
1	NERA	ENA ¹	Cost of Debt at RIIO-2
2	KPMG	ENA	Assessment of Ofgem Cashflow Floor Proposals
3	Frontier Economics	NGN	Cost of debt at RIIO GD2
4	Oxera	NGN	Review of NGN financial analysis for RIIO-GD2

Table 2: Equity focused consultancy reports

Report	Author	Prepared for	Report reference
1	Oxera	ENA	Rates of Return used by Investment Managers
2	Oxera	ENA	Infrastructure Funds Discount Rates
3	Oxera	ENA	Risk Premium on Assets relative to Debt
4	Oxera	ENA	The estimation of beta and Gearing
5	Oxera	NG	Assessment of political and regulatory risk
6	NERA	ENA	Cost of Equity Indexation using RFR
7	NERA	ENA	Review of UKRN Report Recommendations on TMR
8	NERA	ENA	Further evidence on the TMR
9	NERA	NG	Review of Indepen report recommendations on beta estimation
10	NERA	NG	Review of Ofgem’s Commissioned Reports on Beta for Determining the Cost of Equity at RIIO-2
11	NERA	SPEN	Cost of Equity for SPT in RIIO-T2
12	KPMG	Cadent	Cost of Equity and the RIIO-2 Consultation
13	KPMG	Cadent	Risk return balance under RIIO-GD2
14	Frontier	ENA	Adjusting Baseline Returns
15	Frontier	ENA	Inflation in the context of Real TMR
16	First Economics	NG	Allowed v Expected Returns
17	AON	NG	Is the UK an “averagely lucky country”?

- 1.8 We held bilateral meetings and met with network companies and other stakeholders to discuss some of the issues arising. We also asked those investors on our database (almost 600 in total) to respond to the finance questions and to provide their views anonymously – we received eight responses, and we draw on these responses within each applicable chapter. Other investors responded in bilateral meetings.

¹ The Energy Networks Association (ENA) is “the voice of the networks”, representing transmission and distribution network operators for gas and electricity in the UK. See here: <http://www.energynetworks.org/>

Inflation expectations: OBR’s March 2019 forecast

1.9 Before presenting our decisions and updated working assumptions for the cost of debt and the cost of equity, we present the latest available information from the Office for Budget Responsibility (OBR). Inflation forecasts are an important part of our working assumptions for RIIO-2 and underpin many of the consultation issues raised and discussed.

Table 3: Inflation expectations, OBR’s March 2019 forecast²

YE 31st December	2018	2019	2020	2021	2022	2023
CPI	2.48%	2.05%	1.86%	1.98%	2.00%	2.00%
RPI	3.34%	2.95%	2.77%	3.02%	3.07%	3.07%

1.10 We continue to focus on the longest horizon available for the purposes of estimating working assumptions for RIIO-2. We also continue to assume that the best proxy for CPIH is CPI. On this basis, we derive a difference between RPI and CPIH (the RPI-CPIH wedge) of 1.049%³ based on the OBR forecasts for the year 2023.

1.11 Therefore, in the following chapters we refer to a CPIH expectation of 2.00%, an RPI expectation of 3.07%, and an RPI-CPIH wedge of 1.049%.

An update on our working assumptions for the allowed return on capital

1.12 We summarise below (Table 4) an updated working assumption for the cost of capital in CPIH terms reflecting the decisions made within this document and updates to market and other data. After reviewing the consultation responses, we have increased our assumption for the allowed return on debt by 19bps⁴ and have increased our assumption for the allowed return on equity by 30bps. The Baseline Allowed Return on capital (WACC) therefore increases by 24bps relative to the assumption we presented in December.

² See CPI and RPI worksheets here: <https://obr.uk/download/public-finances-databank/>

³ Derived using the Fisher equation: $(1+3.07\%) / (1+2.00\%) - 1$. We display three decimal places solely to allow stakeholders to derive the subsequent tables.

⁴ “bps” refers to basis points, 1bp = 0.01%.

Table 4: Working assumptions for the RIIO-GD2 and RIIO-T2 allowed return in CPIH terms

Price base	Component	Year-end 31st March					Average	Ref	Source
		2022	2023	2024	2025	2026	'22-'26		
CPIH	Allowed return on debt	2.03%	1.96%	1.91%	1.88%	1.86%	1.93%	A	Working assumption as per Table 5
	Allowed return on equity	4.27%	4.29%	4.30%	4.31%	4.32%	4.30%	B	Working assumption as per Table 21
	Notional gearing	60%					60%	C	Working assumption as per Paragraph 7.33
	Allowed return on capital	2.93%	2.89%	2.87%	2.85%	2.84%	2.88%	D	$D = A * C + B * (1 - C)$

1.13 These values are provided for the purpose of business planning only. The cost of capital values will be updated at the Draft Determination stage. Network companies asked us to re-consider whether CPI, rather than CPIH, is a better basis upon which to set allowed returns and apply increases to Regulated Asset Values. We propose to provide an update on this issue at Draft Determination and for now are of the view that CPIH remains an appropriate basis upon which to progress.

1.14 In the consultation, we estimated that the cost saving to consumers associated with a lower cost of capital than in RIIO-1 is worth approximately £6.5bn, or roughly an average £30/year reduction on domestic consumer bills.⁵ Given the increase of 24bps in our working assumption for the allowed return on capital, these savings reduce to £6.0bn and £25/year respectively.

1.15 The remainder of this document, in each of the following 6 chapters:

- summarises the issues we consulted on,
- summarises the responses we received,
- sets out our analysis of these,
- sets out our sector-specific decisions and next steps, and
- outlines how we arrived at our updated working assumption for the cost of capital.

⁵ Over the RIIO-2 periods in real 21/22 CPIH prices, discounted at 3.5% to the 21/22 financial year. Approximately three-quarters of the savings presented are attributed to RIIO-GT2, RIIO-ET2 and RIIO-GD2 which begin in 2021, but the total figure includes RIIO-ED2 for completeness in assessing the potential impact. See paragraph 1.11 of the December Finance Annex for further information (https://www.ofgem.gov.uk/system/files/docs/2018/12/riio-2_finance_annex.pdf).

2. Cost of debt

The cost of debt is a significant component of allowed returns and the cost of network services to consumers.

In this section we summarise our December 2018 proposals, the consultation responses, our analysis and response to these, and our sector-specific decisions.

Summary of issue

- 2.1 The cost of debt allowance is an estimation of the return debt investors expect from an efficiently run company (including both embedded debt raised prior to the price control period and new debt raised during the price control period).
- 2.2 In RIIO-1, the cost of debt allowance is calculated using a rolling average of outturn rates. This benchmark is equal to an average of two iBoxx bond indices (10yr+ non-financials A rated and 10yr+ non-financials BBB rated). We refer to this approach as full indexation. Electricity transmission, gas transmission and gas distribution sectors have allowances that are equal to a 10-year rolling average of historical rates. In addition, there is a company-specific arrangement for Scottish Hydro Electric Transmission (SHE-T).
- 2.3 To date, we have found that this policy has worked well and produced savings for consumers during RIIO-1 when compared to the pre-RIIO approach of setting a fixed cost of debt for the price control period, which necessitated forecasting interest rates and market conditions. Although indexation could lead to higher allowances if interest rates rise it is expected to better match efficient sector debt costs than setting a fixed ex ante debt allowance. This is because setting a fixed cost of debt for the full price control has in the past typically involved 'aiming up' from forward rate curves for the assumed new debt element of the allowance to avoid undercompensating networks. Nevertheless, we have been considering whether and, if so, how we could make further improvements for RIIO-2.
- 2.4 In March 2018 as part of the Framework Consultation we sought views on the policy objectives, relevant principles, and the relevant analysis and options for consideration. We then consulted further in December 2018 as part of the Sector Specific Methodology Consultation.

Summary of December proposals

- 2.5 Following the Framework Consultation in March 2018 and Framework Decision in July 2018, we narrowed the options being consulted on in December 2018 to:
 - Option A: Re-calibrate the RIIO-1 indexation policy (we call this full indexation).
 - Option B: Introduce a fixed allowance for existing debt, but index new debt raised during the price control only (we call this partial indexation).
- 2.6 In the December Finance Annex, we set out the relative merits of both options, and the potential benefits and challenges of sharing debt under/outperformance with consumers.
- 2.7 We stated that we remained of the view that a high bar of evidence would need to be met before we would materially alter our existing approach of full indexation.

- We provided an update on our considerations and proposed ruling out partial indexation unless new information provides reasons to reassess this position.
- 2.8 We also stated that we proposed to rule out an annual within-period debt sharing mechanism.
- 2.9 We identified that with a proposed move away from RPI to CPIH, we would need to consider how we calculate a real cost of debt allowance from the starting point of the iBoxx indices, which are in nominal terms. We identified two possible methodologies for doing this:
- deflating the nominal iBoxx by a measure of break-even inflation (there were two variants of this approach)
 - deflating the nominal iBoxx in one step by using only an expected value for CPIH.
- 2.10 We also asked for stakeholder views on whether there were any other methods for completing this step.
- 2.11 We set out suggested next steps for assessing whether any improvements to the full indexation mechanism could be made, including changes to the trailing average period and changes to the reference benchmark. We set out our intention to assess the appropriateness of expected allowances by considering company-provided and publicly available information relating to:
- interest and financing costs as submitted by the network companies during the Regulatory Financial Performance Reporting (RFPR) process, with possible adjustments for bond yield to maturity where significantly different to bond coupons
 - information relating to debt maturities, repurchases and refinancings, where appropriate and justified
 - expected new financing requirements and timing.
- 2.12 We also set out that we will consider the halo effect⁶, debt issuance costs and whether a smaller company allowance may be appropriate in consideration of frequency and/or costs of issuance compared to that assumed by full indexation. We stated that in line with RIIO-1, we may consider adjusted indexation mechanisms (such as that used for SHE-T in RIIO-1) for unusual company-specific circumstances, if appropriate and justified.
- 2.13 We stated that we will require more information from the network companies in order to estimate the appropriate allowances for RIIO-2, including information on the network companies' plans for investment in the networks. We stated that after we have business plan information, we will assess expected sector debt costs against expected allowances.
- 2.14 In relation to the cost of debt we asked the following four questions:
- FQ1. Do you support our proposal to retain full indexation as the methodology for setting cost of debt allowances?

⁶ The suggestion that regulated utilities, including network companies, are consistently able to issue debt at rates below the iBoxx benchmark used for setting cost of debt allowances.

- FQ2. Do you agree with our proposal to not share debt out-or-under performance within each year?
- FQ3. Do you have any views on the next steps outlined in Paragraphs 2.22 to 2.25 for assessing the appropriateness of expected cost of debt allowances for full indexation?
- FQ4. Do you have a preference, or any relevant evidence, regarding the options for deflating the nominal iBoxx as discussed at Paragraph 2.14? Are there other options that you think we should consider?

Full indexation

Stakeholder views

- 2.15 We received a total of 20 responses, six of which were submitted anonymously through the online survey, to FQ1 regarding the proposal to retain full indexation as the methodology for setting cost of debt allowances.
- 2.16 Ten named respondents and six anonymous online respondents supported full indexation, although a number of network company respondents caveated that this was on the assumption that the index is calibrated so that it is expected to cover efficiently incurred debt costs.
- 2.17 One respondent, Centrica, had a preference for partial indexation, suggesting that separating embedded and new debt would allow the new debt index to have a shorter trailing period and better reflect prevailing market conditions. However, they recognised the challenges associated with the thorough review that would need to be performed for testing efficiency of embedded debt for this solution, so were cautiously supportive of full indexation.
- 2.18 One respondent (NG ESO) requested a bespoke solution for their debt allowance due to the very different nature of their financing structure and asset profile.
- 2.19 Two network company respondents disagreed with the proposal to retain full indexation. These respondents argued that full indexation is insensitive to the timing of efficiently raised debt and were of the view that there should be no regulatory risk associated with recovering efficiently raised debt once the transaction has been completed.
- 2.20 Both respondents who disagreed with the proposal appeared to have greatest opposition to the cost of debt allowance being set on a sector average basis rather than a company-specific basis.
- 2.21 One respondent said it was presumptive of Ofgem to state that a high bar of evidence would be required to change the approach to cost of debt indexation. They argued that Ofgem should be asking what is the right stance in light of our duties and the existing evidence.

Analysis and response

- 2.22 In response to the suggestion that there should be no risk associated with recovering efficiently raised debt once the transaction was completed, we note this would result in this cost being a pass through, which was ruled out at the Framework stage as not providing the required incentive properties. The issues these two respondents raised did not appear to be issues with indexation itself but

with the concept of setting cost of capital allowances on a sector wide average basis rather than on a company-specific basis.

- 2.23 The approach of setting sector wide cost of debt allowances (except for specific exceptional circumstances)⁷ pre-dates RIIO; for example, the cost of debt for GDPCR (the gas distribution price control which ran from 2008-2013) was set at a single level for all network companies in the sector and had regard to short-term trends in the market cost of debt, trends in the market cost of debt over a ten-year period and longer-term equilibria in the market costs of debt⁸. It has therefore been consistently the case since the early years of sector regulation that cost of debt allowances are set by reference to trends in the market cost of debt over a ten-year period and that debt allowances would not be set by reference to individual networks' costs of debt.
- 2.24 It has therefore been clear to network companies and their shareholders that there would be a risk involved in raising a large proportion of debt over a short period of time and/or fixing the rate on that debt for long periods of time. This is because if the interest rate on that debt did not broadly reflect the rolling ten-year average market and/or sector average debt rates they could out-or-underperform the resulting cost of debt allowance set for the sector as a whole. A lower risk strategy for matching debt costs to debt allowances would be to raise debt (or fix rates on debt) gradually over time (accepting that this is a decision for networks and their shareholders).
- 2.25 Previous price controls and associated consultations considered the principles for setting the cost of debt and the evidence available at the time. We also considered this further in the March 2018 Framework Consultation. As stated in the December Finance Annex, it is our view that the cost of debt index has worked well for RIIO-1. We also note that a number of network companies and consumer groups support the continuation of full indexation.
- 2.26 A move to company-specific debt allowances aimed at matching individual company debt costs would do away with the strong incentives to manage company debt prudently and efficiently that setting a sector-wide cost of debt benchmarked to market trailing averages provides. It may also require Ofgem to undertake much greater scrutiny and control over company financing decisions and actions and greater standardisation of company capital structures. This has not been our approach to date; we have long-held the position that network company financing decisions are for network companies and their shareholders and that they then bear the risks of these decisions. It is our view that we should continue with this stance for the following reasons:
- networks and their shareholders are best placed to manage financing risk
 - consumers in different locations should not be exposed to paying different charges due to different financing risk strategies of management and/or shareholders

⁷ For example SHE-T which had an unusually high RAV growth profile was one such exception in RIIO-1 with a RAV weighted cost of debt indexation mechanism. NG ESO may represent another example of a network company with a different asset profile that may justify a bespoke mechanism (to the extent it follows a RAV*WACC model, see ESO annex for discussion of potential financing models for the ESO).

⁸ See paragraph 9.7 of [GDPCR initial proposals](#) and 9.11 of [GDPCR final proposals](#) both published in 2007

- Ofgem should only seek to involve itself in company financing decisions where it observes a market failure or unacceptable levels of risk to consumers. We do not currently observe these conditions.
- where possible, we see benefit in regulatory stability, consistency and predictability.

2.27 In our view, full indexation has the following benefits:

- it references relevant independently produced benchmarks
- it provides a single allowance that covers both embedded debt and new debt
- it adjusts annually to capture changes in market conditions, thereby adjusting for the likely changes to costs of raising new debt
- it is transparent and simple
- it can be calibrated to provide a good estimate of efficient sector debt costs
- it strongly incentivises networks to prudently and efficiently manage debt costs, which should benefit consumers as this is factored into the calibration for subsequent price controls.

Debt Performance Sharing

Stakeholder views

- 2.28 In response to FQ2 and our proposal to not share debt out-or-under performance within each year, eight network companies supported no debt sharing, with many noting the added complexity and reduced incentives that the introduction of debt sharing would bring. Four of the six anonymous survey respondents that answered this question also supported no sharing.
- 2.29 Two network companies (WWU & ENWL) suggested that debt performance should be seen as similar to totex and should therefore be shared. However, those companies did not evidence how sharing would benefit consumers. One of those network companies stated that "Ofgem should provide evidence and support as to why it should be treated any differently to other areas of under/out performance within the price control" and one called for an impact assessment of why sharing should not be implemented.
- 2.30 Citizens Advice were sympathetic to difficulties in assessing actual debt performance and agreed consumers should be protected against poorly managed debt portfolios. They suggested that it is *"essential that Ofgem force the owners of the two outliers (the two companies with distinctly poor debt portfolios) to take advantage of the current low interest rate environment to restructure their debt portfolios"*.
- 2.31 Centrica raised a concern that if any company-specific adjustment or allowances were made then this could result in sharing of underperformance but no sharing of outperformance. They noted that full sharing would allow symmetric sharing.

Analysis and response

- 2.32 In response to the request for further evidence, including on impacts, we have provided further analysis of the issues below.

- 2.33 We consider there to be a material difference between assessing Totex performance and debt performance. Firstly, Totex is not always easily independently benchmarkable and there is an information asymmetry which leads us to conclude that an incentive rate of 100% is not appropriate for Totex. In contrast, cost of debt is fully benchmarkable through independently produced indices and other publically available information on market rates. In addition, there is limited scope for networks' Totex costs to be influenced by group capital structuring decisions or activity outside the regulatory ringfence. There is considerable scope for network companies' debt costs to be influenced by capital structuring or group activity outside the regulatory ringfence which could distort the fairness of sharing, for example:
- gearing, dividend policy and creditor protections at the regulated entity level can impact the credit rating of the regulated entity, impacting the cost of debt of that entity
 - additional debt outside the regulatory ringfence can impact the corporate family credit rating and the rating of the regulated entity, thereby influencing the debt costs of the regulated entity
 - intercompany loans can be used, potentially distorting the cost of debt performance of the regulated business
 - derivatives can be used in different parts of the corporate structure that could impact the profile of group debt liability cashflows but that are not necessarily visible to the regulator.
- 2.34 We therefore believe it would not be appropriate to share out-or-underperformance of debt costs without also imposing much greater restrictions on capital and corporate structures. This would require standardisation of structures across the sector to create a level playing field in which debt costs could be assessed on a like-for-like basis. This would represent more intrusive regulation and could require changes to legislation and significant restructuring costs.
- 2.35 It is also important to recognise that, because of the volume of embedded fixed rate and inflation linked debt in the sector which has long dated maturities, decisions that were made in previous price controls will impact debt performance in RIIO-2. Therefore, any introduction of sharing would risk imposing retrospective sharing of risk for decisions that were made expecting no sharing of this risk and/or return. This would represent a significant departure from our previous stance and, if introduced now, may raise questions over regulatory stability.
- 2.36 In relation to Citizens Advice's suggestion to force companies to refinance, we believe it is appropriate that, while network companies are complying with their licence conditions, shareholders make financing decisions and bear the risk of those decisions.
- 2.37 In relation to Centrica's concern, we are cognisant that company-specific allowances, if that company's debt costs are also included in the calibration of the index, could lead to asymmetric outcomes for consumers. Therefore, to the extent any company-specific allowances are granted (based on efficient costs of debt), we would look to exclude these costs from the calibration of the index more generally such that for the sectors as a whole, consumers would pay no more than an efficient cost of debt.

Decision

- 2.38 We have decided (a) not to share cost of debt variances, and (b) to apply full indexation. Calibration of the specific cost of debt indexation mechanism to be used will be proposed at Draft Determination and decided at Final Determination.
- 2.39 Given that the majority of network companies and Citizens Advice support full indexation, and our own views of its merits (set out in 2.27), we have decided to retain full indexation for setting the cost of debt allowance. We consider this mechanism has worked well in RIIO-1 and aligns with the principles set out in the Framework Consultation in March 2018.
- 2.40 We have concerns that implementing debt sharing now risks retrospective capture of decisions or risks taken in previous price controls (when debt sharing was not in place), and that in turn this could call into question regulatory stability. We have therefore decided not to implement debt performance sharing as we believe the risks and challenges of implementing debt sharing outweigh any potential benefits.

Next Steps - Calibrating the Index

Stakeholder Views

- 2.41 In response to FQ3 asking for views on next steps for assessing the appropriateness of expected cost of debt allowances for full indexation, a number of network companies' responses state that the 10-year trailing average period does not match the issuance profile of the sectors and that a longer trailing average period would be more appropriate to match the average tenor at issuance of sector debt. A number of network companies state that the average tenor of sector debt is 20 years so a 20-year trailing average would be appropriate. However, network companies have not provided data supporting this point.
- 2.42 The majority of network company respondents referred Ofgem to a NERA report produced for the ENA relating to calibrating the cost of debt index, the halo effect and transaction costs⁹. NGN also submitted a report produced by Frontier Economics. These reports offer a more detailed analysis of the expected sector debt costs compared to the current index mechanisms.
- 2.43 The NERA report sets out the results of their modelling of sector debt costs. Their report compares sector debt costs to the existing debt allowance indexation mechanisms for RIIO-1 and NERA's assumption for modelling purposes that these mechanisms continue unchanged into RIIO-2.
- 2.44 The NERA and Frontier Economics reports highlight the treatment of Cadent debt costs and debt refinancing costs as an important calibration decision if Ofgem aims to fund the sector average debt cost with the allowance. This is because Cadent's cash coupon costs are very low and Frontier Economics state that without incorporating some adjustment for the costs involved in the refinancing of pre-existing long dated debt, Cadent's debt costs would distort the sector average cost of debt.
- 2.45 NERA present the results of sector cost of debt modelling on both a pre and post derivatives basis (except for transmission, where two companies did not share

⁹ Cost of debt at RIIO-2: A report for ENA, 14 March 2019

derivative information with NERA) and on a simple average and debt weighted average basis. They also consider different interest rate scenarios. In summary, NERA estimate that GDNs¹⁰ will face under-funding of 35-50bps (pre derivatives) and transmission companies will face under-funding of 25-60bps (pre derivatives) in RIIO-2 if the same mechanism used for RIIO-1 is used for these sectors. The report attributes this underperformance largely to a mismatch between the sector debt issuance profile and the 10-year trailing average period (with sector issuance including a significant amount of long-term fixed rate debt raised prior to the start of the 10-year trailing period for RIIO-2).

- 2.46 Most networks stated that the iBoxx indices used and the weightings given to those indices should reflect the rating of the notional company following financeability assessment.
- 2.47 National Grid did not agree with a sector-specific cross-check for the cost of debt index, stating that the check should be performed across the industry as a whole because all of the energy network sectors have issued debt with broadly the same average tenor. SSEN also stated that sectors with a small number but diverse set of companies in terms of size are dominated by the larger companies in that sector, if the cost of debt allowance is set with reference to debt weighted averages (rather than simple averages).
- 2.48 Three network companies argued that a small company allowance was appropriate because smaller companies face either higher costs associated with sub-benchmark size issuance or additional timing risk. However, a quantification was not proposed for this additional allowance, with two network companies focusing on their individual costs of debt.

Analysis and response

- 2.49 NERA's report includes an analysis for the electricity distribution sector; however, we concentrated our review on transmission and gas distribution as these are the sectors subject to this sector methodology consultation and decision.
- 2.50 We will seek a more complete picture of pre and post derivative financing performance in the transmission sector prior to Draft Determinations because NERA's analysis does not include a post derivative analysis for this sector. NERA states that pre derivatives, the transmission sector is expected to underperform in RIIO-1 (and in RIIO-2) but we note from RFPR submissions that post derivatives, the transmission sector shows expected outperformance for RIIO-1.
- 2.51 We have some sympathy with the suggestion that Cadent's current debt coupon costs may not accurately reflect the all-in cost of debt and may distort the analysis of sector debt costs if not adjusted. We are aware that long-term fixed rate or inflation-linked bondholders expect to be compensated for the market yield movements since issuance when a company is refinancing or repurchasing debt.
- 2.52 We therefore believe it is likely to be appropriate to either:
- (a) factor in the market yield movement element of any such buyback; or
 - (b) exclude Cadent's debt costs for the purposes of calibrating the sector index

¹⁰ Gas Distribution Networks

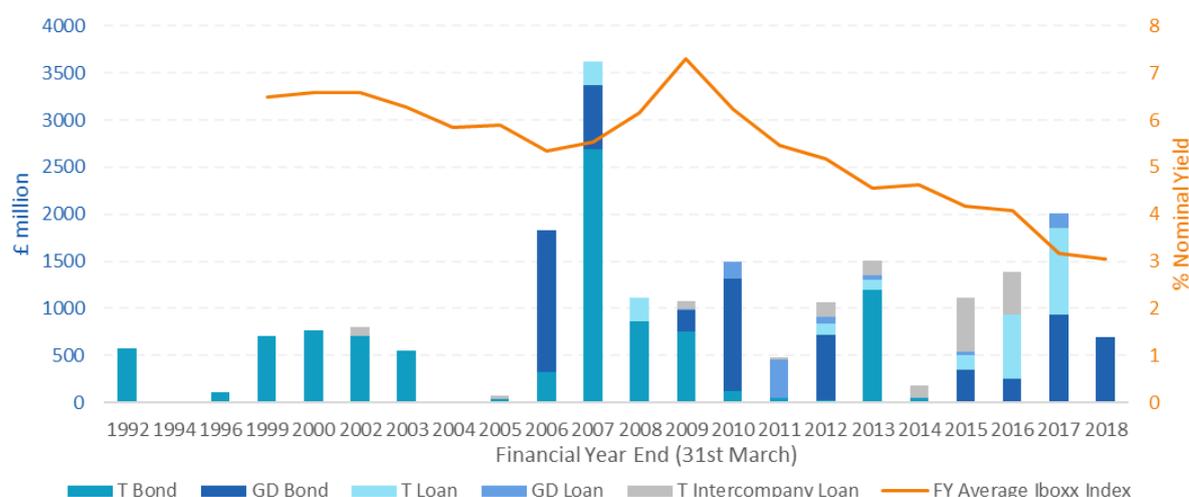
- 2.53 The market yield movement since issuance represented the majority of the costs associated with repurchasing NGG and NGET bonds¹¹ that were refinanced with Cadent bonds. Bond investors may also expect additional premium for tendering bonds and this additional premium is typically larger the greater the volume or proportion of debt to be bought back. We believe any such additional spread premium should be considered an exceptional transaction cost associated with the M&A-related activity and therefore not factored into the sector debt cost analysis.
- 2.54 In relation to networks' suggestion that we match the trailing average period of the index to the 20-year average tenor at maturity of sector bond debt, we would note that the index provides an allowance for all debt, not just long dated bond debt.
- 2.55 Our initial analysis of RFPR data suggests that the GD and T combined average proportion of floating rate debt is currently approximately 14% (pre derivatives)¹². This floating rate debt effectively has an interest rate resetting maturity of 6 months, which reduces the overall debt book tenor from a rate fixing perspective.
- 2.56 We also note that the profile of sector new issuance (to fund RAV growth, for example) impacts the analysis of what length of trailing index might best approximate sector average efficient debt costs. Therefore, we believe networks' suggestion to match the average tenor of bond debt with the trailing average period of the index would represent an oversimplification and could lead to over compensating networks.
- 2.57 However, our initial analysis of RFPR data suggests that 40-50% of the non-floating rate embedded debt outstanding in both the GD and T sectors in 2022 will have been issued prior to FYE 2011, when rates were significantly higher than they have been since 2011. Figure 1 below shows the historical issuance profile of GD and T sectors embedded non-floating rate debt (as at FYE 2018) alongside the iBoxx combined A/BBB index annual average rate.¹³

¹¹ One way to estimate the all-in cost of debt is to base the analysis on the cost of debt observed prior to the refinancing. This is the method Cadent used in submitting an adjusted RFPR (not published but was noted in footnote 4 of [Regulatory financial performance annex to RIIO-1 Annual Reports 2018-2018](#)). The absolute value of this adjustment using this method is estimated as £842m. Ofgem has performed a cross check on this estimate, based on public information relating to repurchase prices for NGG and NGET bonds associated with the tender and refinance and market prices calculated based on Bloomberg quoted credit spreads of these bonds on the day prior to the tender announcement. This cross check results in an estimate of £845m.

¹² [Supporting data file to Regulatory financial performance annex to RIIO-1 Annual Reports - 2017-18](#), Debt Comp sheet, using data from rows 21 and 24 for GD, ET, GT.

¹³ Adjusted for NG/Cadent refinancing to show original rate lock dates of refinanced bonds and reduce volume of bonds issued in FYE 2017 by equivalent amount.

Figure 1: Debt book as at FYE 2018 by year raised and year average iBoxx A/BBB 10yr+ yield



Source: Ofgem analysis of network provided RFPR data

- 2.58 The above analysis would suggest that it may be appropriate to consider a slight extension to the trailing average period of the index to better align with the sector profile of debt issued given the now longer time period between allowance calculation date and historical long dated debt issuance profile compared to RIIO-1.
- 2.59 The Frontier Economics analysis suggests that an 11-15-year trombone¹⁴ would provide a reasonable match to expected sector debt costs for the GD sector. The Frontier Economics analysis also acknowledges that it makes some relatively simple assumptions around the level of expected new issuance over RIIO-2¹⁵. However, the expected new issuance profile is significant in the analysis of what form of index would best match expected sector debt costs. We therefore propose to evaluate this after business plan submissions when a better estimate of sector issuance over RIIO-2 can be made.
- 2.60 Although we will leave calibration of the index until after business plan submission, we do recognise that for business plan submissions, it would be useful to have a best estimate forecast for the cost of debt allowance.
- 2.61 In discussions as part of the ENA finance working group, we stated that our intention is to broadly match debt allowances with sector expected efficient debt costs for RIIO-2 through the calibration of the index. There are a number of ways the index could be calibrated to meet this aim, including adjusting the trailing average period, changing the specific iBoxx indices referenced or the weightings of the indices used, and/or providing a 'wedge' for expected sector embedded debt cost differential to the index. The calibration will consider business plan information regarding expected volume of new debt to be raised in RIIO-2 and will

¹⁴ The averaging period starts on 1 November 2009 and ends on 31 October 2020 for 2021-22 (11 years) and the end of the period will advance by a year each year, trombone-like, until the period length reaches 15 years. For 2025-26, the averaging period will start on 1 November 2009 and end on 31 October 2024 (15 years).

¹⁵ "We emphasise that the projections of the cost of debt that result from our modelling should not be interpreted in any sense as optimised. Rather they derive from a relatively simple set of refinancing rules applied to existing debt books, to illustrate the possible path of future sector debt costs". Frontier Economics Cost of Debt in RIIO-2 report, page 18.

also consider the efficiency of embedded sector debt. Calibration may exclude inefficiently raised debt and/or complex, unusual or opaque products that would not be contemplated for the notional company.

- 2.62 Without prejudice to the eventual calibration of the index at Final Determination, which will be based on scrutiny of full information available at the time, we propose that the networks use a working assumption based, illustratively, on an 11-15-year trombone for business plan submission. This is consistent with the Frontier Economics recommendation and broadly in line with the NERA analysis of the differential between a 10-year trailing average index and their central estimates of expected sector debt costs but does not indicate a methodology decision to this trailing average period and is illustrative and for working assumption purposes only. We have provided a forecast of these figures based on the interest rate and iBoxx data available as at 29th March 2019 in Table 5 below:

Table 5: Cost of debt working assumptions¹⁶

	2021-22	2022-23	2023-24	2024-25	2025-26	RIIO-2 Average
Nominal (%)	4.07	4.00	3.95	3.92	3.89	3.97
CPIH real (%)	2.03	1.96	1.91	1.88	1.86	1.93

- 2.63 In response to the argument that weightings of the indices used should reflect the rating of the notional company following financeability assessment, we note that the objective of the index is to provide a reasonable proxy for efficient debt costs across the sector. Accordingly, if it were the case that networks could consistently raise debt at the level of the spot combined index, we would consider the index remains a reasonable proxy irrespective of the ratings of notional or actual networks. This discussion is linked to the analysis of the halo effect and is discussed further below.
- 2.64 We also note that the trailing average index covers historical embedded debt as well as new debt to be raised in RIIO-2 so any analysis of whether the index remains a reasonable proxy would need to consider both embedded debt and new debt. We also discuss in the section titled "Notional company credit metrics" our initial analysis of notional company credit metrics and how these compare to RIIO-1.
- 2.65 In response to the suggestion that we calibrate the index according to industry wide debt costs, we note that we are not currently consulting on the ED sector at this stage and it would therefore be inappropriate to decide on a methodology or calibration approach that includes ED. A full consultation for the RIIO-ED2 price control will follow, which will consider whether RIIO-ED2 may warrant a different approach.
- 2.66 We also note that we will not be receiving business plans for the ED sector and would be unable to include in any calibration an assessment of likely debt issuance for that sector. However, given some networks concern that sectors with a small

¹⁶ Calculated using iBoxx and gilt data as at 29th March 2019, with future iBoxx values forecasted using Bank of England GLC spot curve implied gilt forwards and 3-year average iBoxx index spreads. Nominal combined iBoxx yields deflated to CPIH real using the Fisher equation and the OBR 5yr forecast for CPI as a proxy for CPIH for each date. Working assumption based on 11-15-year trombone trailing average so calculated using average of resulting data for each date from 01/11/2009 to 31/10/2020 for the 2021-2022 annual allowance, 01/11/2009 to 31/10/2021 for the 2022-2023 annual allowance and so on until 2025-2026 annual allowance using average of data from 01/11/2009 to 31/10/2024.

number of network companies may have their cost of debt allowance assessment dominated by a few large network companies, we would be prepared to consider GD and T as one enlarged sector for the purposes of the cost of debt index cross-check. We invite stakeholders' views on this and would seek to discuss this further through the ENA finance working group.

- 2.67 We would encourage network companies to engage on the question of whether a small company premium may be appropriate on a notional company basis rather than pointing to actual debt costs which have involved actual financing decisions. If networks have evidence to submit on this point we encourage them to submit this with their business plans (or before through the ENA finance working group or in bilateral discussions with us).

Next Steps - Halo Effect and Transaction & Liquidity Costs

- 2.68 In RIIO-1, Ofgem provided analysis which suggested network companies were consistently able to issue debt at rates below the iBoxx benchmark (the "halo effect"). This halo effect was considered to be large enough to more than offset estimated transaction and liquidity costs associated with raising debt (estimated at 20bps). A separate transaction and liquidity cost allowance was therefore not required.
- 2.69 In February 2018, we published a CEPA report¹⁷ which identified a historical halo effect of 38bps for fixed rate bonds. CEPA noted that "*prior to around 2009 all coupons outperformed the index, but since then outperformance has become less certain*". They also noted that this could be due to iBoxx constituent changes: "*the weighting of regulated utilities in iBoxx indices has increased from about 17% in 2010 to about 50% in recent years*". They also stated that "[w]e therefore consider it appropriate to assume the full adjustment of 38-49bps based on historic evidence may not continue in future". We have therefore been cognisant of the need to keep the halo effect under review.

Stakeholder Views

- 2.70 As part of their responses to FQ3, most networks stated that they did not agree that there is a halo effect. Centrica stated that they did think there was a halo effect, referencing the CEPA review and also Ofwat's final PR19 methodology, which involves a downwards adjustment of 15bps to the iBoxx 10yr+ indices to adjust for outperformance of the water sector.
- 2.71 NERA provide some updated analysis on behalf of the ENA which disputes the historical existence of a halo effect and argues that there should be no assumption of a halo effect in the future. They argue that when yield at issue and ratings at issue are taken into account, there is no halo effect (with their updated analysis suggesting a negative halo of 3bps for nominal network bonds).

Analysis and response

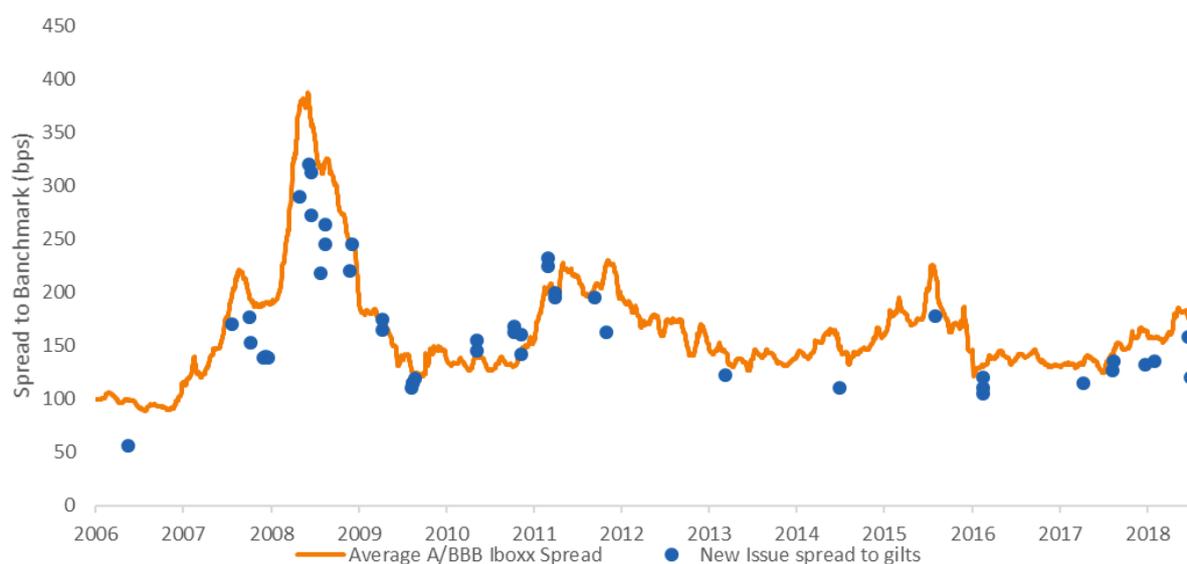
- 2.72 We have considered the NERA analysis and believe that while looking at yield at issue as NERA does is valid, credit spreads to gilts are generally what are used by bond investors to judge relative value of bond issues. Considering credit spreads

¹⁷ <https://www.ofgem.gov.uk/ofgem-publications/130262>. Page 29

rather than yields also has the benefit of better controlling for tenor differences between network bond issues and the average iBoxx tenor.

- 2.73 Spread to benchmark gilts data is available for the iBoxx indices from 2006 onwards. In our view, looking at the subset of network bonds issued since 2006 is a valid sample and we have therefore performed this analysis for network company fixed rate bonds exceeding 10-year maturity at issue.
- 2.74 We used Bloomberg data on issue spread for each issue or, where this was unavailable, we calculated the issue spread based on the issue price and yield and the relevant benchmark gilt yield on the day of pricing (the 'announcement date'). We then compared the issue credit spreads to the average of the iBoxx A 10yr+ index spread to benchmark and the iBoxx BBB 10yr+ index spread to benchmark. A plot of 48 fixed rate network bonds against the average A/BBB iBoxx benchmark spreads is illustrated in Figure 2 below:

Figure 2: Network bond new issue credit spreads compared to average A/BBB iBoxx credit spreads



Source: Ofgem analysis using Bloomberg and Markit data

- 2.75 Based on this analysis, we found a halo effect of 14bps when all network bonds were compared to the average A/BBB index spread, or 7bps when network bonds were compared to the index matching the rating at issue. If this analysis is restricted to issuances post 2010 (post the worst of the financial crisis), then the observed halo effect is 9bps (when compared to the average A/BBB index spread or the index spread matching the rating at issue). On balance, we estimate that the halo effect has reduced to approximately 10bps when the analysis is performed in this way for fixed rate network bonds over 10 years of maturity.
- 2.76 Given the above updated halo analysis, we believe it may be appropriate to consider either calibrating the index to cover transaction and liquidity costs, or providing a specific allowance for transaction and liquidity costs, subject to also considering the impact of floating rate and non-bond debt on sector performance versus the index.

- 2.77 In RIIO-ED1 Draft Determinations, we estimated issuance costs and other fees to be 20bps¹⁸ but we have not conducted detailed analysis of issuance and transaction costs since then and we therefore invite networks to submit evidence of transaction and liquidity costs as part of business plan submission (or in advance).
- 2.78 NERA provide some estimates for what they describe as 'liquidity costs' and 'cost of carry'. They define the cost of carry as "*driven by requirement to issue debt ahead of maturity to meet sufficiency of resources requirement, rating agency and debt covenant requirements etc.*" NERA then define operational liquidity costs as "*driven by requirement to manage day-to-day cash flow operations; we assume equal to 3% RAV*".
- 2.79 NERA's estimates for combined costs of carry and operational liquidity costs range from 23bps to 56bps. We believe that providing an allowance within the cost of debt for both 'cost of carry' and 'operational liquidity costs' may be double-counting because if networks are already holding significant cash because they have issued in advance of upcoming bond maturities, they would not need additional cash to manage 'operational liquidity costs'. Therefore, including both these categories of cash liquidity would risk overestimating the amount of cash generally held in regulated businesses and overcompensating network companies for liquidity costs.
- 2.80 It is also not clear how NERA arrive at an assumption of 3% of RAV for operational liquidity and why they assume this liquidity is held as cash rather than revolving credit facilities.
- 2.81 NERA estimate this operating liquidity cost as 11-12bps. However, Europe Economics on behalf of Ofwat note that "*[c]ompanies have different approaches to ensuring liquidity, but among the common ones are revolving credit facilities — for the purpose of this report we assume that the cost of such facilities is a good approximation of liquidity costs in general*". Europe Economics estimate the costs associated with commitment fees on revolving credit facilities as 35-45bps and that facilities might cover 10% of the value of companies debt, implying a liquidity cost of 3.5-4.5bps.¹⁹
- 2.82 We note that the current indexation approach assumes all debt is raised at long-term fixed debt rates (at the combined A/BBB 10yr+ index yield). However, initial analysis of RFPR data would suggest that network companies hold some shorter dated and some floating rate debt which typically has a much lower cost in a low interest rate environment, such that cost of carry and the benefits of lower cost floating rate debt could be considered to somewhat offset each other.
- 2.83 This appears to be the view taken by PWC on behalf of Ofwat in 2014²⁰. However, if we ultimately decide to include actual company floating rate debt in calibrating the index (which would, all else being equal, reduce the rate offered by the index allowance), then it may be appropriate for us to include a specific cost of carry allowance.

¹⁸ Page 11, https://www.ofgem.gov.uk/sites/default/files/docs/2014/07/riio-ed1_draft_determination_financial_issues.pdf

¹⁹ Europe Economics, "PR19-Initial Assessment of the Cost of Capital", 11th December 2017, page 72: <https://www.ofwat.gov.uk/wp-content/uploads/2017/12/Europe-Economics-Final-report.pdf>

²⁰ https://www.ofwat.gov.uk/wp-content/uploads/2015/10/det_pr20141212riskrewarduplift.pdf, page 23

Next Steps - Deflating the nominal iBoxx

- 2.84 There were 11 responses to FQ4 relating to deflating the nominal iBoxx index to provide a CPIH real debt allowance. Of those, 10 expressed a view on which might be the preferred method of performing this calculation and none preferred option (i), which was to continue using RPI breakeven rates and then to adjust for an assumed RPI/CPIH wedge. All respondents preferred the simplicity of deflating the nominal index in one step using a single measure of inflation.
- 2.85 Four network companies suggested that outturn inflation should be used to deflate the index (instead of a forecast). However, we do not believe outturn inflation data is a good indicator of the long-term future inflation expectations that are embedded in the long-term debt constituents of the iBoxx indices used. We continue to believe that a long-term estimate of inflation expectations is more appropriate for deflating an index based on long-term debt rates. Breakeven inflation is one long-term measure of inflation expectations but official forecasts are another.
- 2.86 Some network companies also expressed concern that CPI and CPIH may not be sufficiently similar to allow use of CPI forecasts as a proxy for CPIH without the need for review and possible adjustment for differences between CPI and CPIH.
- 2.87 We will monitor the potential for differential between CPI and CPIH, broader government policy and the possible emergence of CPIH forecasts before proposing an updated approach at Draft Determinations and taking a decision at Final Determination stage on whether CPIH or CPI is to be used.
- 2.88 We will therefore consider whether there would be any need for review or possible adjustment for differences between CPI and CPIH for the purposes of deflating the nominal iBoxx also at Draft and Final Determination stage.

3. Cost of equity

We estimate the cost of equity so that equity investors can be remunerated for the risk that they bear. Given the capital intensive nature of the business, the return on equity that we allow has a significant influence on the cost of network services to consumers. Alongside totex and depreciation, the cost of equity is one of the three principal determinants of a price control's impact on consumer bills.

In this section, we summarise the December 2018 proposals, outline the consultation responses received, before setting out our views on these responses. We then set out our decisions on the methodology for setting the allowed return on equity. Based on responses, updated analysis, and our updated view, we update the working assumption for the allowed return on equity from 4% to 4.3%, on the basis that our central estimate of the cost of equity has increased from 4.5% to 4.8% (all values in CPIH Real).

Introduction

3.1 The cost of equity is an estimation of the return that equity investors expect. It is a material element of the price control settlement. In the Sector Specific Consultation, we estimated that each 10bps (10 basis points or 0.10%) on the cost of equity is worth approximately £172m over the course of the RIIO-2 price controls. We proposed a methodology to estimate the cost of equity and to set an allowance for these costs.

Summary of Framework Consultation

3.2 In the Framework Consultation (March 2018), we referred stakeholders to a research project that had been undertaken by a team of academics and industry consultants (the UKRN Study).²¹ We summarised our interpretation of this study and set out our views on ten recommendations that it made for estimating the cost of equity and allowing for the associated costs. We then set out a proposed methodology.

Summary of Framework Decision

3.3 In the Framework Decision (July 2018), we decided that we would use the Capital Asset Pricing Model (CAPM) to estimate investor expectations. We decided how we would estimate various aspects of CAPM (which we outline in further detail within the separate sections below). We also decided:

- not to rule out updates to the allowance during RIIO-2 to reflect changes in market information for the risk-free rate (equity indexation);
- to cross-check the outcome of CAPM against other market information; and
- to distinguish between allowed and expected returns.

Summary of Sector Specific Methodology consultation

3.4 In the Sector Specific Consultation (December 2018), we proposed a three-step methodology to set the allowed return on equity:

- Step 1 – the CAPM evidence
- Step 2 – cross-checking the CAPM results
- Step 3 – distinguishing between expected and allowed returns

²¹ <https://www.ukrn.org.uk/wp-content/uploads/2018/06/2018-CoE-Study.pdf>

- 3.5 We outlined our rationale and approach for each of these three steps, proposing that we would conduct these steps at Draft and Final Determinations. We also:
- proposed to update the allowed return on equity based on annual information for the risk-free rate, and
 - presented a working assumption for the allowed return on equity (4% CPIH-real) based on the evidence available to us at that time.
- 3.6 We sought views from stakeholders, asking 17 questions on the various aspects of the methodology that we proposed.

Summary of Sector Specific Methodology responses

- 3.7 Responses from stakeholders tended to focus on calibration and implementation issues rather than on the underlying methodology that we described. Stakeholders supported the ideology of Step 1 and Step 2, although there were concerns around data interpretation and numerical estimation. There was less support for Step 3, with network companies united in their opposition, primarily from a principled perspective. The network companies argued that the allowed return on equity assumption was too low, while Citizens Advice, Centrica and the RIIO-2 Challenge Group argued that it was too high.
- 3.8 There was also some confusion about how a 3-step methodology would integrate with equity indexation on an ongoing basis. This arose because we demonstrated an uplift for forecast interest rates within Step 1 while also proposing that the allowance, to be set after Step 3, would update each year. An uplift for forecast interest rates is required to be consistent with Step 2 and Step 3, which also apply to a future period. To show that the uplift for interest rates is only counted once, we reconcile future rates with current spot rates (see Appendix 1). We also demonstrate each step of the equity methodology at Appendix 1 to outline the increase (of 0.3%) in the working assumption since the Sector Specific Consultation.
- 3.9 To supplement their arguments, network companies referred us to 17 consultancy studies (see Table 2). At Appendix 2 below, we summarise the main arguments put forward, and our analysis of these, focusing on the issues that are not otherwise addressed in the remainder of this chapter.
- 3.10 In the sections that follow, we address stakeholder views with respect to each of the three steps of the proposed methodology.

Step 1 - The Capital Asset Pricing Model evidence

Background

- 3.11 The CAPM allows us to estimate investor expectations by combining three parameters (the risk-free rate, equity beta, and Total Market Returns). In line with recommendation 2 from the UKRN Study, we estimate each of these three parameters using long-term tenors or long-runs of outturn data. In the subsections below, we address each of these three parameters in turn.

Risk-free rate and equity indexation

Framework Consultation and Framework Decision

- 3.12 In the Framework Consultation (March 2018), we proposed to estimate the risk-free rate by using yields on long-dated index-linked government bonds. We also

sought views from stakeholders on our proposal to index the risk-free rate during RIIO-2 to reflect the changes in market yields.

- 3.13 In the Framework Decision (July 2018), we decided to estimate the risk-free rate by using the current yields on long-term index-linked government debt. We committed to developing how equity indexation could work. We also decided to move away from RPI and acknowledged that our approach to equity indexation needed to reflect our intention to use CPIH.

Sector Specific Consultation

- 3.14 In the Sector Specific Consultation (December 2018), we proposed that equity indexation would be based on:
- RPI-linked government bonds, as published by the Bank of England, for the 20-year investment horizon;
 - OBR forecasts for the difference between RPI and CPI;
 - an assumption that the difference between RPI and CPIH is equal to the difference, as forecast by OBR, between RPI and CPI;
 - a derived 20-year CPIH bond, created by adding the OBR's forecast difference between RPI and CPI to the RPI bond prices as published by the Bank of England;
 - the daily average RPI-linked yields for the month of October each year, for the October month immediately preceding the start of the financial year; and
 - an Ofgem-published update, four months in advance (by 30th November) of the relevant financial year beginning.
- 3.15 We explained that the proposed approach reflected our view that we should use, for each year of RIIO-2, the latest information available to us on investor expectations.
- 3.16 We presented a working assumption for the risk-free rate in both RPI and CPIH terms, on a spot and forward basis. In CPIH terms, the average risk-free rate we presented, for the 5-year period ending 31st March 2026, was -0.53%.
- 3.17 We asked stakeholders the following four questions:
- FQ5. Do you agree with our proposal to index the cost of equity to the risk-free rate only (the first option presented in the March consultation)?
 - FQ6. Do you agree with using the 20-year real zero coupon gilt rate (Bank of England database series IUDLRZC) for the risk-free rate?
 - FQ7. Do you agree with using the October month average of the Bank of England database series IUDLRZC to set the risk-free rate ahead of each financial year?
 - FQ8. Do you agree with our proposal to derive CPIH real from RPI-linked gilts by adding an expected RPI-CPIH wedge?

A summary of stakeholder views

- 3.18 In general, stakeholders were supportive of our proposals to update the allowed return on equity for changes in the risk-free rate. Issues raised by network companies focused on how (calibration and implementation), not whether, equity

indexation is applied. The RIIO-2 Challenge Group argued that we were passing interest rate risk on to consumers, who had no ability to hedge this risk and that investors would be protected under these proposals, whereas they were previously exposed.

A summary of responses to FQ5 (Do you agree with our proposal to index the cost of equity to the risk-free rate only)

- 3.19 Centrica and Citizens Advice signalled support for our proposal but views among the network companies varied, with some being more supportive than others.
- 3.20 Some network companies (NG, Cadent, WPD) believed indexation had merit while noting concerns about the method while SPEN, SGN, NGN and NPG thought that the Ofgem proposal was better than alternatives. However, the other network companies were more tentative. SSEN, WWU and UKPN argued that the methodology needs to be further developed and that Ofgem needs to conduct further analysis while ENWL thought indexation was unnecessary.

A summary of responses to FQ6 (Do you agree with using the 20-year real zero coupon gilt rate for the risk-free rate?)

- 3.21 Centrica and Citizens Advice signalled support for our proposal. Network companies supported the 20-year horizon, but opposed the use of RPI-linked gilts. All network companies argued, or referred to NERA's recommendation, that nominal gilts could be used instead.

A summary of responses to FQ7 (Do you agree with using the October month average to set the risk-free rate ahead of each financial year?)

- 3.22 Centrica were supportive, Citizens Advice did not raise any objections, but all network companies raised concerns about using a single month of data for the subsequent year's allowance.
- 3.23 Most network companies (NG, SSEN, Cadent, SGN, WWU, UKPN, ENWL, WPD and NPG) proposed (or referred us to) using 12-month averages instead, whereas arguments by SPEN and NGN implied that the minimum period for averaging should be six months. SGN suggested that the relevant data period should be the financial year in question rather than any period prior to the financial year beginning.

A summary of responses to FQ8 (Do you agree with our proposal to derive CPIH real from RPI-linked gilts by adding an expected RPI-CPIH wedge?)

- 3.24 Centrica agreed this was reasonable, Citizens Advice did not raise any objections, but all 11 network companies disagreed. However, the network companies provided different reasons for their disagreement.
- 3.25 Some network companies (NG, NPG and SSEN) argued that the use of RPI in the price control should be discontinued. SPEN, SGN, ENWL and NGN argued that RPI-linked gilt prices for the 20-year tenor were distorted and/or were unreliable estimations of risk-free. Cadent, WWU, UKPN, and WPD queried whether using RPI-gilts would affect NPV neutrality, arguing that there may be a forecast error or benefit in using a "true-up" mechanism. ENWL added that the inflation adjustment should be aligned to inflation expectations over the regulatory period. ENWL also argued that there was, in its view, a framework dis-joint between long-term inflation expectations being used to deflate the nominal WACC, and RAV and revenue growth being inflated based on outturn inflation.

Analysis and response

Our analysis of responses to FQ5 (Do you agree with our proposal to index the cost of equity to the risk-free rate only?)

- 3.26 Responses are generally supportive of our proposal. The analysis provided by SSEN, WWU and UKPN does not alter our view that there are net benefits for consumers of equity indexation. We note ENWL's argument that indexation is unnecessary, but our view remains that equity indexation is better than forecasting the risk-free rate.²² ENWL did not provide tangible evidence to support its argument.

Our analysis of responses to FQ6 (Do you agree with using the 20-year real zero coupon gilt rate for the risk-free rate?)

- 3.27 Responses support long-tenor gilts, although we note opposition to using RPI-linked gilts. The use of RPI-linked gilts was proposed in March 2018 and decided on in July 2018. At that time, we did not receive strong objections.
- 3.28 Network company arguments focus on a theory that RPI-linked gilt prices are distorted. However, our view is that the evidence provided by network companies: (a) does not show that one risk-free tenor is more distorted than others; (b) did not explain why any distortion would invalidate asset pricing models such as CAPM, and (c) did not provide detailed options or analysis for alternatives. In particular, our point (b) is closely related to the 'price of tomatoes' argument that is outlined in the UKRN Study, that market based prices are reliable. The UKRN study argued "we see no reason to treat the market for indexed debt differently to the market for tomatoes" and referred to following rationale²³:

"When you shop for a salad, all you care about is the price of tomatoes. Whether tomatoes are expensive because the trucks got stuck in bad weather or because of an irrational bubble in the tomato futures market makes no difference to your decision."

- 3.29 In proposing nominal gilts, network companies did not address in detail how we would derive CPIH-real, and in particular, network companies and NERA did not address the fact that nominal gilts will include an inflation-risk-premium. We note that in 2012, network companies argued that the inflation risk premium is material. For example, in response to the RIIO-1 strategy document in 2012, National Grid and SGN estimated that an inflation risk premium is worth 30bps (see NG response²⁴, and SGN response²⁵).
- 3.30 We see two methods for deriving CPIH-real risk-free rates: 1) starting from nominal gilts (as suggested by network companies), or 2) starting from RPI-linked gilts (as proposed in the December Finance Annex at paragraph 3.47). The difference between these methods should be, after adjusting for risk, relatively small.
- 3.31 We believe this issue is worth further and more detailed consideration. In doing so, we would need to consider the: (a) appropriate tenor, (b) how to account for

²² See the December Finance Annex paragraph 3.37 onwards.

²³ This quote can be traced back to an article by John H. Cochrane, published in The Journal of Finance, Vol 66, August 2011, pp1047-1108.

²⁴ See page 55 here: <https://www.ofgem.gov.uk/sites/default/files/docs/2012/10/nqgd-ip-response-sept12---finance-and-uncertainty.pdf#page=55>

²⁵ See page 34 here: https://www.ofgem.gov.uk/sites/default/files/docs/2012/09/sgn_riioqd1ip_response_-_redacted.pdf#page=32

inflation, and (c) the size of the inflation risk premium (to compare methods). We will propose an updated approach at Draft Determinations.

Our analysis of responses to FQ7 (Do you agree with using the October month average of the Bank of England database series IUDLRZC to set the risk-free rate ahead of each financial year?)

- 3.32 In our view, the difference between using monthly averages or annual averages does not jeopardise the methodology generally. We note that there is no clear agreement from networks on whether 6-month or 12-month averages is preferred. We also note suggestions that the relevant period for averaging could be the relevant price control year (SGN). However, we believe that to use the data for the allowed return within the year of the allowed return would invalidate our view that the cost of equity is, by definition, an expectation.
- 3.33 Networks will be familiar with the cost of debt approach – it is also based on periods exclusively prior to the financial year in question. We do not believe that using the relevant year increases the accuracy of estimating the cost of capital or that we should necessarily use it for setting allowed returns. We disagree with ENWL’s view that inflation expectations are being used to deflate “the nominal WACC” – we do not estimate a nominal WACC – to do so could imply that networks are exposed to inflation-risk. Instead, we estimate a real WACC, in light of the fact that networks are not exposed to inflation risk on capital investments.
- 3.34 We also note that a longer trailing average will delay any rate rises being reflected in price control allowances. We are, however, content to consider this issue further, proposing an updated approach at Draft Determinations.

Our analysis of responses to FQ8 (Do you agree with our proposal to derive CPIH real from RPI-linked gilts by adding an expected RPI-CPIH wedge?)

- 3.35 We note that issues raised are somewhat inseparable from those raised for FQ6. We do, however, provide additional thoughts on the issues raised by companies.
- 3.36 There are inconsistencies in some network companies’ (NG, NPG and SSEN) arguments, relative to their responses to other questions. To argue that prices for government bonds cannot be trusted, due to their reference to RPI, would be inconsistent with arguments that we should continue to assess Total Market Returns as if RPI continued to be the best available measure of inflation (see responses to TMR questions where companies’ arguments imply that we must use RPI as the best expectation of inflation).
- 3.37 We acknowledge the concerns from SPEN and SGN that breakeven measures of inflation were very different for 20-year and 10-year tenors - although as we noted in our December Finance Annex, shorter tenors would provide for a more volatile measure of risk-free. In effect, there are different properties for different tenors and something of a trade-off to consider. It was therefore not immediately obvious that we should necessarily use nominal gilts (particularly without adjusting for the inflation-risk-premium) rather than using shorter tenors for RPI-linked gilts.
- 3.38 We do not agree with NGN's argument that adding a wedge is more complex than other options and it was unclear why NGN believe a wedge adjustment would be less transparent. It was also unclear which distortions NGN were referring to. In addition, NGN did not propose any distortion-addressing solutions.

- 3.39 We do not agree that there is any role for an inflation 'true-up'. In our view, the cost of equity is an expectation, not something that can be observed, and therefore we cannot obtain 'truth'. Similarly, if the cost of equity is not observable, there cannot, therefore, be an observable 'forecast error'. The proposal to use equity indexation is in part driven by a desire to best estimate expectations, using the most recently available data, rather than a desire to revisit allowances to correct a difference between expectations and outturns.
- 3.40 We disagree with ENWL's suggestion that the inflation adjustment should be aligned to inflation expectations over the regulatory period. To do so would considerably shorten the investment horizon, and contradict our decision in July 2018 to consider a long-horizon approach for all cost of capital components. We continue to believe that the cost of capital should be estimated over a long horizon, and propose to do this consistently for all aspects of the cost of capital, including debt and equity, and therefore, a long horizon is necessary for estimating real costs of debt and real costs of equity.

Decision

- 3.41 Based on consultation responses and our updated analysis, we have decided to:
- implement equity indexation by updating the allowed return on equity to reflect changes in the risk-free rate only, referring to data prior to the financial year beginning, and to long-horizon inflation forecasts (t+5 from OBR).
 - re-consider the exact calibration of how this is done, including the method for deriving CPIH (or CPI) real values, the averaging period and the relevant tenor. We will propose an updated approach at Draft Determinations.

Next steps

- 3.42 In our view, the methodology proposed in the December Finance Annex for estimating and updating the risk-free rate remains suitable for business planning purposes.
- 3.43 We will make detailed implementation and calibration proposals at Draft Determinations.

Table 6: Risk-free rate and the forward curve, 20yr tenor, as at 29th March 2019

Component	2022	2023	2024	2025	2026	Average	Ref	Source
Risk-free rate (RPI, spot)	-1.99%	-1.99%	-1.99%	-1.99%	-1.99%	-1.99%	A	Bank of England
Forward curve (RPI)	0.11%	0.17%	0.22%	0.26%	0.30%	0.21%	B	Bank of England
Risk-free rate (RPI, forward) ²⁶	-1.88%	-1.82%	-1.77%	-1.73%	-1.69%	-1.78%	C	C = A+B
Risk-free rate (CPIH, spot)	-0.96%	-0.96%	-0.96%	-0.96%	-0.96%	-0.96%	D	$D = (1+A) * (1+1.049\%)^{-1}$
Risk-free rate (CPIH, forward)	-0.85%	-0.79%	-0.74%	-0.70%	-0.66%	-0.75%	E	$E = (1+C) * (1+1.049\%)^{-1}$
Uplift (CPIH)	0.11%	0.17%	0.22%	0.26%	0.30%	0.22%	F	F = E - D

²⁶ Forward rates are consistent with our proposed methodology to use risk-free rates for periods prior to the financial year beginning. For example, the rate -1.88% for year ending March 2022 represents the value that we derive for the beginning of October 2020.

Total Market Returns

Framework Consultation and Framework Decision

- 3.44 In the Framework Consultation (March 2018), we proposed to estimate the TMR by considering the historical long-run average of market returns as the best single objective estimate of investors' expectations of the future. We proposed to take account of the findings of the Competition Commission in the Northern Ireland Electricity appeal (2014) as well as forward-looking approaches indicated recently by other regulators such as Ofwat and CAA. The Framework Consultation referred to the UKRN Study, and an estimation of the long-run historical average for TMR being 6-7% in CPI terms (and 5-6% in RPI terms).
- 3.45 In our Framework Decision (July 2018), we decided to implement our preferred TMR approach – that the best objective measure of TMR is the long-run outturn average, while also placing due weight on forward-looking approaches.

December proposals and consultation questions

- 3.46 In the Sector Specific Consultation (December 2018), we addressed in detail three of the primary arguments made by network companies that we had incorrectly interpreted outturn data. We also provided a reconciliation from previous advice we received (2003 and 2006) to more recent advice we received in 2018 via the UKRN Study.
- 3.47 To reflect the fact that two of the three main arguments raised by network companies regarded inflation, we sought to consider outturn data in alternative ways, to avoid any bias or over-reliance on our preferred approach. We did this by considering outturn real returns in US dollar (\$) terms for both the UK and world markets. We took comfort from the fact that US dollar returns for both UK and world markets were lower than our estimation of UK real returns. We also took comfort from the fact that a larger arithmetic uplift (as advocated by network companies) on US-dollar based returns gives the same results for real returns (6-7% CPI), as recommended by the UKRN Study.
- 3.48 To supplement this, we cross-checked the proposed TMR range in two ways. First, we cross-checked to an updated Dividend Growth Model from our consultants, CEPA, which indicated a nominal TMR of just above 8% nominal (approximately equal to 6% real CPIH). Second, we cross-checked to TMR estimates from investment managers and advisors, highlighting that the data indicated a TMR of 6.6% nominal (approximately equal to 4.6% CPIH real).
- 3.49 Based on our methodology and updated analysis, we proposed a working assumption for the TMR of 6.25% to 6.75% CPIH real.
- 3.50 We asked stakeholders the following three questions:
- FQ9. Do you have any views on our assessment of the issues stakeholders raised with us regarding outturn inflation, expected inflation, and the calculation of arithmetic uplift (from geometric returns)?
 - FQ10. Do you have any views on our interpretation of the UKRN Study regarding the TMR of 6-7% in CPI terms and our 6.25% to 6.75% CPIH real working assumption range based on the range of evidence?

- FQ11. Do you have any views on our reconciliation of the UKRN Study to previous advice received on TMR as outlined at Appendix 2?

Summary of stakeholder views

3.51 In general, our proposed methodology divided opinion, particularly our proposal to focus on long-run outturn averages of market returns as the best single objective estimate of investors' expectations. Citizens Advice and Centrica raised concerns that our focus on long-run averages is upwardly biased, given that other measures, including our cross-checks using the Dividend Growth Model and expert forecasts, point towards much lower values. On the other hand, network companies continued to support our approach to focus on long-run outturn averages, but continued to disagree with how we have interpreted available data, while raising concerns about which data we should focus on.

A summary of responses to FQ9 (Do you have any views on our assessment of the issues stakeholders raised with us regarding outturn inflation, expected inflation, and the calculation of arithmetic uplift (from geometric returns)?)

- 3.52 Stakeholders generally repeated their already-stated views, presenting some new evidence in places. All the network companies repeated their view that outturn averages must be interpreted in RPI terms (RPI must be added to outturn values, or, if CPI is to be added, the real value must increase by the difference between RPI and CPI). All the network companies stated again their disagreement with the UKRN approach to assume a lower uplift from arithmetic to geometric returns.
- 3.53 Some network companies (NG, SGN, NGN and ENWL) argued, based on advice from NERA, that the Bank of England's dataset could not be relied upon as a valid measure of CPI.
- 3.54 NG argued that we should use different data periods, starting from 1825 or from 1950, instead of 1900, and that we should use different data sources (rather than rely on the dataset from Dimson Marsh Staunton). NG also provided a report from AON on 14th April (dated 6 March 2019) on how outturn data could be interpreted.
- 3.55 SGN argued that the way Ofgem interpreted the outturn TMR data was not NPV neutral.
- 3.56 Citizens Advice suggested that we should supplement outturn TMR values with a simulation of expected returns for the years 2020-2023. Citizens Advice argued that this would be a useful way of combining outturn TMR data with various expectations of TMR for the additional four years, from 2019 to 2023. This would, Citizens Advice argued, be more appropriate for RIIO-2 as 2023 would be the relevant mid-point for investor expectations. Centrica considered that our TMR assumption remained overly generous.

A summary of responses to FQ10 (Do you have any views on our interpretation of the UKRN Study regarding the TMR of 6-7% in CPI terms and our 6.25% to 6.75% CPIH real working assumption range based on the range of evidence?)

- 3.57 Network companies did not disagree with our interpretation of, but did disagree with the approach taken in, the UKRN Study. Network companies continued to argue that the working assumption TMR range we proposed (6.25% to 6.75% real CPIH) was too low and that the TMR cross-checks were inappropriate or incorrectly estimated.

- 3.58 Network companies (Cadent, SGN, WWU, NGN) argued, while typically referring to advice from NERA, that CEPA's DGM model was unreliable for various reasons. Network Companies repeated arguments that the Bank of England model gives higher results, adding that dividend growth should be based on international GDP rather than UK GDP. Cadent referred us to NERA's report, which shows that Bank of England estimates for dividend growth are based on analyst forecasts, arguing that these may not be biased, stating that CMA evidence is now out-of-date. NERA argued that, contrary to other research, it found no systematic decline on the TMR based on survey evidence.
- 3.59 NG argued that the evidence supports a TMR range of 6.2% to 7.2% relative to RPI, updating its March 2018 reference (7% relative to RPI).
- 3.60 SGN argued that DGM inputs should be sourced from independent organisations and WWU suggested that DGM inputs should be sourced from Bloomberg.
- 3.61 SGN recommend that at least 1.7% is added to the geometric averages in line with regulatory precedent.
- 3.62 Network companies referred to arguments by Oxera regarding TMR projections by the investment management industry. Oxera argued that the estimates by investment managers were out of line for three reasons:
- These values are underpinned by prudence, reflecting regulations from the Financial Conduct Authority.
 - Academics and practitioners put little weight on survey evidence.
 - Geometric averages require upward adjustment.
- 3.63 Network companies also referred to arguments by KPMG regarding TMR projections by the investment management industry. KPMG argued that:
- The Vanguard forecast is based on a 40% bond portfolio and queried whether it should be excluded for this reason.
 - The Willis Tower Watson forecast represents actual hedged returns rather than a forward-looking estimate and is therefore likely to be biased downwards.
 - The TMR projections may not be reliable due to various issues, such as: sampling bias, lack of comparability, inconsistent time horizons, different methodologies, lack of transparency, and interpreting ranges.
 - The use of a mean to determine the average, as opposed to a median, is distorted by outlying data points.
- 3.64 ENWL argued that we should not rely fully on the UKRN Study and stated its belief that there is subjectivity involved when interpreting historical data.
- 3.65 Citizens Advice and Centrica did not raise major concerns with Ofgem's interpretation of the UKRN Study. Centrica stated that it was not clear how Ofgem arrived at the proposed 6.25% to 6.75% range and encouraged Ofgem to consider if it had placed sufficient weight on the TMR cross-checks.

A summary of responses to FQ11 (Do you have any views on our reconciliation of the UKRN Study to previous advice received on TMR as outlined at Appendix 2?)

- 3.66 Network companies did not disagree with our reconciliation but argued that the breakdown could be presented differently. Network companies also disagreed with two approaches taken in the UKRN Study that led to lower estimation of real returns (using Bank of England's estimation of inflation and the lower implied arithmetic uplift).
- 3.67 NG stated that the decrease can be attributed to three factors: a reduction in average long-run returns; a view that inflation expectations are CPI not RPI; and, a lower arithmetic uplift.
- 3.68 Cadent believe that Ofgem's efforts are very useful but that they did not change its view on the fundamental issues for assessing the TMR.
- 3.69 SPEN, ENWL and NPG argued that another 100bps is missing from the reconciliation (a reference to the 2018 real return being relative to CPI whereas the 2003 and 2006 returns being relative to RPI).
- 3.70 NGN suggested that Ofgem should provide stakeholders with an explicit consideration of the predictability factor.
- 3.71 SSEN argued that the adjustment undertaken by Ofgem (a reference to interpreting real returns relative to CPI rather than RPI) is novel and not reliable.

Analysis

Our analysis of responses to FQ9 (Do you have any views on our assessment of the issues stakeholders raised with us regarding outturn inflation, expected inflation, and the calculation of arithmetic uplift (from geometric returns)?)

- 3.72 Responses confirm that there are differences in opinion regarding the optimal methodology and the most appropriate way to interpret outturn data.
- 3.73 We are not persuaded that outturn inflation data from the Bank of England (BoE) is unreliable. We agree however, that the BoE approach is different from the approach typically taken by Dimson Marsh Staunton (DMS) regarding outturn inflation.²⁷ The DMS approach, up to the 2017 publication, suffers from out-of-date weighting information by using expenditure weights from 1904. We note the following research from O'Neill et al:

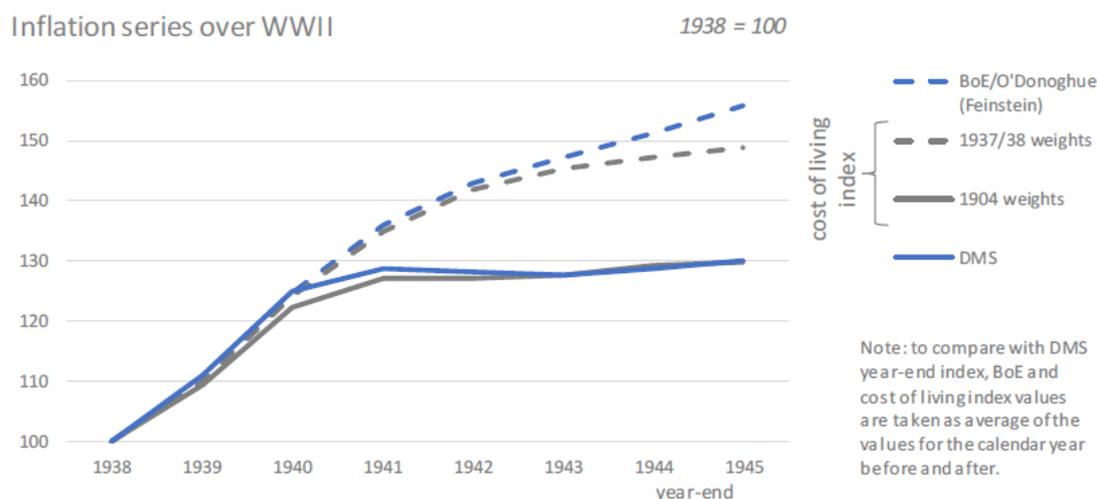
*"While prices were captured every month by staff working in local labour exchanges, the 1904 data for the expenditure shares for different types of goods was not updated during the 1910s, 1920s and into the 1930s; indeed a new household expenditure survey wasn't carried out until 1937/1938. The cost of living index was widely criticised for its use of out-of-date weighting information. As a result of the outbreak of World War II, the new weighting information wasn't implemented until after the war was over."*²⁸

²⁷ DMS have changed, on multiple occasions, their sources for outturn inflation. See Appendix 2 for more information on our review of NERA's arguments (Consultancy Study 7). The most recent DMS publication in March 2019, refers to O'Neill & Ralph.

²⁸ See 'Inflation: History and Measurement', Robert O'Neill (University of Huddersfield), Jeff Ralph and Paul A Smith (University of Southampton), 2017, p12. These three authors previously worked for the Office for National Statistics.

- 3.74 In our view, the BoE approach appears to overcome these issues as demonstrated by the chart below (comparing to the approach taken by DMS prior to 2017). This helps explain why the BoE inflation estimation is higher than the pre-2017 DMS approach.

Figure 3: Inflation series during World War II, 1938 = 100



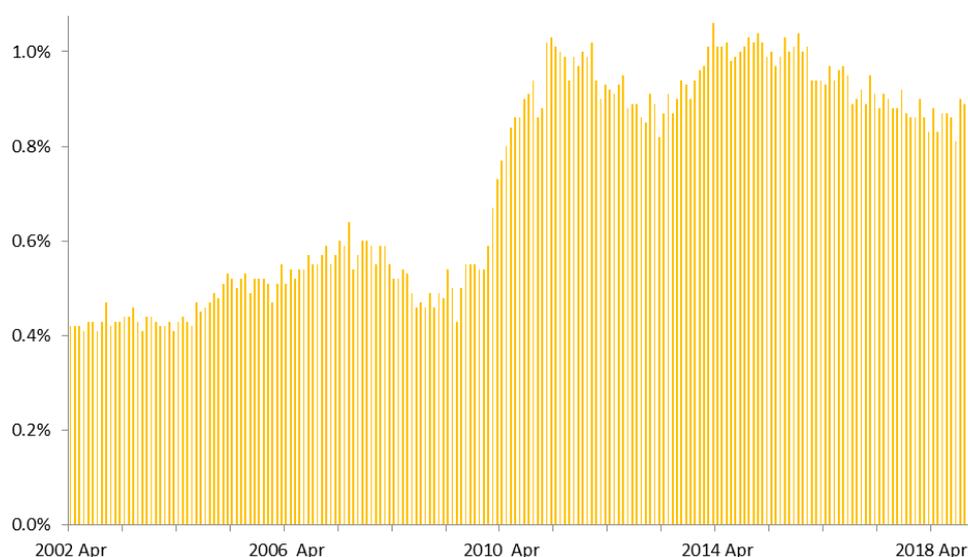
Source: Ofgem, based on analysis by the UKRN cost of capital group

- 3.75 We are therefore not persuaded by arguments made by NG, SGN, NGN and ENWL that BoE data on outturn inflation cannot be relied upon. We also consider that investors would today consider CPI or CPIH the best proxy for inflation expectations in assessing a real return. This is supported by evidence from investors and issues highlighted since 2010 on the use of RPI as an inflation statistic. This is a neutral approach because we are using the best information available to us to estimate the TMR, which we would do regardless of whether we continued to set allowed returns relative to RPI or CPI/H.
- 3.76 We were not persuaded by NG's argument that we should use different outturn periods for estimating the TMR. NG suggested that we should use data from 1950 onwards. However, of the 66 years from 1950 to 2016, 51 have had positive returns (77% of the sample) - therefore, reliance on this period alone, as suggested, without good reason for discarding the other data, seems unduly biased.
- 3.77 We also note that to focus on the sample from 1900 is consistent with our approach for RIIO-1. In this period, we find 86 years of positive returns from the 117-year sample (73%) - therefore on this basis, it appears that the 20th century has more positive bias than negative. This also makes it doubtful that there may be a disaster-bias by including the first 50 years of the 20th century, as argued by AON.
- 3.78 We do note however that AON's argument appears to be partly based on the thesis that negative returns can be more impactful than the positive returns. However, AON did not demonstrate clearly that this theory is unduly affecting the period from 1900 onwards.
- 3.79 Similarly, we were not convinced that we should increase our data sample to include most of the 1800s - it is widely known that data going back so far in history may not be reliable. For example, Jorion and Goetzmann (1999) argue:

*"Long-term estimates of expected return on equities are typically derived from U.S data only. There are reasons to suspect that these estimates are subject to survivorship, as the United States is arguably the most successful capitalist system in the world.... The high equity premium obtained for U.S. equities appears to be the exception rather than the rule."*²⁹

- 3.80 AON noted that the DMS data may underestimate outturn inflation. As our analysis above shows, and contrary to NG's arguments, we agree with AON that this appears to be the case. AON also noted that it is useful to consider returns in USD terms given the uncertainties of inflation data in the UK. We agree with AON, and as we noted in our consultation, this is one of the reasons US dollar returns are used as a cross-check. We note AON's argument that outturn TMR should be considered in global terms, contrary to NG arguments that we should use DMS UK returns (NG argued that, after adding 1.8% (for arithmetic uplift) to UK realised geometric returns of 5.48%, the resulting real TMR is 7.3% real-RPI). Taken together, the AON analysis reminds us that our interpretation, and the UKRN recommendation, of outturn TMR data, is conservative.
- 3.81 We disagree with SGN that we have not interpreted TMR data in a neutral way. Similarly, we disagree that RPI is the best ex-ante expectation of inflation to us at this time. The main issue here is that network companies assume that RPI measurement is consistent and reliable. However, as Figure 4 below shows, RPI systematically changed in 2010 due to changes in the way that the Office for National Statistics collected clothing costs.³⁰ The change in clothing costs had a knock-on effect on the formula effect³¹, making it much larger than it previously was. This provides strong evidence that: a) CPI is a more reliable measure of inflation; and b) that Real RPI returns are lower from 2010 onwards.

Figure 4: An update on the formula effect due to changes in RPI



Source: Ofgem analysis of ONS data

²⁹ Jorion and Goetzmann (1999), *Global Stock Markets in the Twentieth Century*.

³⁰ Ofgem identified this issue in December 2013 making an adjustment to equity returns of 0.4%.

³¹ Different formulae are used in the CPI and RPI. This causes a difference between the measures of inflation and is therefore called the 'formula effect'.

3.82 We also refer network companies to:

- The fact that world returns and US dollar returns can more safely be interpreted in CPI terms than RPI terms.³²
- The Johnson review in 2015 regarding issues with RPI and the recommendation that regulators avoid reliance on it as a measure of inflation.³³
- The House of Lords paper in 2018 regarding the ongoing issues with RPI.³⁴

3.83 We remain comfortable with the arithmetic uplift implied in the UKRN Study. Advice from NERA appeared to misinterpret the UKRN Study by assuming that an adjustment of 1% had been made to the simple arithmetic mean of realised returns to derive the lower bound 6% real TMR. Network companies and Oxera also suggested that we should adjust simple arithmetic means rather than adjust geometric means. We are not persuaded by this, noting that adjusting geometric means upwards is, in our view, established precedent. See, for example, the Barclays Equity Gilt Study, Smithers & Co³⁵ and Triumph of the Optimists (Dimson Marsh Staunton).

3.84 The suggestion by Citizens Advice to simulate returns to the period 2023 is creative, and persuasive. To do so would combine outturn data with expectations in a way that will help us understand what the future outturn value will be by the mid-point of GD2 and T2, and prior to our decisions on ED2. We can do this by making two additional assumptions: a) that the standard deviation of future annual returns will be similar to previous years; and b) that future returns are expected to revolve around a certain mean. We do not, however, expect this analysis to significantly change our view and note that Citizens Advice did not provide an estimation of the impact in its response.

A summary of responses to FQ10 (Do you have any views on our interpretation of the UKRN Study regarding the TMR of 6-7% in CPI terms and our 6.25% to 6.75% CPIH real working assumption range based on the range of evidence?)

3.85 Responses confirm that network companies disagree with the approach taken in the UKRN Study and the 6.25% to 6.75% working assumption, arguing that both are downwards-biased. To address concerns raised by Centrica and network companies, in particular regarding our TMR cross-checks, we provide updated analysis below.

3.86 Regarding the DGM, we remain sceptical of whether the BoE model is appropriate for informing price control decisions. We note the following guidance from the BoE in 2017:

"...investors' true dividend expectations cannot be observed, so any proxy for these used in a DDM, whether derived from analyst surveys or GDP forecasts, is necessarily only an approximation.... Given the uncertainty associated with measuring the ERP, the Bank's analysis

³² See Appendix D by Derry Pickford: <https://www.ukrn.org.uk/wp-content/uploads/2018/11/2018-CoE-Study.pdf#page=109>

³³ https://www.statisticsauthority.gov.uk/wp-content/uploads/2015/12/images-ukconsumerpricestatisticsarevie_tcm97-44345.pdf#page=15

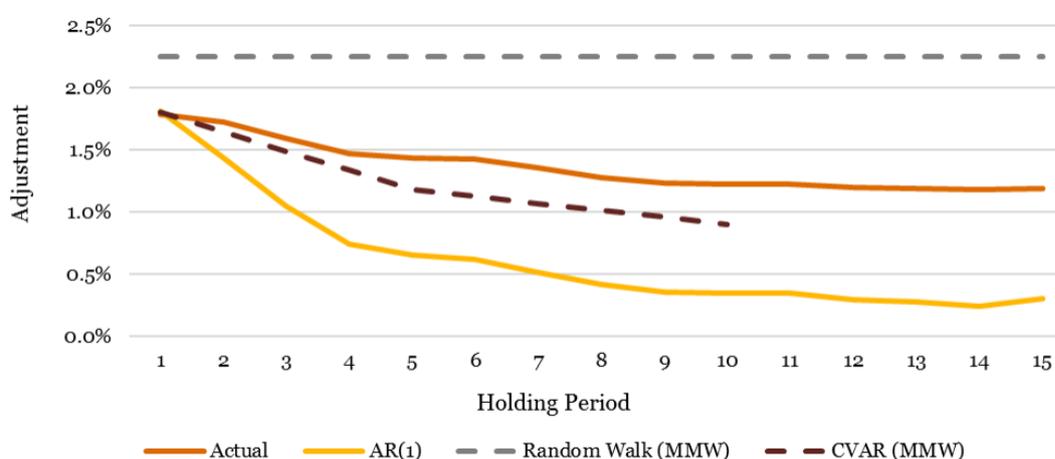
³⁴ <https://www.parliament.uk/business/committees/committees-a-z/lords-select/economic-affairs-committee/news-parliament-2017/measuring-inflation-report-publication/>

³⁵ <https://www.ofgem.gov.uk/ofgem-publications/50794/2198-jointregscoc.pdf>

tends to focus less on the precise level of the ERP and more on changes in the ERP over time or on the level of the ERP relative to historic averages."³⁶

- 3.87 Contrary to the BoE’s approach, we asked CEPA to focus on the precise level, not the changes over time, to provide information on the TMR expectations. We therefore believe that the BoE DGM is less appropriate for our purposes than the CEPA approach. In addition, by relying on analyst forecasts for GDP growth the BoE model is liable to bias. We noted a contradiction in network company arguments that analyst forecasts should be relied upon (heavily) in the DGM but not in our cross-checks with investment manager forecasts.
- 3.88 SGN argued that Bloomberg published an estimate of TMR for many years and WWU stated that it expected Ofgem to source a DGM estimate from Bloomberg. However, SGN and WWU did not provide any evidence on these Bloomberg estimates or explain why the Bloomberg approach was superior to the approach taken by CEPA. As noted in our December Finance Annex, CEPA’s DGM uses Bloomberg inputs.
- 3.89 SGN did not provide evidence to support its argument that "at least 1.7% is added to the geometric averages" aside from a claim that to do so would be in line with regulatory precedent. We note that the regulatory precedent has been to add 1% to 2% to derive a range, which is 1.5% on average, not 1.7%. We did however collect information from the Civil Aviation Authority (CAA) on this issue (see Figure 5 below). In its work for the CAA, PwC’s analysis supports an upward adjustment to the geometric mean of around 0.4-1.3% for a 10-year holding period, towards the lower end of the 1-2% range in the UKRN Study.

Figure 5: PwC’s analysis of adjustment to the geometric mean under different return models and for different holding periods



Source: CAA proposals (Feb, 2019) for NERL price control³⁷

- 3.90 Oxera's arguments on investment management forecasts are useful.
- We did not find sufficient evidence to support Oxera’s argument that the Financial Conduct Authority (FCA) had biased their range downwards. Oxera’s analysis may simply highlight that the FCA put more weight on historical

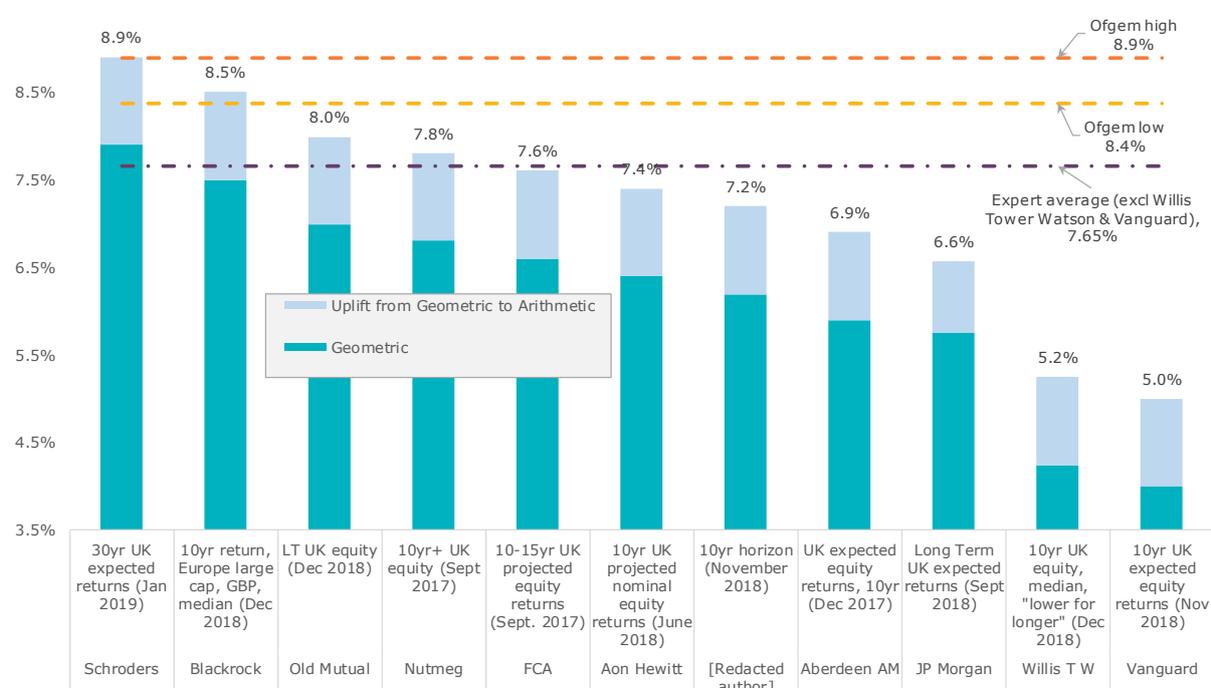
³⁶ 'An improved model for understanding equity prices' 2017, p93. <https://www.bankofengland.co.uk/-/media/boe/files/quarterly-bulletin/2017/an-improved-model-for-understanding-equity-prices>

³⁷ https://consultations.caa.co.uk/economic-regulation/reference-period-3-draft-performance-plan-proposal-1/supporting_documents/CAP%201758A.pdf#page=33

returns rather than forward-looking models. In any event, it was not clear how the FCA values could be adjusted to correct for any bias, based on Oxera’s claim.

- It is possible that academics and practitioners put less weight on survey evidence than on other evidence.
- We contacted the investment managers and received confirmation that their published values are in geometric terms. We therefore agree with Oxera that geometric averages may need upward adjustment. Oxera suggested an uplift of 2% but it is much less clear to us that this quantum is appropriate. As shown at Figure 6 below, in the absence of arithmetic values from the publishers, we assume an uplift of 1%, which we believe is appropriate based on the JP Morgan publication (which implies a differential between arithmetic and geometric forecasts of 0.82%).³⁸ Note that this simplification is for demonstration purposes and may not be appropriate for all values.

Figure 6: Total Market Returns, investment management forecasts (nominal)



Source: Ofgem analysis, discussions with publishers and recent publications

3.91 We also provide additional evidence at Appendix 4 to show how return forecasts change with the investment horizon.

3.92 We considered the arguments by KPMG regarding the TMR projections from the investment management industry. These issues are addressed below:

- The Vanguard forecast appears to be, as KPMG argued, based on a 40% bond portfolio and therefore it may be downward-biased for our purposes. For this reason, we exclude it from the average presented in Figure 6 above.

³⁸ See here: <https://am.jpmorgan.com/blob-qim/1383582205822/83456/JPM51230%20LTCMA%202019%20-%20EMEA.PDF#page=104>

- The Willis Tower Watson forecast appears to be, as KPMG argued, based on hedged returns rather than a forward-looking estimate. We therefore exclude it from the average presented in the chart above.
 - The forecasts presented in December are, as KPMG argued, potentially unreliable for a number of reasons, such as inconsistent time horizons. We address these issues by harmonising, as far as possible, the time horizons we present within Figure 6 above.
- 3.93 We agree with KPMG that the use of the mean to determine the average, as opposed to the median, resulted in the December average being approximately 21 basis points lower. In Figure 6 above, the mean is 7.65% whereas the median is, in this case, marginally lower at 7.60%. Given the small sample, we err on the upside, and continue to show a simple mean.
- 3.94 We agree with ENWL that we should not rely fully on the UKRN Study and that there is a subjective nature when interpreting historical data for ex-ante purposes. For these reasons, we continue to place weight on TMR cross-checks and the full range of evidence on the ex-ante TMR.
- 3.95 We agree with Centrica that we should be as clear as possible in terms of how we have arrived at the proposed 6.25% to 6.75% range and the weight we place on TMR cross-checks. In our approach, the TMR cross-checks provide supplementary evidence – some judgement is needed to interpret these and we believe we have provided the best clarity possible in the circumstances.

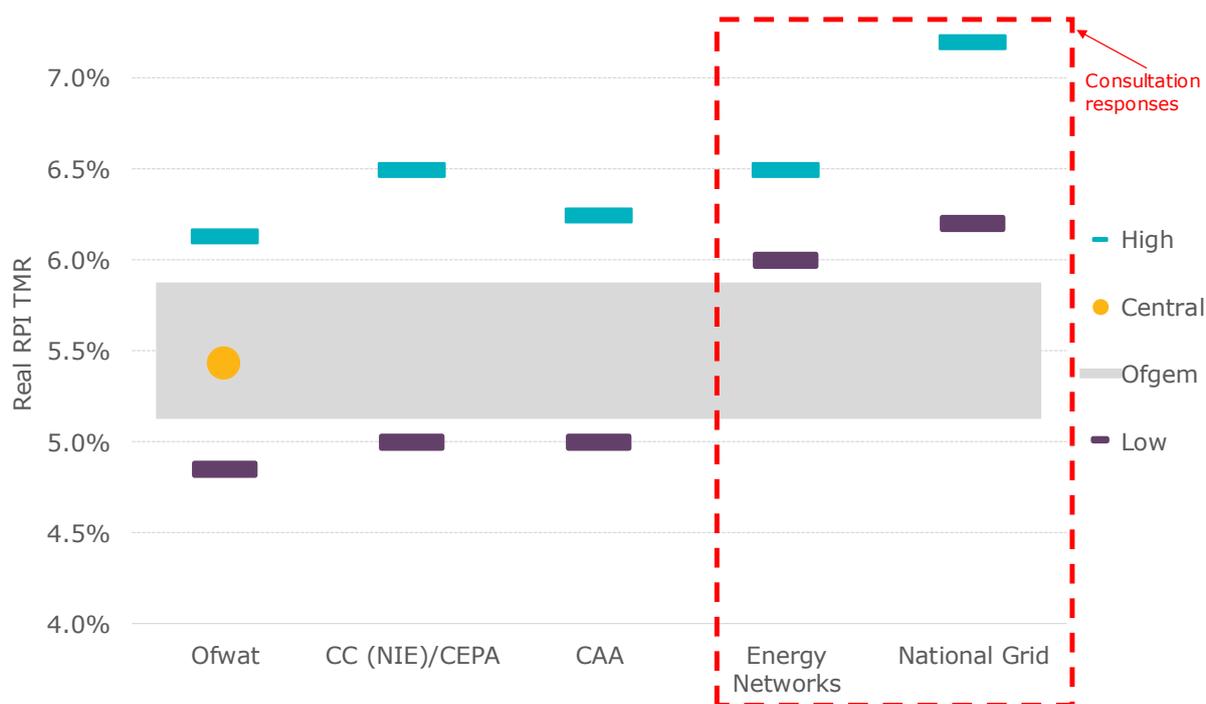
Responses to FQ11 (Do you have any views on our reconciliation of the UKRN Study to previous advice received on TMR as outlined at Appendix 2)

- 3.96 Responses confirm that stakeholders find the reconciliation we provided useful. The reconciliation is important because it shows areas where the UKRN Study takes a more conservative (upward-biased) approach than previous advice that we received in 2003 and 2006. As noted above, AON's advice to National Grid argues that the capital should be liquid internationally and therefore a focus on international TMR is reasonable. In this regard, the 2018 UKRN Study may be upward-biased due to an apparent focus on UK returns.
- 3.97 We disagree with NG's characterisation that the decrease in TMR can be attributed to three factors. There are other factors, including a material off-setting increase due to a focus on UK returns in the 2018 UKRN Study relative to previous advice, putting less weight on international returns.
- 3.98 We disagree with SPEN, ENWL and NPG that 100bps is missing from the reconciliation – this is described separately in the consultation with additional information provided in this document with regards to how RPI and CPI have changed over time. The issue here, as described above, is that RPI is not a consistent measure over time, so it is wrong to assume that RPI post 2010 is similar to RPI pre 2010 (see formula effect in Figure 4 above).
- 3.99 We note NGN's suggestion that we should provide an explicit consideration of the predictability factor. However, it did not appear to us that this factor was materially affecting the UKRN Study, particularly in light of the information on World and US dollar returns.
- 3.100 We disagree with SSEN's argument that the approach taken by Ofgem is novel and not reliable. A similar issue on TMR was addressed during the RIIO-ED1

consultations, so our approach is not novel.³⁹ We also believe our approach is reliable given the information on cross-checks and the changes in inflation indices and the well-documented issues with the reliability of RPI as a measure of inflation.

3.101 In general, our interpretation is consistent with three recent UK regulatory precedents as presented at Figure 7 below. We contrast these precedents with consultation responses we received.

Figure 7: Current positions on the Total Market Return⁴⁰



Source: Ofgem analysis of regulatory precedents and consultation responses

3.102 The chart above shows NG’s response⁴¹ is not fully consistent with the SSEN presentation of the Energy Network’s view. We therefore present both views.

Decision

3.103 Based on consultation responses and our updated analysis as set out above, we have updated our evidence base as follows:

- We continue to believe that the UKRN Study provides a robust recommendation that the TMR is between 6% and 7% CPIH real.

³⁹ See here:

https://www.ofgem.gov.uk/sites/default/files/docs/2013/12/consultation_on_equity_market_return_methodology_letter_0.pdf#page=11

⁴⁰ Ofwat (2017, December) 'Appendix 12: Aligning risk and return'

Competition Commission (2014, March) 'Northern Ireland Electricity Limited price determination'

CAA (2019), NERL, Appendices to Draft UK Reference Period 3

Energy Networks' 'Industry' view as per SSEN (2019, March) 'RIIO-2 Sector Specific Consultation' page 23

National Grid (2019, March) 'National Grid response to Ofgem Consultation - Finance' page 34

⁴¹ National Grid argued "The TMR range should instead be increased, to 6.2% to 7.2% relative to RPI (equivalent to 7.3% to 8.3% relative to CPI, using Ofgem’s assumed c.1% wedge for RPI-CPI). The balance of evidence supports a value at or in the top half of this range..."

- The DGM cross-check indicates a TMR return of approximately 8% nominal, or 6% CPIH real (after deducting 2% for the CPIH expectation and ignoring the Fisher equation for simplicity).
- The expert forecasts continue to indicate a TMR below our proposed range, although this evidence indicates a higher number than presented in December. This cross-check now indicates 7.65% nominal, or 5.5% CPIH real (after deducting 2% for the CPIH expectation using the Fisher equation).

3.104 Given our analysis as summarised above, we have decided:

- To apply our proposed methodology to focus on long-run average returns while placing due weight on TMR cross-checks.
- To re-present our TMR range of 6.25% to 6.75% CPIH-real as a working assumption (see Table 7 below), which we believe is conservative in light of the range of reasonable evidence.

Table 7: Total Market Return range relative to CPIH

Component	Low	High
Total Market Return	6.25%	6.75%

Next steps

3.105 We will update our dataset and assessments for draft determinations in Q2 2020.

Equity beta

Framework Consultation and Framework Decision

3.106 In the Framework Consultation (March 2018), we proposed that we would estimate forward-looking equity betas by looking at the historical correlations between the share prices of regulated utilities and a stock market index such as the FTSE All-Share index. We proposed to consider informing our estimate of equity beta by making use of sophisticated econometric techniques such as those referenced in the UKRN Study, to filter out noise from the underlying datasets. We also proposed to investigate the appropriate measures of translating between raw equity betas and notional (asset or equity) betas for network companies.

3.107 In the Framework Decision (July 2018), we decided to investigate further the issues involved in estimating equity beta. We also re-iterated our intention to look deeper at the relationship between gearing and beta risk.

Sector Specific Consultation

3.108 In the Sector Specific Consultation (December 2018), we published, and summarised, two consultancy studies that had been undertaken, by Indepen Ltd and by Dr Robertson. We also addressed various issues that were raised by stakeholders during 2018 (for example in response to the Framework consultation in March 2018 or that were raised in workshops and bilaterals with stakeholders between July and December 2018). These included arguments raised by network companies and suggestions by Citizens Advice and Centrica.

3.109 We also presented a notional beta range, showing how raw equity beta⁴² values (0.6 to 0.7) translated into notional equity beta values (0.646 to 0.762), based on assumptions for gearing (actual, adjusted actual and notional) and debt beta.

3.110 We did not identify a central estimate, noting that it was, at that time, appropriate to assume a consistent equity beta range across the sectors and companies pending our review of: a) company business plans, and b) the overall systematic risk of the RIIO-2 price control.

3.111 We asked stakeholders the following four questions:

- FQ12. Do you have any views on our assessment of the issues that stakeholders raised regarding beta estimation, including the consideration of: all UK outturn data, different data frequencies, long-run sample periods, advanced econometric techniques, de-gearing and re-gearing, and the focus on UK companies?
- FQ13. What is your view on Dr Robertson's report?
- FQ14. What is your view on Indepen's report?
- FQ15. What is your view of the proposed Ofgem approach with respect to beta?

Summary of stakeholder views

3.112 In general, stakeholders did not provide significant challenges on the raw equity beta evidence. The main concern, as raised by network companies and Citizens Advice, was the method that we demonstrated to account for financial risk (converting the raw equity into a notional equity beta).

3.113 The RIIO-2 Challenge Group argued that the range for equity beta is too generous, that betas are much lower over a long horizon and given the tendency of beta to mean revert, it would likely reduce over the period of RIIO-2. In addition, the RIIO-2 Challenge Group highlighted an inconsistency between the TMR approach (using over 100 years of data) and the beta approach that is based on much shorter periods. The RIIO-2 Challenge Group argued that *"these companies have a fairly low risk profile with their principal residual risk, which is regulatory risk, very much contained by the RIIO framework"*.

3.114 Stakeholders understand clearly the various issues regarding estimation. Stakeholders also engaged in detail with the research and analysis we provided in the consultancy studies by Indepen and Dr Robertson. These studies helped to crystallise areas of agreement amongst stakeholders, with some recommendations from the studies being more acceptable than others.

3.115 There is an implied consensus amongst stakeholders that we should continue to focus on outturn information in order to estimate an appropriate notional beta for RIIO-2. For example, stakeholders focused on how we interpreted historical data without proposing alternative approaches to better estimate the future. In addition, stakeholders saw benefits in different methods of econometric analysis and the consideration of different time periods. In terms of looking backwards, considering different econometric approaches and considering a variety of time

⁴² The 'raw equity beta' is a term we use to refer to the systematic risk that we derive from outturn market data on share price movements.

periods, we find general support amongst stakeholders for our proposed methodology.

A summary of responses to FQ12 (Do you have any views on our assessment of the issues that stakeholders raised regarding beta estimation...)

3.116 Network companies argued that 1) they continued to have different views for various reasons, and 2) the notional equity beta range, provided as a working assumption, was wrong, primarily because of two issues related to gearing. First, the actual outturn gearing was lower than Ofgem estimated and second, that the EV to RAV ratio (1.1) should not be used when deriving a notional equity beta from underlying market data. Centrica and Citizens Advice did not raise concerns with how we had addressed issues raised prior to December (but did raise concerns with our approach to estimating financial risk - see FQ15 below).

3.117 In summary, network companies argued that:

- we made errors when estimating outturn gearing and were wrong to use the EV to RAV ratio within the conversion process.
- the EV to RAV ratio (1.1:1) is, i) a double-count of the allowed-expected return adjustment by assuming that the equity beta is lower as a result of expected outperformance; ii) is not supported by the data; and, iii) puts undue reliance on the water companies. NERA argued that the use of this ratio should be, for consistency reasons, mindful of: a) applying the return-on-equity to the EV rather than the RAV; and b) using a notional gearing weighting for equity rather than market gearing.
- the calculation of debt beta may not be reliable.
- each listed stock should be individually de-gearred and re-gearred, reflecting the average of its gearing over the period which corresponds to the beta estimation period.
- we should retain the traditional approach, as per regulatory precedent, with regards to taking account of differences between observed gearing and notional gearing.
- it was wrong to not carry out a risk disaggregation process, for example by disaggregating NG's observable beta into sub-betas for UK and US operations. NG argued that if its beta was disaggregated it would imply a markedly higher asset (and equity) beta for the UK Networks.
- we should place weight on equity betas for network companies from outside the UK.
- more weight should be placed on shorter-term results with some network companies arguing that these shorter time periods should be between two and five years. Some cautioned against the use of long-horizon data.
- raw betas are not reliable in setting or cross-checking allowed returns for RIIO-2.

A summary of responses to FQ13 (views on Dr Robertson's report) and FQ14 (views on Indepen's report)

3.118 NG and SSEN argued, alongside NERA, that the two consultancy studies were inconsistent with each other, and/or contradictory.

- 3.119 SPEN argued that the Robertson report provides a similar view to the Indepen report in terms of views on: using high frequency data (eg daily or weekly instead of quarterly), and recognising structural breaks.
- 3.120 Cadent stated that the Robertson report is useful to understand the relative merits of different approaches to beta assessment. WPD stated that the Robertson report provided a clear articulation of the application of the GARCH estimation method in light of heteroscedasticity and how GARCH estimation in theory will provide more precise estimates of beta. WPD argued that GARCH will provide a more statistically precise estimation in a period where beta varies around a long-term level. WPD also argued that it is only the long run level that will be relevant.
- 3.121 All network companies disagreed with the Indepen report in two ways. First, network companies disagreed that raw equity betas could be used as a cross-check on notional equity betas. Second, network companies disagreed that the EV to RAV ratio should be used to estimate gearing.
- 3.122 Most network companies explicitly agreed with the Indepen approach of using: high frequency data (daily or weekly instead of quarterly), Ordinary Least Squares as an estimation technique, and to consider the potential impact of structural breaks.
- 3.123 WWU argued, as did Citizens Advice, that market equity betas should be de-gearred with market gearing ratios for consistency.
- 3.124 SPEN, NGN, NPG, ENWL, WPD, and UKPN argued that GARCH may have limited value or does not provide a basis for moving away from traditional practice.

A summary of responses to FQ15 (views on Ofgem's proposed approach with respect to beta)

- 3.125 Responses demonstrate large differences of opinion between stakeholders. All the network companies disagreed with the values Ofgem used for de-gearing and re-gearing, whereas Citizens Advice and Centrica believe that Ofgem's approach is upwardly-biased, noting that the low end of the presented range is too high.

A summary of network company arguments in response to FQ15

- 3.126 All companies agreed that raw equity betas should be adjusted for gearing but argued that the adjustment should be much larger than the consultation document demonstrated, resulting in a much larger increase from raw equity beta to the notional equity beta. For example, NG and Cadent argued that the notional equity beta could be, after accounting for re-gearing effects, as large as 1.1.
- 3.127 NG and SPEN argued that Ofgem's approach was inconsistent with Indepen's, although NG noted that the results are, in either case, very similar.
- 3.128 WPD argued that Ofgem's approach implies that network companies are significantly less risky than before, even though investor risk is, in WPD's view, increasing.
- 3.129 SPEN argued that the debt beta assumption (0.1 to 0.15) is not well supported and referred to a CMA reference (on the Bristol Water appeal) that debt beta has very little impact. UKPN also challenged the debt beta assumption.
- 3.130 SGN argued that there are GDN-specific risks around asset stranding and operational leverage. However, NERA argued, in advice to SPEN dated 19th April 2019 (submitted to us after the consultation closed), that Transmission Operators

face higher risks than most other energy networks due to: complexity of investment, competition risks, and asset stranding.

3.131 KPMG, in a report for Cadent, argued that there were eight RIIO-2 mechanisms that could decrease risk, as follows:

- Reduced Totex Incentive Rate
- Real Price Effect indexation (all three methods)
- Return Adjustment Mechanisms
- Output Delivery Incentives
- The Investment assessment
- Corporation tax changes
- Pensions deficit funding (admin and PPF levy)
- GD2-specific uncertainty mechanisms

3.132 KPMG also argued, in the same report for Cadent, that, excluding the CPIH transition, there were nine RIIO-2 mechanisms that could increase risk, as follows:

- Rebasing of cost allowances (including loss of interpolation and adjustment for workflow)
- Price Control Deliverables
- Output targets
- Enhancing competition
- Business plan incentive
- Cashflow Floor
- Cost of Equity indexation
- Whole Systems Solutions
- Licence obligations

A summary of arguments from Citizens Advice and Centrica in response to FQ15

3.133 Citizens Advice argued that if we are not willing to move lower than the stated beta range, then it should stick to the lowest end presented (0.6). Citizens Advice and Centrica argued that Ofgem's range was higher than the recommendation from Indepen (0.55 to 0.7).

3.134 Citizens Advice considered that our re-gearing adjustment is generous for two reasons. First, Citizens Advice believe that, to estimate notional beta, market data is more reliable and relevant than relying on the method of de-gearing and re-gearing. Second, even if re-gearing is applied, we should use the market value of debt rather than the book values, in line with investors and practitioners. Citizens Advice argued that to base risk assessments on book values, would wrongly imply that borrowing via derivatives or leases (or other off-balance-sheet items) does not have any impact on the risk profile of the borrower.

3.135 Centrica argued that:

- OLS may overstate the true value of beta as it fails to take into account the movement of beta over time.
- Ofgem is correct to consider how beta changes over time and to adopt a non-zero debt beta.
- CEPA research shows that the gearing relationship does not hold in the short run. In Centrica's view, the relationship between asset beta and equity beta does not therefore hold in the short run and that regulators should therefore use long time horizons.
- Ofgem's reliance on proxies, such as NG and SSE, could lead to an overestimation in the beta estimates.
- Ofgem's estimates are higher than international comparisons including the USA, Canada and Australia.

3.136 Centrica also argued that RIIO-2 will be lower risk than RIIO-1 for the following reasons:

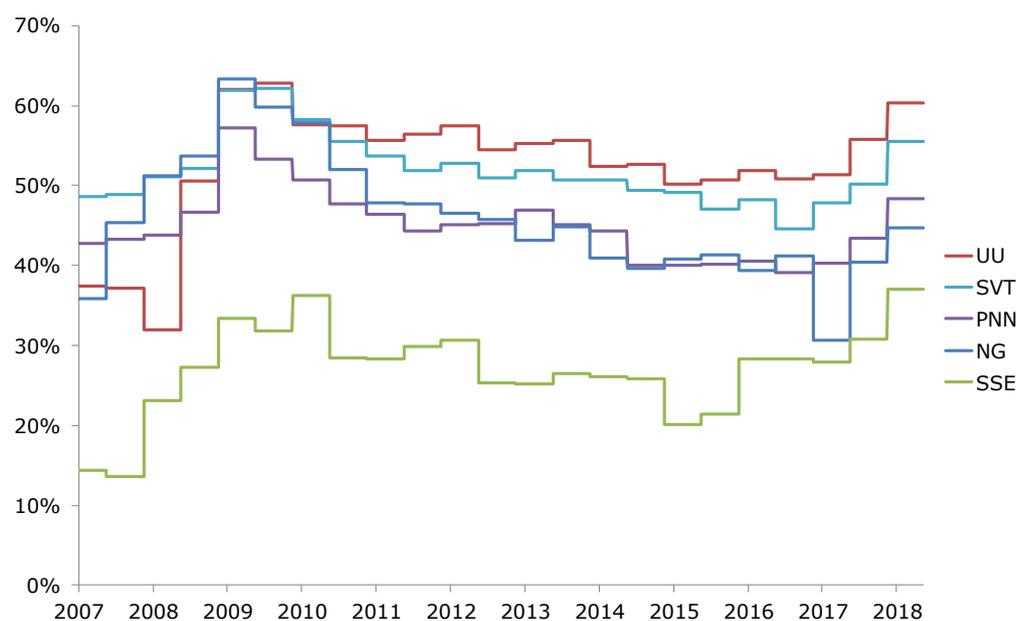
- equity indexation,
- Return Adjustment Mechanisms,
- indexing Real Price Effects,
- any pass-through of tax,
- new uncertainty mechanisms,
- lower incentive rates,
- a shorter price control, and
- a cashflow floor.

Analysis

Analysis of responses to FQ12 (Do you have any views on our assessment of the issues that stakeholders raised regarding beta estimation, including the consideration of: all UK outturn data, different data frequencies, long-run sample periods, advanced econometric techniques, de-gearing and re-gearing, and the focus on UK companies?)

3.137 We revisited our approach to gearing in light of stakeholder arguments. The issue raised by network companies is that gearing should, in their view, be measured over the same period that the raw equity beta is measured.

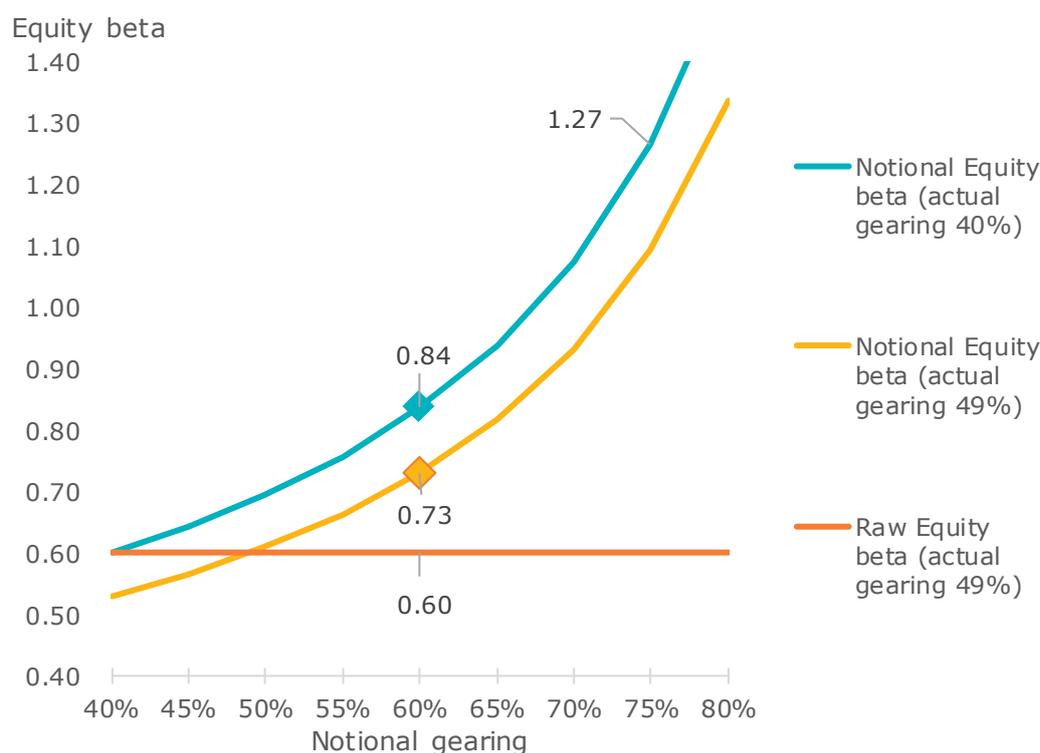
3.138 Retaining the same gearing definition from the consultation (Net Debt / enterprise value) but excluding hybrid debt, we observe the following values over time for our five proxy stocks:

Figure 8: Measuring outturn Net Debt/Enterprise Value

Source: Ofgem analysis of Bloomberg data

3.139 We can see that the values are typically higher in 2018 than the immediately preceding years, and generally lower than values as far back as 2010. The thrust of the network companies' argument is that if equity beta is adjusted for gearing, then the relevant gearing measure is observed outturn gearing, rather than the most recent value, for consistency with share price movements that are observed over the same period.

3.140 When gearing is low (high), there is low (high) financial risk. By extension, if the notional company has higher gearing than actual companies, then the notional company will have higher financial risk than the actual company, and the raw equity beta should arguably be adjusted upwards to reflect this financial risk. We demonstrate this below at Figure 9.

Figure 9: Relationship between raw equity beta, notional equity beta and gearing

Source: Ofgem's stylised analysis

3.141 As shown in Figure 9, when actual gearing and notional gearing are equal, there is no difference between raw and notional equity beta (these are the points on the chart where the lines intersect). We can also see that, the greater (smaller) the difference between actual and notional gearing, the greater (smaller) the impact on the equity beta. Using this logic, if the notional company is 75% geared and the actual company is 40% geared, then the equity beta would more than double, from 0.6 to 1.27. This is the primary reason why Cadent and NG argue that the notional equity beta could be 1.1 and why SSEN argued that the 'Industry' view on equity beta is at least 0.93.

3.142 Taking outturn values for gearing, as suggested by the network companies, gives actual gearing values of approximately 43% over the previous 5 years (to September 2018) or 44% over the full sample of data available (17.5 years to September 2018).⁴³ We take these values into account in our updated working assumption.

3.143 The second main argument made by the network companies is that the EV:RAV ratio (the December Finance Annex assumed a ratio of 1.1) should not be taken into account when estimating gearing. The network companies argued that it was not appropriate to use this ratio to adjust gearing, particularly when setting a forward-looking cost of equity because the future enterprise value may be in line with the RAV value. In any case, the network companies argued that to use it (the EV:RAV ratio) to estimate risk would be a double count of the Allowed versus Expected returns adjustment.

⁴³ On a book net debt to enterprise value basis, ignoring hybrid debt and the market value of debt, for simplicity.

3.144 However, we are not persuaded by this. The flaw in the network companies' argument is, in our view, to argue that we should use some outturn data (low ND/EV) while excluding other outturn data (a positive EV:RAV ratio), coupled with an inconsistency in gearing definitions, using ND/EV when de-gearing but ND/RAV when re-gearing.

3.145 To address company arguments on the quantum of the EV:RAV ratio, we re-considered whether the working assumption in the consultation (1.1) remained appropriate. The research in Figure 10 was published by Barclays on 29th January 2019:

Figure 10: Barclays research on premium/ discount to RAB values



Source: Barclays Research estimates, Ofwat and Company data

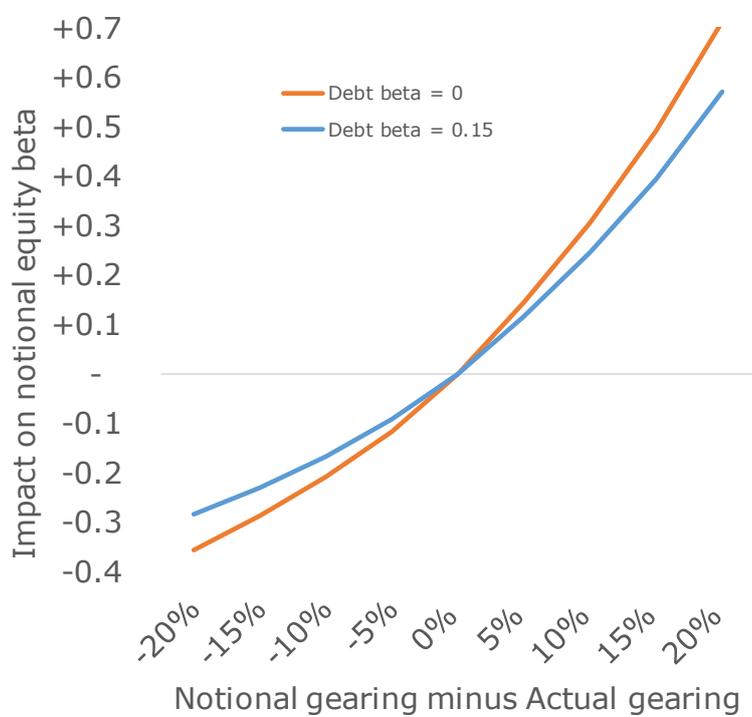
3.146 This independent research shows that the "Premium / Discount to RAV" (analogous to the EV:RAV ratio) can rise and fall. Barclays argue that it appears to drop prior to, and peak after, regulatory announcements. In Barclays view, this cycle reflects the intuition that uncertainty peaks prior to regulatory announcements (premiums therefore fall) and reduces immediately after (premiums therefore rise). In our view, this research supports our December assumption and an EV:RAV ratio of 1:1 (analogous to 10% on the Barclays chart).

3.147 Network companies criticised the debt beta range that we presented in December (0.1 to 0.15), arguing, with support from NERA, that it was too high. An accurate estimation of debt beta is important for the same reason that accurate estimations of gearing are important: both are required to convert the observed equity beta into a notional equity beta.

3.148 Intuitively, the debt beta represents non-diversifiable risk borne by debt investors. It is required because the full effects of financial risk are not borne by equity investors alone, because companies are typically financed by both equity and debt (as is the case for the actual and notional companies for RIIO-2). A higher (lower)

debt beta implies that a higher (lower) proportion of systematic risk is borne by debt investors. Therefore, a higher (lower) proportion of systematic risk being borne by debt investors results in a lower (higher) impact of gearing adjustments to equity beta. This effect is displayed graphically below in Figure 11.

Figure 11: The relationship between notional equity beta, debt beta and gearing



Source: Ofgem stylised analysis

3.149 As we can see in Figure 11, a lower debt beta increases the sensitivity of gearing adjustments, unless notional gearing is equivalent to actual gearing. We checked the range we presented in the consultation (0.1 to 0.15) against regulatory precedent and academic research as presented below in Figure 12.

Figure 12: Regulatory precedents and academic research on debt beta

Regulatory Precedent	Decision/consultation	Date	Debt Beta
Ofgem RIIO-T1	Decision	2012	no debt beta
Ofgem RIIO-GD1	Decision	2012	no debt beta
Ofgem RIIO ED1	Decision	2014	no debt beta
Ofgem/CEPA RIIO-2	Consultation	2018	0
CAA Heathrow/Gatwick Q6	Decision	2014	0.1
CAA/PwC H7	Consultation	2017	0.05
CMA NIE	Decision	2014	0.05
CMA Bristol	Decision	2015	0
Owat PR14	Decision	2014	0
Owat PR19 final methodology	Early view	2017	0.1
Oofcom (BC market review)	Decision	2013	0.15
Oofcom (FA market review)	Decision	2014	0.1
Oofcom (MCT market review)	Decision	2015	0.1
Oofcom (BC market review)	Decision	2016	0.1
Oofcom (WLA market review)	Decision	2018	0.1

Authors	Date	Rating	Debt Beta
Fama & French	2002	BBB	0.22
		A	0.21
		AA	0.20
Schaefer & Strebulaev	2008	-	0.04
Damodaran	2012	A	0.125
Brealey & Myers	2013	-	0.00 - 0.20
Brattle Group	2016	BBB+ to BBB-	0.10
		AAA to A-	0.05

Source: NERA analysis⁴⁴

- 3.150 Referring to this evidence, NERA advised Ofcom that a debt beta assumption of 0.1 was appropriate. NERA's analysis and advice to Ofcom supports our view that the debt beta can be assumed to be in the range of 0.1 to 0.15. Network companies did not justify in detail, or provide any additional analysis that warranted, a lower assumption.
- 3.151 We applied our gearing adjustment by company, as suggested, taking into account observed values of actual gearing for each of the five proxy companies. See Appendix 5 for sensitivity analysis that addresses this issue.
- 3.152 Network companies asked us to retain the traditional approach, as per regulatory precedent, with regards to taking account of differences between observed gearing and notional gearing. In our view, our methodology is consistent with traditional approaches - see Appendix 5 for sensitivity analysis on this.
- 3.153 Network companies asked us to disaggregate National Grid's beta into sub-betas for UK and US operations. However, network companies did not sufficiently address the issues identified in the Indepen report with regards to the difficulties with international risk assessment. The evidence provided was not persuasive and we note that companies did not attempt to disaggregate SSE's risk into component parts, taking into account SSE's riskier generation assets, for example.
- 3.154 We remain unconvinced by arguments from network companies, Oxera and NERA, that we should place material weight on non-UK beta evidence. We note that the suggestion to do so appears to be based on the observation that stocks outside the UK tend to have higher observed betas. In all likelihood these higher betas are driven by risk differences. It is difficult to place weight on international evidence without a clear basis for the benefits and a clear understanding of the risk differences.
- 3.155 We remain unconvinced that we should place material weight on short-term equity beta results. Statistically, we believe this is dubious and intuitively we do not think there is materially more information content within short-term (eg 2 to 5-year) beta values compared to long-run values. Our strong view is that the noise to signal ratio is particularly high within short-term results. We also observe a mean-reversion effect within the data - we therefore believe that long runs of data will help us to see through the cycle, avoiding undue bias on high-points or low-points within the short-term date.

⁴⁴ Collected from NERA's advice to Ofcom dated 11th October 2018 "Cost of Capital: Beta and Gearing for 2019 BCMR" https://www.ofcom.org.uk/data/assets/pdf_file/0018/124740/nera-wacc-report.pdf p 43-44

3.156 We remain unconvinced that raw betas should be discarded. We continue to believe that adjusting raw equity betas for gearing may not be perfectly accurate, particularly given issues with estimating gearing and particularly when there are material differences between actual and notional gearing.

Our analysis of responses to FQ13 (views on Dr Robertson's report) and FQ14 (views on Indepen's report)

3.157 We do not believe that the Robertson report is unduly inconsistent with the Indepen report, as implied by NG, SSEN and NERA. In our view, both reports are constructive and complementary. We note that SPEN and other network companies support both consultancy studies in terms of assessing high frequency data and to recognise structural breaks.

3.158 We agree with Cadent and WPD that the Robertson report is useful and that the merits of GARCH can be clearly understood based on this work. We agree with WPD that GARCH can provide a more precise estimation in a period where beta varies around a long-term level, and that the long-run level is particularly relevant.

3.159 Network companies disagreed with the Indepen approach to adjust gearing for the EV to RAV ratio, but did not explain in detail how to address the issue that Indepen identified.

3.160 We agree with WWU and Citizens Advice that market equity betas should be adjusted by market gearing ratios for consistency, although we note that this is not something that was addressed by the Robertson or Indepen reports. We address the market value of debt within our analysis of FQ15 below.

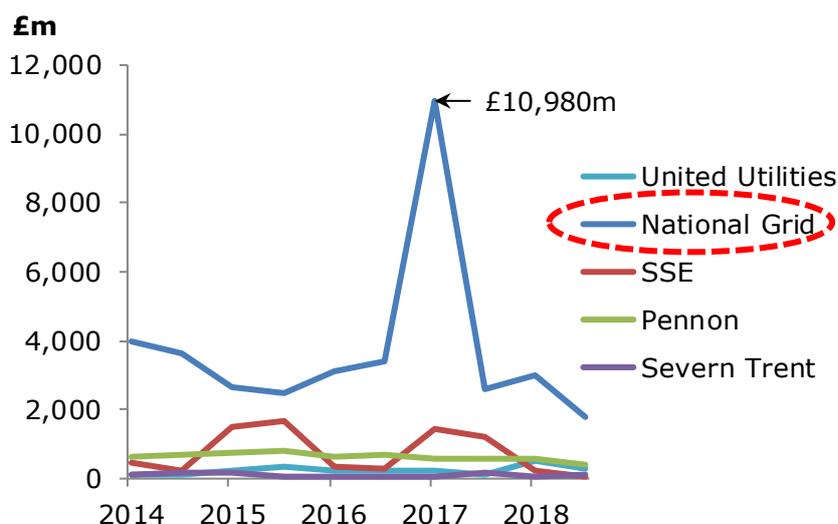
3.161 We are not persuaded by network company arguments that GARCH has limited value or that it does not provide a basis for moving away from traditional practice. In our view, it is particularly dangerous to combine OLS with short-run data (as advocated by network companies). The Robertson report highlights that OLS is not designed to account for time-variation, unlike GARCH⁴⁵. Network companies (SPEN, NGN, NPG, ENWL, WPD and UKPN) did not identify a way addressing the weaknesses of OLS, particularly for small samples of data.

Our analysis of responses to FQ15 (What is your view of the proposed Ofgem approach with respect to beta?) from network companies

3.162 In our view, company arguments for a higher beta are almost exclusively dependent on estimating and adjusting for gearing. We considered whether the historical measures of gearing may be unreliable for any reason. We find that the outturn gearing may be downward-biased due to a large amount of cash (£11bn of short-term investments) on NG's balance sheet at 31st March 2017. We display this graphically below in Figure 13.

⁴⁵ To demonstrate the benefits of GARCH, we set out the following simplified two-period example. The first period has a covariance of 1 and a variance of 1.5 (thus an equity beta of $1/1.5 = 0.67$) and the second period has a covariance of 1.5 and a variance of 1 (and thus an equity beta of 1.5). The companies argue that we should rely primarily on OLS to take an average of the two periods, implying an equity beta of 1.1. However, unlike OLS, which would take an average of the ratios, GARCH is designed to take a ratio of the averages, implying an equity beta of 1 (the average covariance is 1.25 and the average variance is 1.25, therefore the average equity beta is 1). Therefore, GARCH is designed to account for time-variation.

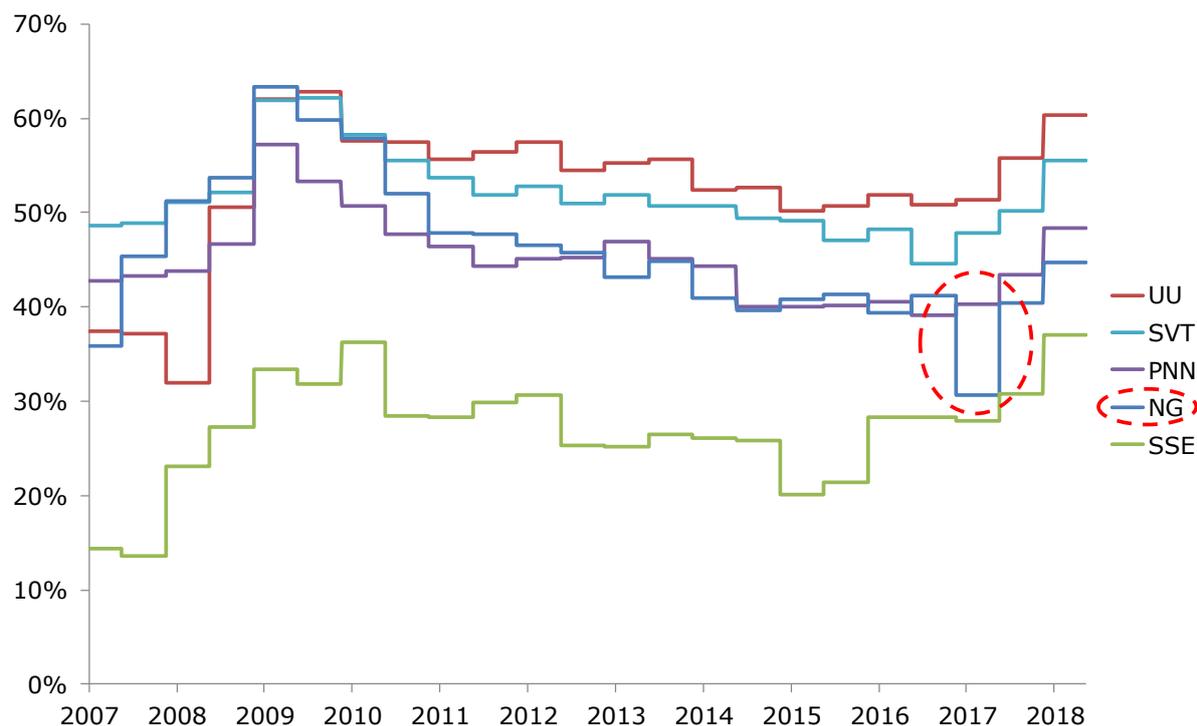
Figure 13: Spike in cash



Source: Ofgem analysis of Bloomberg data ('Cash and marketable securities')

3.163 This spike in cash reduces measured gearing due to the use of 'net debt', as highlighted in Figure 14 below.

Figure 14: Measuring outturn Net Debt / Enterprise Value, highlighting cash spike impact



Source: Ofgem analysis of Bloomberg data

3.164 This cash balance could be one-off in nature, and could unduly increase the re-gearing adjustment that companies seek. Network companies did not address this issue in their consultation responses. In our view, a long-run of outturn data will help to smooth any such outliers.

- 3.165 We note that NG and SPEN argue that Ofgem's approach is inconsistent with Indepen's, in terms of adjusting equity beta for gearing. We agree with NG that results are, using either approach, very similar. The issue that NG and SPEN are referring to appears to be that the Indepen report refers to Net debt / EV, for both actual and notional gearing.⁴⁶ The approach demonstrated in the consultation is Net debt / RAV, for both actual and notional gearing. We are happy to consider further which approach is more appropriate, making firm proposals at draft determinations.
- 3.166 WPD did not provide substantial evidence to support its view that risks were increasing or higher than risks borne during RIIO-1.
- 3.167 SPEN's argument that the debt beta is not well supported is inconsistent with NERA's advice to Ofcom (as set out above). We believe the updated debt beta evidence above supports the assumption outlined in the December Finance Annex.
- 3.168 SGN did not provide substantial evidence on asset stranding and operational leverage risks. NERA's advice to SPEN, that Transmission Operators faced higher risks than most other networks, is more substantial but still anecdotal. Asset stranding, in their own view, is a risk for both SGN and SPEN, and therefore not a differential risk. Similarly, competition risk applies to both the distribution and transmission sectors. It was also unclear how complexity of investment was related to systematic risk, in NERA's view.
- 3.169 KPMG's review of RIIO-2 mechanisms, in terms of risk effects, was more substantial, and more balanced, than the issues raised by SGN, SPEN or NERA. However, KPMG's view on increased risk seems to lack a link to systematic risk, and therefore CAPM, to allow us to interpret this safely when setting the cost of equity. For example,
- KPMG's view that rebasing of cost allowances would increase risk seems to relate to 'change' rather than 'systematic risk'. The process for setting cost allowances can change at each price control without necessarily increasing risk.
 - Cost of equity indexation would seem to reduce the risk that an ex-ante fixed allowance is out of line with market rates (therefore reducing the risk of regulatory error). Interest-rate risk is generally recognised as being systematic in nature, and therefore, to reallocate the risk of movements onto consumers would appear to be a lowering of risk for investors.

Our analysis of responses to FQ15 from Citizens Advice and Centrica

- 3.170 We agree with Citizens Advice and Centrica that a wider range of raw equity beta values should form part of our range, as recommended by the Indepen Study. We therefore update our working assumption in this regard to 0.55 to 0.70 for raw equity beta.
- 3.171 Using market values of debt, as advised by Citizens Advice, is in line with our understanding of practitioner and academic recommendations. Using market values, rather than book values, for net debt results in a higher value for outturn gearing. We estimate that actual gearing is approximately 45% to 46% once we take this into account (the lower value consistent with a long horizon of 10-17.5

⁴⁶ See page 33 of the Indepen report:

https://www.ofgem.gov.uk/system/files/docs/2018/12/final_beta_project_riio_2_report_december_17_2018_0.pdf#page=45

years and the high end consistent with a 5-year horizons, ending September 2018).

- 3.172 We agree with Centrica that OLS may overstate the true beta. This, however, is not provable because the true beta is unobservable. Our approach to utilise a long-run of data and to conduct sensitivities on this, will help to overcome some of the limitations with OLS.
- 3.173 We understand that Centrica are referring to CEPA research dated 2010.⁴⁷ We agree with Centrica that this is relevant for RIIO-2, particularly in light of stakeholder concerns around: 1) adjusting for gearing; and, 2) using short or long time horizons. We believe that the underpinning theory for gearing adjustments is more likely to be accurate over long time horizons. We would make two observations. First, the relationship between gearing and risk is likely to be more reliable over the long term. Second, the estimation of systematic risk is likely to be more accurate when using larger samples of data. We therefore think these two issues are complementary.
- 3.174 Centrica's suggestion to consider international data for risk assessment is not supplemented with a detailed approach on avoiding international risk issues. As per the Indepen report, it appears that international risk assessments may have limited value. Centrica did not provide analysis or submissions that change our current view on this.
- 3.175 We note Centrica's arguments regarding the risk comparison between RIIO-2 and RIIO-1. We note that some of the RIIO-2 mechanisms that Centrica believe will reduce risk (equity indexation, cashflow floor) are also the same changes that KPMG believe will increase risk. This highlights the difficulty that stakeholders have in reaching consensus on risk issues.

Decision

3.176 In light of stakeholder responses, we have decided:

- That we will estimate the raw equity beta by focusing on outturn data over long periods of time of at least 5 years, primarily using OLS, with GARCH as a cross-check.
- That we will adjust for gearing by considering outturn data over the same time periods of at least 5 years. Our estimation of gearing will reflect our estimation of EV:RAV and of the market value of debt. In our view, adjustments for outturn gearing are not safely separable from the outturn market data on EV:RAV or the market value of debt.
- The relevant proxy sample includes five companies (SSE, NG, UU, SVT and PNN). We will consider at Draft Determination the weight we attach to each company, in light of the relevance for RIIO-2 given for example arguments made about SSE, by NERA, Oxera and CEPA.
- At Draft Determinations we will re-consider evidence submitted on risk, alongside a consideration of risk implied within business plans. We will propose at draft determinations whether there are (systematic) risk differences between sectors or notional companies.

⁴⁷ "Short-term relationship between equity and asset betas" <https://www.ofgem.gov.uk/ofgem-publications/52014/short-term-relationship-between-asset-and-equity-betas-cepa-2010pdf>

Next steps

3.177 Based on stakeholder views and our updated analysis, our working assumption for the cost of equity is higher than that presented in the December Finance Annex. The mid-point of our notional equity beta range is 0.75 rather than 0.7. Our mid-point for the CAPM-implied spot cost of equity is 4.7% rather than the 4.4%⁴⁸ presented in December. The increase of 0.3% is due to:

- outturn Net Debt / EV gearing being lower when we take an average of historical data rather than the most recent observation;
- the low end of the raw equity beta range now being 0.55 instead of 0.6, and
- the introduction of a Market Value Factor (of between 1.03 and 1.06), for both the low-end and high-end of our range, in order to account for the market values of debt being larger than the book values.

3.178 The working assumption is provided below at Table 8.

Table 8: Working assumption for the notional equity beta range

Component	Low	Mid	High	Ref	Source
Raw Equity beta	0.55	0.63	0.70	A	Low value = 17.5-year period, High value = 5-year period. Both to Sept 2018
Book Value Gearing: net debt/EV	43.5%	43.4%	43.2%	B1	As per Bloomberg. See Table 29
Market Value Factor	1.03	1.04	1.06	B2	See Table 31, Financial Accounts and Bloomberg.
EV/RAV	1.10	1.10	1.10	C	Ofgem judgement based on outturn values for long-run
Adjusted Gearing: net debt/RAV	49.2%	49.8%	50.3%	D	$D = B1 * B2 * C$
Debt beta	0.15	0.125	0.10	E	Ofgem judgement based on precedent and academic research
Asset beta	0.35	0.38	0.40	F	$F = A * (1 - D) + E * D$
Notional gearing	60%	60%	60%	G	Working assumption
Notional equity beta	0.66	0.75	0.85	H	$H = [F - (G * E)] / (1 - G)$

3.179 To supplement our RIIO-2 approach to beta, as set out in Table 8, which we accept is sensitive to the underlying cut-off point (September 2018) and the estimation of underlying components (including for A, B1, B2 and C), we provide a more general sensitivity analysis at Appendix 5 (including for raw equity betas, asset betas and notional equity betas). This additional analysis supports our working assumptions for asset beta (of 0.35 to 0.40) and the notional equity beta (of 0.66 to 0.85).

Summary of CAPM evidence for the cost of equity

3.180 Table 9 below provides a summary of the CAPM evidence for each of the underlying parameters as discussed above.

⁴⁸ See Sector Specific Consultation, Finance Annex, Table 13. The CPIH range presented was 3.79% to 4.98%. The simple average of these is 4.4%. Given the sensitivity of the values to re-gearing, we now present a mid-point that takes into account the re-gearing effect, taking the average of the underlying inputs.

Table 9: CAPM-implied cost of equity, GD2 and T2 average, in CPIH terms

	Low	Mid	High	Ref	Source
Risk-free rate ⁴⁹	-0.75%	-0.75%	-0.75%	A	Table 6
Notional equity beta	0.66	0.75	0.85	B	Table 8, supported by Appendix 5
Total Market Return	6.25%	6.50%	6.75%	C	Table 7
Cost of equity	3.87%	4.71%	5.63%	D	$D = A + B * (C-A)$

Step 2 - Cross-checking the CAPM-implied cost of equity

Introduction

3.181 Step 2 is designed to check CAPM results against other information on equity investor expectations. Doing so helps provide assurance that the estimate for the cost of equity is not unduly influenced by individual or combined CAPM parameters, all of which have a degree of uncertainty.

3.182 In the sections below, we summarise consultation questions, responses, and set out our updated analysis.

Framework Consultation and Framework Decision

3.183 In the Framework Consultation (March 2018), we proposed to sense-check the results of the CAPM calculation against evidence from:

- Market to Asset Ratios (MARs), and
- returns bid by investors in competitions run by Ofgem (Offshore Transmission Owners (OFTOs)).

3.184 In the Framework Decision (July 2018), we confirmed that we would cross-check the CAPM using these proxies.

Sector Specific Consultation

3.185 In the Sector Specific Consultation (December 2018), we proposed to include two more cross-checks on CAPM evidence. We referred to these as:

- professional forecasts from investment managers and advisors, and
- infrastructure fund discount rates.

3.186 We set out how evidence for these four cross-checks could be interpreted. We can summarise this as follows:

- MARs evidence indicated that investors were expecting to earn returns in excess of their cost of capital, although we did not put a numerical estimate on this excess.
- Latest OFTO bids indicated a cost of equity of approximately 7.2% nominal.
- Professional forecasts from investment managers and advisors indicated nominal returns on the total market of 6.7% nominal.

⁴⁹ Includes updated risk-free and forward curve, as of 29th March 2019.

- Infrastructure fund discount rates, excluding 3i from our sample, indicated nominal returns of 7.2% to 7.9% nominal.

3.187 We also noted that there was no perfect cross-check to CAPM, noting that some cross-checks involved assets that were exposed to different risk profiles or gearing levels.

3.188 Based on available cross-checks, the CAPM-implied range (3.85% to 5.01%⁵⁰ in CPIH terms) was rounded to 4% to 5%. We stated that, forward-looking UK equity market returns led to an increase in the bottom end of the range and that the top end was supported by infrastructure fund and OFTO data. The rounding of the December range can be interpreted as an increase of 0.1% to the mid-point.

3.189 We asked stakeholders the following three questions:

- FQ16. Do you agree with our proposal to cross-check CAPM in this way?
- FQ17. Do you agree that the cross-checks support the CAPM-implied range and lend support that the range can be narrowed to 4-5% on a CPIH basis?
- FQ18. Are there other cross-checks that we should consider? If so, do you have a proposed approach?

Summary of stakeholder views

3.190 In general, we find that stakeholders support the concept of cross-checking the CAPM values. However, network companies raised issues with how we have interpreted the data, arguing that different inputs give different results and that some cross-checks are either not relevant or are not appropriate for RIIO-2 (mainly due to risk differences). Citizens Advice and Centrica argued that we had not put enough weight on cross-checks when narrowing the CAPM range, and suggested that a number of other cross-checks should be included. The RIIO-2 Challenge Group supported the concept of cross-checks but raised a concern that both the top end and low end of the range are too high.

A summary of responses to FQ16 (do you agree with our proposal to cross-check CAPM in this way)

3.191 NG, SSEN, SGN, Cadent and ENWL supported the concept of cross-checking the CAPM results. NPG stated that it was standard practice to do so, but should not be a way of confirming pre-disposed views.

3.192 NG and SGN argued that little weight can be placed on MARs due to the impact of a control premium. NG, SGN and ENWL stated that MARs are influenced by a winner's curse. NG argued that a MAR below one indicates negative investor sentiment. Cadent argued that higher than notional gearing is one of the biggest components of MARs and that there is a double-count risk of having both the MAR and allowed expected return adjustment, adding that there is no discernible trend in the MAR evidence. WWU argued that MARs should not be used as a cross-check and NGN argued that MARs should not be directly used to inform or cross-check CAPM elements.

3.193 NG argued that OFTO investments are so materially different, as evidenced by gearing levels, that any comparison of equity returns is, in NG's view, meaningless. NG argued that adjusting OFTO bids for gearing, tax and terminal

⁵⁰ This range is the average of the Low and High values for the 5-year period ending 31st March 2016 including the impact of the forward curve. See Sector Specific Consultation, Finance Annex, Table 14.

values, reveals that there may not be any information content or large changes over time. NG argue that OFTOs face significantly lower risks in many areas, including: the absence of regulatory reset risk, lower construction risk, lower political risk, and low operating and maintenance costs. SPEN argued that OFTO returns are unreliable and an unverified estimator, noting that Ofgem has not accounted for gearing differences. SPEN added that OFTO bids were as high as 10.2% (in 2011-12) and thus far higher than the proposed RIIO-2 range. In SPEN's view, the risk profile for the operation of offshore transmission assets is lower than a Transmission Operator undertaking a portfolio of capital assets. ENWL argued that the OFTO cross-check is not valid due to risk and structural differences.

- 3.194 Cadent argued that there is a potential double-count if investment-manager-forecasts are used in both TMR and in narrowing the CAPM-implied range. WWU and NGN argued that investment-manager-forecasts were not reliable. ENWL argued that investment-manager-forecasts and FCA values may be downward-biased by as much as 2% and referred us to academic literature.
- 3.195 NG argued that infrastructure funds are not subject to regulatory reset risk and are not relevant to an assessment of return required by equity investors in energy networks. NG referred to a discount rate for John Laing Group (8.8%) instead of John Laing Infrastructure Fund (7.3%) and argued that it was selective to ignore the 3i discount rate of 10.1%. SPEN argued that infrastructure funds were lower risk than energy networks, referring us to a presentation by BBGI. SPEN also argued that 70% of HICL's portfolio consists of investments in Public Private Partnership (PPP) contracts. SGN argued that INPP (International Public Partnerships) is more than 50% PPP or senior debt. NGN argued that all funds, except for 3i, consist either entirely or to a very large part, of long-term availability-based PPP contracts. NGN and SGN argued that PPPs are less risky than energy networks due to the government support they receive. NGN argued that quoted premiums to NAVs are not valid because they are very sensitive to the chosen date. ENWL argued that: there are multiple issues with infrastructure funds; investment horizons were unclear; there are gearing differences; accounting rules may distort discount rates; discount rates may be affected by investor type (capital versus dividends); and, funds may be more diversified than network investors.
- 3.196 UKPN disagreed with a number of cross-checks and WPD argued that the cross-checks should focus on the long-term financeability of the network companies. SGN argued that regulators should continue to base their estimate of the TMR on long-run averages and that undue weight cannot be put on current market conditions.
- 3.197 Centrica agreed that cross-checks were useful but argued that Ofgem did not appear to give much, if any, weight to the views of investment-manager-forecasts.

A summary of responses to FQ17 (do you agree that the cross-checks lend support to narrowing CAPM range to 4%-5% on a CPIH basis)

- 3.198 All network companies disagreed with the 4-5% CPIH range. NG argued that the cost of equity should be at least 6.5% (relative to CPIH⁵¹) before any cross-checks

⁵¹ NG presented its view in RPI terms. For consistency, we present NG's view in CPIH terms by adding 1% for the expected difference between RPI and CPIH, ignoring the Fisher equation for simplicity.

and before consideration of relative risk. SSEN argued that the 'Industry' view of the cost of equity is 7-7.34% (relative to CPIH⁵²). NGN stated that the cost of equity should be 6.51-7.34% (relative to CPIH) and NPG argued that the cost of equity is 2% to 2.5% higher than Ofgem's current position.

- 3.199 In NG's view, none of the proposed cross-checks provide a meaningful cross-check of the proposed cost of equity. WPD argued that the data published by Ofgem does not support the 4-5% range.
- 3.200 ENWL argued that the cross-checks support the proposed range of 4-5% on a CPIH basis, but that due to the subjectivity involved, the same cross-checks could also be used to support a much broader range, thereby minimising their usefulness.
- 3.201 Cadent argued that the quoted CAPM range is too low as a result of mis-calibrated TMR and equity beta assessments. Cadent stated that on grounds of relevance, reliability and double-counting, it did not agree that the cross-check evidence supports a narrowing of the quoted range.

A summary of responses to FQ18 (are there other cross-checks that we should consider)

- 3.202 Network companies asked us to consider a cross-check recommended by Oxera (the differential between the Asset Risk Premium and Debt Risk Premium).
- 3.203 NGN and UKPN asked us to consider the use of Dividend Growth Models as a cross-check, but not CEPA's model, as it was, the companies argued, incorrectly specified, asking us to refer instead to Oxera's DGM model. An anonymous investor asked us to consider a simple DGM model based on: a) the Morgan Stanley estimate for dividend growth for the MSCI UK index (4%), plus b) current dividend yields. This investor argued that the results indicate that 62-84 companies offer a more attractive return (than the RIIO-2 assumption).
- 3.204 SGN argued that we should consider aiming up, referring to CMA precedent and Frontier arguments. NPG argued that Ofgem had abandoned regulatory practice to date by assuming that the risks of setting the cost of equity too high and of setting it too low are symmetrical.
- 3.205 Centrica suggested that cross-checks should include allowances made, for the Total Market Return, by other regulators internationally.
- 3.206 Citizens Advice suggested that the cross-checks included any other bids made by companies' owners. Citizens Advice referred to SGN's licence application in Northern Ireland in 2014, where SGN set out a range for the cost of equity. Citizens Advice argued that SGN's application could be interpreted as 3.5% (in CPIH terms⁵³). In addition, Citizens Advice also argued that NERA's advice⁵⁴ to the Utility Regulator in 2014 is also relevant, arguing that NERA's recommendation can be interpreted as 4.82% (in CPIH terms⁵⁵).

⁵² SSEN presented the Industry View in RPI terms, for consistency, we present this in CPIH terms by adding 1% for the expected difference between RPI and CPIH, ignoring the Fisher equation for simplicity.

⁵³ Citizens Advice presented a cost of equity in RPI terms. For consistency, we present its view in CPIH terms by adding 1% for the expected difference between RPI and CPIH, ignoring the Fisher equation for simplicity.

⁵⁴ We understand Citizens Advice are referring to the following advice from NERA (2014, July) 'Gas to the West': A Report for the Utility Regulator': <https://www.uregni.gov.uk/sites/uregni.gov.uk/files/media-files/NERA - Gas to West Advice on Financial Costs.pdf>

⁵⁵ Citizens Advice presented a cost of equity in RPI terms. For consistency, we present its view in CPIH terms by adding 1% for the expected difference between RPI and CPIH, ignoring the Fisher equation for simplicity.

3.207 The RIIO-2 Challenge Group suggested the following cross-checks: rates acceptable to pension funds, ratio comparison, rates for other utility companies, and the OFTO WACC rates. The Challenge Group suggested that high OFTO gearing makes OFTOs inherently riskier than the network companies which are the subject of the RIIO-2 price control.

Analysis

Our analysis of responses to FQ16 (do you agree with our proposal to cross-check CAPM in this way)

3.208 We find that stakeholders support the concept of cross-checking CAPM results but disagree with how the evidence should be interpreted.

3.209 Network companies identified challenges involved when interpreting cross-check information, but issues seemed to focus on gearing and risk differences, which we had already identified in the consultation.

3.210 We note company arguments regarding the use of MARs. However, these arguments are largely anecdotal in nature – network companies did not provide convincing evidence for example that disaggregated MAR premium into component parts, and did not back-solve for the implied outperformance over future years that would justify certain MAR ratios. NERA referred to some evidence in this regard but we did not find it credible - NERA's analysis implied that some RAVs were trading at a 65% discount.⁵⁶

3.211 We note Cadent's argument that the use of MARs when cross-checking CAPM may be a double-count of the adjustment for allowed versus expected returns. However, Cadent did not expand its view on how this alleged double-count would arise in price control allowances, or on its estimated materiality. In general, network companies did not provide tangible evidence to support their views, for example WWU did not explain in detail why, in its opinion, MARs should not be directly used to inform or cross-check CAPM.

3.212 We are not persuaded by network company arguments that we should not use OFTO data. We noted an inconsistency between the arguments on equity beta and OFTO cross-checks. On equity beta, network companies sought a mechanical and material allowance to remunerate notional financial risk (given higher notional gearing than actual). For example, Cadent and NG argued that this financial risk could more than double observed equity betas. However, NG also argued that because OFTOs were higher geared, the data could not be used as a cross-check. In our view, it might be inconsistent if the same mechanics were not applied to equity betas and OFTO data. SPEN argued that OFTO bids were unverified but that we should refer to bids of 10.2% from 2011-12, implying that it placed some faith in OFTO bids. SPEN's observation that OFTO data could be adjusted for gearing differences is a good one. We present analysis in this regard in Appendix 6. This supports our proposed CAPM range, particularly the low end and corroborates company arguments that OFTOs have lower asset risk than energy networks.

3.213 Network company concerns (Cadent, WWU and NGN) on the use of investment-manager-forecasts were not supported by tangible evidence. ENWL did not support its claims that there is academic evidence regarding the downward-biased nature of investment-manager-forecasts. Network companies may have been

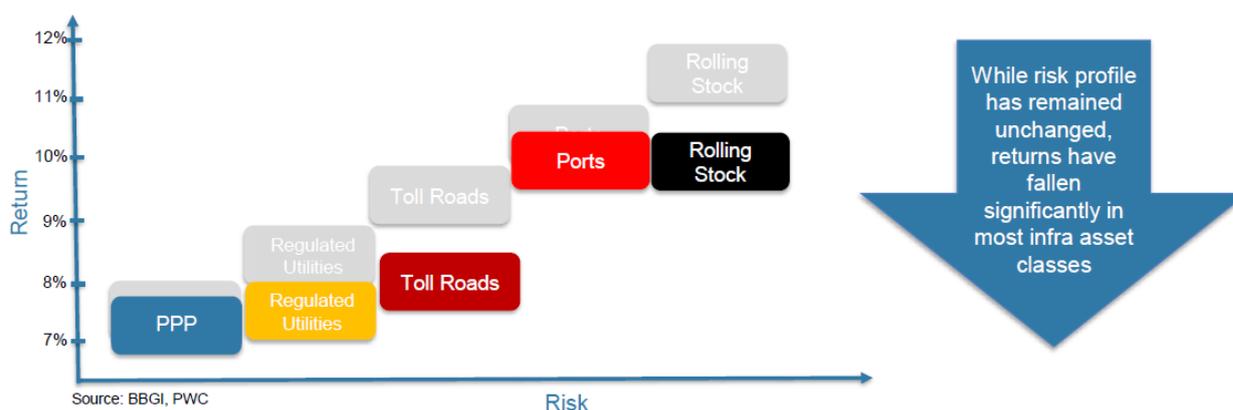
⁵⁶ See page 6 here:

https://www.nera.com/content/dam/nera/publications/2017/171201_MAR_report_final.pdf#page=6

repeating the arguments raised by Oxera (we address these at 3.90 above and at Appendix 2 below).

3.214 To address company concerns on infrastructure funds, we collected additional information (see Appendix 3 below). In summary, we are not convinced that infrastructure fund discount rates are unreliable. SPEN referred us to an annual report for one of the funds, BBGI. In this report,⁵⁷ BBGI display a graphic that we represent at Figure 15 below.

Figure 15: Infrastructure returns and risks



Source: BBGI interim results presentation

3.215 In BBGI's view, which appears to be supported by PwC, returns have fallen significantly in most infrastructure asset classes, while the risk profile has remained unchanged. BBGI's view corroborates network company and KPMG arguments that PPP assets are lower risk than regulated utilities. However, the BBGI chart shows that returns on PPP and regulated utilities are very similar, at approximately 7% to 8% (nominal), even if risk is higher for regulated utilities. In our view, this justifies the use of PPP asset returns as a cross-check for expected returns on regulated utilities.

3.216 In general, company arguments on infrastructure funds were not well-supported with additional evidence. KPMG's review was the most detailed (see our view of Consultancy Report 12 at Appendix 2 below). We are not persuaded by recommendations to include 3i within our primary cross-check sample.

3.217 UKPN disagreed with a number of cross-checks but did not provide tangible evidence to support its view. We disagree with WPD's view that cross-checks should focus on the long term financeability of the network companies. In our view, financeability and the cost of capital are separable issues. SGN's argument that we should not put due weight on current market conditions was not supported, and appeared to be based on the fact that current market conditions indicate lower returns.

Our analysis of responses to FQ17 (do you agree that the cross-checks lend support to narrowing CAPM range to 4%-5% on a CPIH basis)

3.218 NG, NGN and NPG did not provide a transparent breakdown in CAPM terms to support their position on equity returns, or how these link to risks or other market evidence.

⁵⁷ See page 27 here: <https://www.bb-gi.com/media/1141/31-aug-2018-2018-interim-results-presentation.pdf>

- 3.219 We note that ENWL agree that our CAPM range is supported by cross-checks, in contrast with NG and WPD, although ENWL argued that the range could be wider due to the subjectivity involved. However, ENWL did not describe or substantiate its view on subjectivity - the cross-checks we presented were unadjusted from the original sources.
- 3.220 Cadent's views on cross-checks seemed influenced by its view on CAPM. Cadent referred to TMR and equity beta rather than addressing in detail the evidence that we presented on the four cross-checks. Cadent did not provide tangible evidence to change our view on any of the four cross-checks.

Our analysis of responses to FQ18 (are there other cross-checks that we should consider)

- 3.221 All network companies asked us to consider Oxera's recommended cross-check on the Asset Risk Premium (ARP) versus Debt Risk Premium (DRP) differential.
- 3.222 Oxera's cross-check is designed to test if the premium for asset investors is sufficiently larger than the premium for debt investors, where both premiums are measured relative to the risk-free rate. Oxera agree that the working assumption results in a larger premium for asset investors than for debt investors, but argue that it is not sufficiently larger. Oxera argue that its analysis suggests that approximately 2% should be added to the return on equity (relative to the working assumption presented in the consultation).
- 3.223 We agree with Oxera that our approach is consistent with asset investors bearing greater risk and being remunerated at a higher level than debt investors. However, Oxera's argument that this differential is not large enough rests on a number of assumptions that may not hold. In our view, for example, the Oxera analysis assumes that the differential between ARP and the DRP is constant over time. Oxera's analysis does not take into account inflation or risk issues (demand risk or financial risk for example). Oxera's analysis also seemed to be less transparent and less independent of CAPM than the other cross-checks that we proposed. Further, if there is a possibility that regulatory precedents are too high for RIIO-2, then it can be argued that Oxera's analysis is not particularly informative – it only tells us what we would expect – a narrowing of the ARP versus DRP differential, relative to precedent. For additional analysis on Oxera's proposed cross-check, see our review of Consultancy Report 3 at Appendix 2.
- 3.224 NGN and UKPN's suggestion to use DGM as a cross-check seemed to involve the same issues that we describe above (see for example paragraph 3.87) regarding CEPA's TMR-based DGM. The anonymous investor did not provide supporting detail on the dividend growth estimate of 4% for us to put material weight on this view.
- 3.225 SGN's suggestion, supported by Frontier, that we should follow regulatory precedent to aim up was not particularly well supported and did not seem to be a 'cross-check' on CAPM, but rather a method of choosing a point estimate. We address aiming up arguments at Appendix 2 – see Consultancy Report 14.
- 3.226 Centrica's suggestion to include within our cross-checks international data on allowed TMR is useful. We will consider this at draft determination.
- 3.227 The suggestion from Citizens Advice to consider bids during any licence applications is a good one, and we also think we should consider any corporate transaction bids that we become aware of.

3.228 The RIIO-2 Challenge Group suggestion to use OFTO WACC rates may not be appropriate as the OFTO WACC can be heavily influenced by contemporaneous costs of debt whereas we believe that the RIIO-2 price control allowance for debt should reflect debt raised prior to RIIO-2. We will monitor other rates of return within the UK. It was less clear to us how we could use, as suggested, the rates acceptable for pension funds or ratio comparisons, as cross-checks for RIIO-2. Therefore, at this time, we are not convinced we can rely heavily on this information.

Summary analysis for cross-checks

3.229 We present below at Table 9 a summary of cross-check evidence:

Table 10: Summary evidence on three cross-checks and a cross-check hybrid

	Nominal	CPIH-real	Source
OFTOs	7.20%	5.1%	Nominal value as per Figure 14 of the consultation. CPIH-real derived using 2% CPIH assumption. $(1+7.2\%) / (1+2\%) - 1 = 5.1\%$
Investment managers	7.65%	5.5%	Nominal value as per Figure 6. CPIH-real derived using 2% CPIH assumption. $(1+7.65\%) / (1+2\%) - 1 = 5.5\%$
Infrastructure funds	7.55%	5.4%	Nominal value is average of 7.2% and 7.9%, as listed in Table 15 of the consultation. CPIH-real derived using 2% CPIH assumption. $(1+7.55\%) / (1+2\%) - 1 = 5.4\%$
CAPM with investment managers' value for TMR	6.05%	4.0%	Real value calculated using notional equity beta of 0.75, risk-free of -0.75% and real TMR of 5.5%. Nominal value derived using 2% CPIH assumption. $(1+4\%) * (1+2\%) - 1 = 6.05\%$

Decision

3.230 In general, consultation responses focused on the four cross-checks that we proposed, including the interpretation of the evidence we presented. We are open-minded about including other cross-checks, including those suggested by Centrica (international TMR assumptions), Citizens Advice (company bids or licence applications) and from Oxera (ARP - DRP). However, our current view is that suggestions by Centrica and Citizens Advice are of greater benefit than the proposal from Oxera, mainly because they are forward-looking and contemporary.

3.231 We have therefore decided that:

- We will cross-check CAPM results using the four cross-checks that we proposed in the consultation, and
- We will consider further at Draft Determinations the other cross-checks proposed by stakeholders.

Next steps

- 3.232 After analysing consultation responses and refreshing the underlying data, we have increased one of the cross-checks to reflect consultation responses (see above detail on investment management forecasts).
- 3.233 In our view, the cross-checks support the revised CAPM particularly around the 5% CPIH real level. It is our view that there is similar pressure on the CAPM-implied range to that we noted in December, with the low-end best supported around 4.00% CPIH real and the high-end best supported by 5.60%. A mid-point of 4.8% is, in our view, appropriate.
- 3.234 We therefore retain an implied 0.1% uplift to the CAPM-midpoint, similar to the effect within the December Finance Annex. The outcome of Step-2, therefore, increases our estimation of the cost of equity from 4.7% to 4.8% CPIH-real.

Table 11: Equity methodology, Step 1 & Step 2, working assumptions, December 2018 compared to May 2019, CPIH real

Component	Low	High	Low	High	Ref	Source
	December 2018	December 2018	May 2019	May 2019		
Notional equity beta	0.646	0.762	0.66	0.85	A	Table 8
Total Market Return	6.25%	6.75%	6.25%	6.75%	B	Table 7
Spot risk-free rate	-0.69%	-0.69%	-0.96%	-0.96%	C	Table 6
Forward curve uplift	0.15%	0.15%	0.22%	0.22%	D	Table 6
Risk Free Rate	-0.53%	-0.53%	-0.75%	-0.75%	E	Table 6
Cost of equity (step 1)	3.85%	5.01%	3.87%	5.63%	F	$F = E + A * (B - E)$
Cost of equity (step 2)	4.00%	5.00%	4.00%	5.60%	G	Judgement based on Step 1 and Step 2

Step 3 - Expected versus allowed returns

Introduction

- 3.235 Step 3 is designed to apply a distinction between the returns that investors expect (ER) and the baseline allowed return (AR) on equity. The AR can be different from the ER due to financial incentives. The larger the expected financial incentive (positive or negative) the greater the divergence between the ER and the AR.
- 3.236 We summarise below the consultation questions, responses, and set out our updated analysis and decisions.

Framework Consultation and Framework Decision

- 3.237 In the Framework Consultation (March 2018), we proposed to distinguish the AR from the ER and referred to evidence in the UKRN Study⁵⁸ that supported our view that the ER can be materially different from the AR.
- 3.238 In the Framework Decision (July 2018), we decided that we would, when setting the price control for RIIO-2, distinguish between AR and ER.

⁵⁸ See for example p64 onwards of the UKRN Study: <https://www.ukrn.org.uk/wp-content/uploads/2018/11/2018-CoE-Study.pdf#page=64>

Sector Specific Consultation

3.239 In the Sector Specific Consultation (December 2018), we re-stated the principle that the WACC is an expected return by definition. By extension this meant that the cost of equity is equal to the ER.

3.240 We summarised engagement that we had undertaken with the Energy Networks Association, noting concerns raised by stakeholders that:

- The distinction between AR and ER could be tackled at source - cost allowances and associated incentives could be set on the expectation of zero (out- or under-) performance.
- Future price controls may not reflect the past and that investor expectations for RIIO-2 may not, given other changes being made for RIIO-2, reflect the outcomes of other price controls.

3.241 We identified two options for implementing a consistent distinction between AR and ER.

- The first option was described as a strict application, where we would obtain the consistency that we sought by setting the AR in light of our best estimate of the cost of equity, and our best estimate of expected (out- or under-) performance during RIIO-2. Algebraically, this can be displayed as follows⁵⁹:
 - $AR = COE - EO$
- The second option was described as a more conservative application, whereby we would set the AR in light of our best estimate of expected (out- or under-) performance, within the bounds of the estimated cost of equity range (as per Step 1 and Step 2 of the methodology). This option reflected stakeholder concerns that RIIO-2 expectations or outcomes may not be easy to estimate and may not reflect returns that had materialised in other price controls.
 - $AR = COE - EO$, where $AR > COE_{low}$, $AR < COE_{high}$

3.242 We presented evidence on outperformance of other price controls, both within and outside the energy sector, and we referred to equity analyst estimates that outperformance can be realised in future price controls.

3.243 We stated that based on current evidence available to us, we believed that, on the balance of probabilities, investor expectations will be positive and that companies will be expected to outperform regulatory targets during RIIO-2. We therefore proposed to set the AR by selecting a point estimate at the lower end of the cost of equity range where the range is first estimated by CAPM (Step 1) then cross-checked to other market data (Step 2). We proposed that prior to making determinations for RIIO-2, we would update the underlying analysis from Step 1 and Step 2 and reflect on any relevant information regarding Step 3.

3.244 This approach led us to a working assumption of 4% CPIH real for the allowed return on equity, implying a 0.5% reduction from the mid-point (4.5%) of the cost of equity range (4% to 5%).

3.245 We asked stakeholders the following three questions:

⁵⁹ Using this notation, EO represents Expected Outperformance. Expected Underperformance is equivalent to negative Expected Outperformance – in this case the AR would be larger than Cost of Equity (COE).

- FQ19. Do you agree with our proposal to distinguish between allowed returns and expected returns as proposed in Step 3?
- FQ20. Does Appendix 4 accurately capture the reported outperformance of price controls?
- FQ21. Is there any other outperformance information that we should consider? We welcome information from stakeholders in light of any gaps or issues with the reported outperformance as per Appendix 4.

Summary of stakeholder views

3.246 All network companies opposed applying an adjustment in the application of Step 3, arguing that the AR should not differ from the ER, and arguing that it is arbitrary and duplicative of existing mechanisms. Citizens Advice supported the concept but thought that the approach presented lacked robustness. Centrica argued that cost allowances should not easily be beaten although it also added that the correct adjustment could potentially be larger than 0.5% and therefore our proposal may be too conservative. The RIIO-2 Challenge Group supported the concept but noted that it was difficult to form a definitive view on the exact amounts in the absence of a full understanding of the proposed incentive package.

A summary of responses to FQ19 (Do you agree with our proposal to distinguish between allowed returns and expected returns as proposed in Step 3?)

- 3.247 All network companies disagreed with our proposal. Although network companies did not typically disagree that the AR is a distinct concept from the ER, they did argue that expected incentives should be zero, and therefore the AR would numerically equal the ER.
- 3.248 Network companies continued to argue that cost/ incentive targets should be adjusted instead. NG argued the AR should not be adjusted to compensate for errors in incentive calibration. NGN argued that Ofgem should improve the quality of its analysis that feeds into target setting rather than applying a remedy that ignores the underlying problem and creates new problems of its own. UKPN also argued that Ofgem should adjust cost or incentive targets rather than the AR.
- 3.249 Network companies referred to advice from First Economics and Frontier Economics to support their opposition to the proposal (Appendix 2 summarises the main issues identified in these reports).
- 3.250 NG argued that the approach is conceptually flawed because investors cannot expect outperformance of a framework that has not yet been set. NG argued that the AR and incentives are funding different things and should not be confused. In NG's view, the AR attracts and rewards investment whereas consumers are willing to pay more for networks that deliver incremental improvements. NG acknowledged, in response to a separate question (CSQ95), that Ofgem has provided a clean and transparent safety net through RAMs, making additional mechanisms unnecessary.
- 3.251 NG argued that the adjustment implied a large scale of efficiency would be required and that CMA precedent shows that Ofgem may find its proposal difficult to justify. Cadent argued that 0.5% is akin to a totex stretch target of 5-6% for the GD sector.
- 3.252 SSEN stated that Ofgem should be aware of the interaction RAMs have with allowed versus expected returns, and (in response to CSQ95) SSEN argued that

RAMs and allowed versus expected returns are being targeted at similar issues Ofgem believe exist in RIIO-1 and need corrected in RIIO-2. SPEN, WPD and other network companies argued that Ofgem departed from a well-understood and longstanding practice of aiming up. This aiming up argument assumes that the consequences of setting the allowance too low are very severe, but the consequences of setting the allowance too high are nowhere near as severe. It is therefore appropriate to err on the high side.

- 3.253 WPD argued that the proposal is arbitrary. NPG argued that aiming low is not something a credible regulator should contemplate, stating that the adjustment was without merit and had unintended consequences. NPG argued (in response to CSQ95) that Ofgem needs to put in place a return adjustment mechanism as a failsafe, but that it is also proposing to make a relevant adjustment in the wrong part of the price control settlement, as part of allowed versus expected returns.
- 3.254 Citizens Advice sought a more formal approach for landing at the proposed 0.5% adjustment to aid duplication of such a mechanism for RIIO-3, stating that it supported the rationale behind the proposal but noted that it lacked robustness in its currently proposed form. Citizens Advice also argued that the assumed quantum of 0.5% could be viewed as overly cautious, especially given that it fundamentally does not reflect the actual past outperformance levels of about 3% in RIIO-1.
- 3.255 Centrica agreed that it is more likely that network companies outperform targets for two reasons. First, because there is an asymmetry of information between network companies and Ofgem in setting targets. Second, because there is an asymmetric risk of setting targets too tight and regulators have tended to be cautious and lenient. Centrica argued that the level of outperformance in RIIO-1, where there is an expectation that all 26 networks will have outperformed against the allowed RoRE⁶⁰, will lead investors to expect RIIO-2 to be out-performable, regardless of RIIO-2 being tough and regardless of the changes that Ofgem has proposed to make through RAMs or the wider suite of uncertainty mechanisms.
- 3.256 Centrica argued that given the historical levels of outperformance in both the energy networks and water sectors and the clear evidence from MARs, as well as signs that investor appetite for assets in the energy networks sector has not diminished, Ofgem may need to reconsider its assessment that a 50bps adjustment to the allowed return is sufficient to ensure that expected returns are equal to allowed returns and that the price controls are fair and transparent for consumers. Centrica noted that numerous infrastructure funds, strategic investors and even some of the incumbent DNOs⁶¹ have been linked with an upcoming sale of Electricity North West, notwithstanding the latest consultations from Ofgem on its approach to RIIO-2.

A summary of responses to FQ20 (Does Appendix 4 accurately capture the reported outperformance of price controls?)

- 3.257 NG argued that there was no evidence of systematic outperformance and that historical performance is irrelevant for assessing anticipated performance for RIIO-2.

⁶⁰ Return on Regulatory Equity

⁶¹ Distribution Network Operators, the regulated electricity distribution network operators.

- 3.258 SPEN agreed that the data reveals significant outperformance but argued that regulation is not a one-way bet.
- 3.259 SPEN, SSEN and Cadent argued that the analysis presented has now largely been superseded by the RIIO-1 Annual Reports⁶² published on 8th March 2019.
- 3.260 Cadent argued that it was unable to assure and validate third party evidence and could not comment on its appropriateness or accuracy. ENWL argued that the Citizens Advice work regarding outperformance of price controls⁶³ could not be relied upon.
- 3.261 NGN and SGN argued that outperformance data that Ofgem referred to is selective and misleading. NPG argued that the data presented excludes DPCR2, DPCR3, DPCR4, TPCR1, TPCR2, TPCR3 and gas prior to 2007. WWU and UKPN argued that the data presented does not fairly capture outperformance because it excludes performance on debt and tax.
- 3.262 First Economics presented information on out- and under-performance, including illustrations from other sectors and regions, in terms of totex and output assumptions. For example, First Economics argued that Heathrow Airport underperformed from 2003/04 to 2013/14, and that Network Rail underperformed from 2009/10 to 2017/18. First Economics also argued that Northern Ireland Electricity performed broadly in line with its regulator's assumptions since 2012/13, as did Scottish Water from 2010/11.
- 3.263 The First Economics report argued that the emphasis within the UKRN Study on information asymmetry is not particularly insightful or helpful. In First Economics' view, the difference between ER and AR can be more simply referred to as expected out-performance and that this can arise in many different ways unrelated to information asymmetry. First Economics identified three reasons for outperformance which it said were not linked to information asymmetry: 1) a regulator getting calculations wrong, 2) the way that risks crystallise in a control period, and 3) the way a regulated firm responds to regulatory incentives.
- 3.264 Frontier Economics presented information on pre-RIIO price controls (including DPCR4, DPCR5, GDPCR1, TPCR4, and the TPCR4 Rollover). Frontier argued that network companies achieved strong outperformance in DPCR5, GDPCR1, TPCR4 and the TPCR4 Rollover. However, Frontier referred to two price controls that provided a different picture:
- The electricity distribution price control ending 31st March 2010 (DPCR4), which shows quite a different picture if non-cost incentives are excluded. Frontier state that, while overall outperformance ranged from 250bps (highest), the sector average was only 80bps, and if non-cost incentive performance (Frontier refer to non-cost examples including Quality of Service, losses incentives, volumes, tax and real interest) was stripped out, then there was an underperformance of around 70bps.
 - The gas distribution price control ending 31st March 2007 resulted in network companies being exposed to 31% of the NPV of overspends.

⁶² See here: <https://www.ofgem.gov.uk/network-regulation-riio-model/current-network-price-controls-riio-1/network-performance-under-riio>

⁶³ A reference to Appendix 4 in the consultation, where we referred to the Citizens Advice publication 'Many Happy Returns': [https://www.citizensadvice.org.uk/Global/Public/Corporate%20content/Publications/ManyHappyReturns-NewBrandEdition%20\(2\).pdf](https://www.citizensadvice.org.uk/Global/Public/Corporate%20content/Publications/ManyHappyReturns-NewBrandEdition%20(2).pdf)

3.265 Referring to these two controls, Frontier argue that there is a marked difference between the most recent price controls and those that were in place much further back. Frontier assert that there are two important explanations for this difference, neither of which relate to asymmetric information. First, the Global Financial Crisis caused forecasting difficulties, and that outperformance arose due to expected inflationary pressure not materialising, which Ofgem now propose to address through RPE indexation. Second, in Frontier's view, Ofgem simply mis-calibrated the RIIO-regime, embedding higher returns in the sector as a consequence. The lesson for Ofgem, Frontier argue, is to remedy the implementation of a basically sound system, rather than discarding it altogether.

3.266 Frontier also argue that changes in RIIO-2 may mean that historical levels of outperformance provide no reliable guide to future outperformance.

A summary of responses to FQ21 (Is there any other outperformance information that we should consider?)

3.267 NG cautioned against using historical performance for implementing a wedge between allowed and expected returns. SEN and NPG argued that the focus should be on future performance.

3.268 SPEN suggested that Ofgem should consider Return on Capital Employed (RoCE) and Return on Assets (ROA). WWU argued that RoRE ignores risks and that RoRE should also be considered on a cash basis.

3.269 SGN argued that expanding the dataset back before the last set of pre-RIIO price controls disproves Ofgem's assumption that historical data shows there is an inherent and systematic informational advantage which means that networks systematically outperform targets. NGN also argued that analysis of the fuller dataset would reveal a significantly different picture to that presented in Ofgem's analysis.

Analysis

Our analysis of responses to FQ19 (Do you agree with our proposal to distinguish between allowed returns and expected returns as proposed in Step 3)

3.270 Network companies continued to argue that cost/incentive targets should be set so that there is no difference between AR and ER. However, the principle to distinguish between AR and ER does not rest upon the absolute level of cost/incentive targets. We need to explicitly recognise the impact of incentives when we set the allowed return. Therefore, we consider the distinction is necessary within our equity methodology because we should be clear how the allowance for equity relates to the cost of equity. This is important even if the impact on the AR is zero as it makes clear the assumption underpinning the allowance.

3.271 In our view, the First Economics report is flawed because it argues that setting a 'fair bet' is possible without addressing whether it is probable.

3.272 The Frontier Economics report argues that it is impossible to simultaneously satisfy allocative and productive efficiency. Frontier argued:

"in making their recommendation around RER and RAR, clearly focused on achieving better allocative efficiency, MPW fail to consider these wider implications of forcing convergence, which can be readily inferred from the extensive body of regulatory theory and practice.

This wider perspective confirms that it is impossible to simultaneously satisfy allocative, productive and dynamic efficiency, and that forcing allocative efficiency at the expense of productive and dynamic efficiency is unambiguously detrimental to customers' interests."

3.273 Frontier refer to a trade-off between different types of incentives/efficiencies, where convergence between the AR and ER represents improved allocative efficiency, and would, Frontier argue, be at the expense of productive efficiency. Frontier's argument implies there is a mechanical trade-off, such that increases in allocative efficiency necessarily reduce productive efficiency. At the limit this implies a binary choice, such that consumers must pay more than the efficient cost and monopoly networks must earn excessive economic rents. We do not accept this premise.

3.274 Frontier argue, based on research by Pollitt et al, that energy networks have outperformed (productivity growth) the UK economy by around 1% per year in the 30 years since privatisation. In Frontier's view, this is due to a clear incentive-based model and a stable approach to financing requirements. However, we do not believe that Pollitt's research is as conclusive as Frontier's claim. For example, Pollitt et al conclude:

*"A major learning has been just how slow the measured TFP (Total Factor Productivity) productivity growth for energy networks has been over the entire period (in general), but this is still better than the UK economy as a whole. A suspected reason for low measured productivity is that energy networks have needed to invest heavily to respond to government objectives for the addition of renewables and the promotion of energy efficiency without seeing increased measured outputs."*⁶⁴

3.275 Frontier referred to regulatory precedent for aiming up, as follows:

"... the CMA has tended to provide a highly transparent treatment of its approach to aiming up. The CMA is the supra-regulator for Ofgem and hence its approach should be highly relevant in guiding Ofgem's determinations. On this basis, the most important and readily translatable regulatory precedent supports explicit aiming up somewhere between the 80th and 100th percentile."

3.276 To support its argument, Frontier present six CMA cost of capital decisions, for various dates and industries, including from 2007 (the Heathrow Airport and Gatwick Airport decision), 2008 (Stansted Airport) 2010 (Bristol Water), 2014 (NIE) and 2015 (Bristol Water). Frontier show that the point estimate for WACC varies widely within each given range, highlighting that there are five different selections for the WACC percentile. For example, in the 2015 decision for Bristol Water, the CMA chose the 50th percentile (the mid-point of the range) in contrast with other decisions, such as for NIE, where the 100th percentile was chosen (the top end of the range). Therefore, these precedents show a range of decisions, and we note that CMA explained its decision for its chosen WACC percentile, based on the relevant circumstances. The precedent therefore shows that the point estimate is subject to regulatory discretion, evidently differing by sector and to reflect the broader issues being considered.

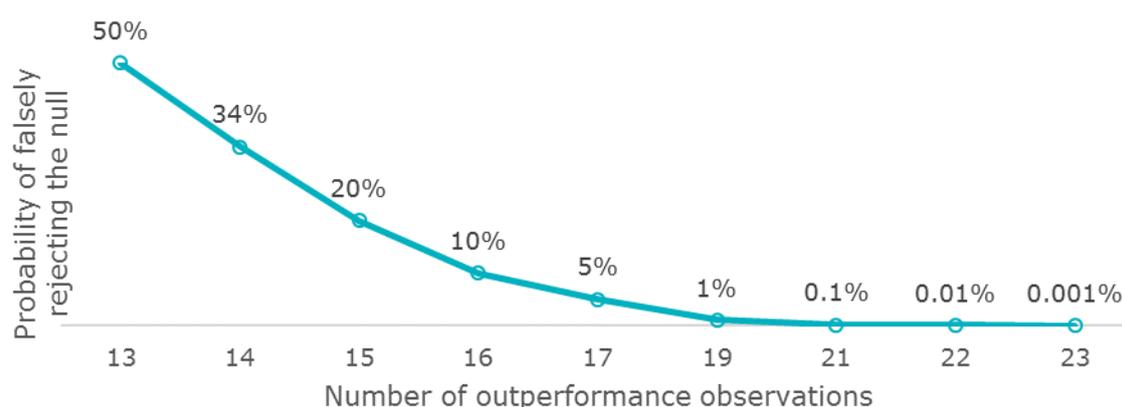
⁶⁴ https://www.ofgem.gov.uk/system/files/docs/2019/01/ofgem_productivity_report_dec_2018_1.pdf

- 3.277 In respect of 'aiming-up', the argument to aim up within the cost of capital range rests upon a number of subjective assumptions. First, the range itself must be relatively accurate at both the high and low ends. Second, the cost of underinvestment and over-remuneration need to each be estimated accurately. Arguments to over-remunerate may be more applicable in sectors that are experiencing capacity shortages, such as those in aviation or other growth sectors. This may have been a factor in the Competition Commission deliberations regarding the airport decision in 2007, to which Frontier refer. Third, our proposal to cross-check CAPM against four other investor return benchmarks may in fact better capture investors true expectations. To aim-up after considering these cross-checks may lead to a double-count. Finally, it would be remiss to ignore the risks of consistent and deliberate over-remuneration. Such risks, including political risk and increased legitimacy risk, could in fact out-weigh the benefit of aiming up, to which Frontier refer.
- 3.278 See Appendix 2 for further analysis of the First Economics and Frontier Economics reports.
- 3.279 We disagree with NG's view that investors cannot expect outperformance of a framework that has not yet been set. In our view, investors can, and do, build expectations well in advance of price control settlements. These expectations can be based on engagements with company management.⁶⁵
- 3.280 We disagree with NG's view that the AR and incentives are necessarily funding different things. NG's view implies that consumers must pay more than the cost of capital to receive incremental benefits. However, consumers can expect, and in all likelihood do expect (given GDP growth in the economy generally), that they would receive incremental benefits in return for funding baseline costs, rather than zero incremental benefits, as implied by NG.
- 3.281 In response to the December consultation, some network companies argued that there was overlap or duplication between return adjustment mechanisms and our proposals to distinguish between expected and allowed returns. We do not accept that these measures are duplicative. The principle behind 'allowed returns' addresses ex ante expectations to set the most appropriate baseline for returns, having regard to the systemic nature of information asymmetry and other potential sources of return. Return adjustment mechanisms are intended to operate only as a failsafe mechanism when ex post outturns deviate substantially from those ex ante expectations.
- 3.282 NG and Cadent argued that the AR ER adjustment is akin to totex adjustments. We do not agree that it is appropriate to package the policy as totex adjustments because the cost of capital and the efficient baseline for costs (and incentives) are unknowns.
- 3.283 We note the arguments by SPEN, WPD, NPG and Frontier that Ofgem should follow regulatory precedent and aim-up. However, these arguments are fundamentally theoretical and may not hold (see paragraph 3.277 above).
- 3.284 To date we have focused on the *principle* that ER is distinct from, and can differ from, the AR, rather than the estimation of the difference. In light of this primary principle, we conducted further analysis, using information on other price controls

⁶⁵ For example see National Grid Investor presentation, September 2018, page 44: <https://investors.nationalgrid.com/~media/Files/N/National-Grid-IR-V2/seminar-centre/2018/World%20TV%20-%20National%20Grid%20-%20UK%20Investor%20Teach-In%20-%202021-09-18.pdf#page=44>

including those referred to in responses to the consultation. We now have a dataset of 25 price controls of which 20 show outperformance and 5 show underperformance. Making a number of simplifying assumptions, including that these are independent, we can test a 'fair bet' hypothesis. A 'fair bet' means each price control had an equal probability (50%) of underperformance as outperformance (similar to a single toss of a fair two-sided coin). Using a binomial distribution, we reveal the relationship between a 'fair bet' hypothesis and the observed number of results that display outperformance. Figure 16 below shows the probability that we incorrectly reject a 'fair bet' (the null hypothesis) under a range of outperformance observations.

Figure 16: Testing a 'fair bet' hypothesis using a sample of 25 price controls



Source: Ofgem analysis

3.285 As shown in Figure 16, if we observed only 13 cases of outperformance we would not be confident of rejecting the hypothesis of a 'fair bet' (or bias towards underperformance). However, given that our sample shows 20 cases of outperformance, we would falsely reject a 'fair bet' hypothesis less than one percent of the time. If these statistical properties were applicable to our dataset, it shows a strong bias towards outperformance.

Our analysis of responses to FQ20 (Does Appendix 4 accurately capture the reported outperformance of price controls?)

3.286 NG did not robustly support its claim that there was no evidence of systematic outperformance. The report by First Economics shows that more price controls show outperformance than underperformance, contrary to NG's assertion. We disagree that historical outperformance is irrelevant because investors are likely to base their expectations for future price controls based on their experience and interpretation of previous price controls.

3.287 We agree with SPEN that the data shows significant outperformance and we also agree that regulation is not a one-way bet. However, the issue is the probability of outperformance relative to the probability of underperformance. Underperformance in some price controls does not invalidate our view that, on the balance of probabilities, investors could expect outperformance in RIIO-2.

3.288 We agree with SPEN, SSEN and Cadent that subsequent reporting is relevant to the analysis. This does not change the evidence base, or our interpretation of the expected outcome of RIIO-1.

3.289 Cadent and ENWL did not provide alternative analysis to support their views that the outperformance data we presented could not be relied upon.

- 3.290 NGN and SGN were concerned that the data presented is selective and misleading. However, we presented the readily available information and invited stakeholders to suggest additions (see consultation questions FQ20 & FQ21). The consultancy reports from First Economics and Frontier Economics added some detail to non-RIIO price controls and we found these efforts helpful.
- 3.291 We agree with NPG that it would be useful to establish a shared historical dataset. It would seem safe to assume that investors base their expectations on the best available data, which may be our consultation and the responses to it.
- 3.292 We agree with WWU and UKPN that the data presented may not perfectly capture outperformance due to the exclusion of debt and tax. Again, we would like to establish a shared dataset in this regard, working collaboratively with the network companies to establish the best records for previous periods, back to privatisation. This exercise may support the network companies' argument that price controls are not systematically outperformed. Our expectation, however, is that debt performance will not materially affect the sector average performance, because debt allowances have typically been based on sector average costs. It would also be interesting to understand tax performance, but if we take a long-horizon view, it is likely that any outperformance (underperformance) in previous price controls will be offset by underperformance (outperformance) in future price controls, all else remaining equal. We would also add that the adjustment we propose to make is not influenced by debt and tax performance, and is therefore not contaminated by outturn performance for these two elements.
- 3.293 We found the report by First Economics useful. In it, First Economics presents their interpretation of the financial outcome of other price controls, including pre-RIIO controls and controls from other sectors. On page 16 of this report, we see twelve green bars and five red bars, indicating, as we anticipated, that more price controls have resulted in outperformance than underperformance.⁶⁶ Of the five price controls that show underperformance, four of these are in other sectors, two in aviation (Heathrow Airport) and two in rail (Network Rail), potentially limiting their suitability for RIIO-2. For example, the underperformance in the two Heathrow Airport price controls is likely to be related to the different risks to which Heathrow Airport is exposed, such as demand risk. First Economics use this presentation to argue that underperformance is possible. We agree, however, in our view, the issue is the expectation for RIIO-2, and whether outperformance is more probable.
- 3.294 We agree with First Economics that the difference between AR and ER can arise in many ways that may not relate exclusively to information asymmetry.
- 3.295 First Economics appear to rely on anecdotal evidence in other parts of its report, for example to argue that information asymmetry can be beneficial or detrimental to the firm, referring to "[o]ur experience, across many price reviews over many years...", and that reliance on econometric models has led to errors that disadvantaged as many companies as it has advantaged. First Economics did not substantiate these views, for example with verifiable evidence.
- 3.296 The report by Frontier Economics is useful. Frontier focus on energy sector price controls going back to 2002. In this respect, the Frontier report is also supportive of our view – it also shows more examples of outperformance than underperformance. Similar to First Economics, Frontier argue that there is a

⁶⁶ <http://www.first-economics.com/allowedexpectedreturn.pdf#page=16>

possibility of underperformance in price controls while referring to two price controls (electricity distribution ending 31st March 2010 (DPCR4) and the gas distribution price control ending 31st March 2007) in support of this.

- However, Frontier demonstrates that DPCR4 shows outperformance overall, and we note that Frontier refer to the average outperformance of 80bps as being “relatively small”. We note that the working assumption for RIIO-2 is even smaller, at 50bps. We are not persuaded by Frontier’s argument for excluding certain elements of DPCR4 because similar incentives will apply in RIIO-2.
- Frontier’s presentation of the gas distribution price control ending 31st March 2007 accords closely with our understanding.⁶⁷ However, the fact of underperformance in one price control may in fact support our view that there is a bias towards outperformance overall. The Frontier arguments would be more persuasive if they presented price control performance since privatisation, by sector, by licensee and by year, showing a balanced picture between outperformance and underperformance or by combining the monetary value of outperformance and comparing this with the monetary value of underperformance. We are not persuaded that the bias towards outperformance can be explained by the two factors to which Frontier refer: a) the Global Financial Crisis (GFC), and b) Ofgem’s implementation of RIIO. With regards to a), the GFC in 2008 may have positively impacted some price controls (or aspects thereof), but it would have also negatively impacted others (or aspects thereof), for example airport price controls that are exposed to demand risk. Frontier did not draw a robust link between the GFC and the price controls presented in the consultation at Annex 4.⁶⁸ With regards to b), the implementation of RIIO impacts only a small number of price controls (four in our sample of 25). So we were not persuaded by these two arguments.

3.297 We agree with Frontier that historical levels of outperformance may not necessarily provide a reliable guide to future outperformance. We would also add that investor expectations at Final Determinations will, in all likelihood, take into account the potential quantum of outperformance in RIIO-2, in light of changes to, for example, incentive rates and baseline performance targets.

3.298 However, we observe that price controls operate on a repeat cycle, and therefore investors will not look in isolation at changes between RIIO-2 and RIIO-1. In our view, investors will, in all likelihood, consider instead that each price control involves structural and baseline changes from the immediately preceding control, recognising that, even with these changes, there are more examples of outperformance than underperformance. We note that Frontier refer to the outperformance of a previous price control (DPCR4) as being “relatively small, at around 80bps”. We therefore believe that investors may also interpret an assumption of 50bps for RIIO-2 as being relatively small, even if RIIO-2 differs structurally from RIIO-1.

⁶⁷ Frontier referred to 31% NPV exposure as per paragraph 3.21 here: <https://www.ofgem.gov.uk/ofgem-publications/48815/16340-one-year-control-final-proposals-document-final.pdf>

⁶⁸ See Appendix 4 here: https://www.ofgem.gov.uk/system/files/docs/2018/12/riio-2_finance_annex.pdf#page=95

Our analysis of responses to FQ21 (Is there any other outperformance information that we should consider?)

3.299 We agree with NG, SSEN and NPG that the same levels of historical outperformance may not materialise in RIIO-2. Network companies argue that implementation is best secured by setting cost and incentive targets so that expected outperformance is zero. In our view however, setting new cost and incentive targets does not render unnecessary a distinction between the AR and ER, particularly given information asymmetries and other possible factors (as identified by First Economics at paragraph 3.263 above). Evidence of outperformance persistence in general, arising from our review of previous price controls, informs our view that investors will, on the balance of probabilities, expect outperformance during RIIO-2.

Decision

3.300 We have therefore decided that:

- We will include step 3 in the equity methodology, and continue to consider further evidence on other price controls.
- We will estimate at draft determination the expected (out- or under-) performance for RIIO-2 in light of updated information available to us, including additional information provided by network companies in business plans, revealed investor expectations, the RIIO-2 incentive regime, and the approach to setting RIIO-2 cost and incentive baselines.
- We will propose an allowed return on equity at draft determinations that reflects our estimation of: a) the cost of equity; and b) expected (out- or under-) performance for RIIO-2, insofar as the AR remains within the bounds of our estimate of the cost of equity range. Ultimately, we may estimate an expectation of zero for (out- or under-) performance.

Next steps

3.301 Consultation responses have not provided material evidence that changes our proposed methodology or proposed working assumption for expected outperformance. In particular, as noted in the consultation, the quantum of expected outperformance will be revisited at determination and calibrated based on the final RIIO-2 price control as a whole. We continue to believe that the value used as a working assumption (0.5%) is, at this time, reasonable.

3.302 In effect, our updated working assumption for the allowed return on equity remains 0.5% less than our current best estimate of the cost of equity. In any case however, this means that investors can expect to achieve 4.8% returns on equity. Our current view is that 4.3% will be earned through the allowed return on equity and 0.5% will be earned through incentives. By extension, if we are persuaded, in light of the additional information to which we refer, that expected outperformance is less than 0.5%, then we would set the allowed return closer to the cost of equity. In either case, investors should, based on our current view, expect 4.8% return on equity.

3.303 We present below (Table 12) updated working assumptions, comparing the December Finance Annex to our May 2019 position.

Table 12: Equity methodology, working assumptions, December 2018 compared to May 2019, CPIH-real

Component	Low	Mid	High	Low	Mid	High	Ref	Source
	December 2018			May 2019				
Notional equity beta	0.646		0.762	0.66		0.85	A	Table 8
Total Market Return	6.25%		6.75%	6.25%		6.75%	B	Table 7
Risk-free rate	-0.69%		-0.69%	-0.96%		-0.96%	C	Table 6
Forward curve uplift	0.15%		0.15%	0.22%		0.22%	D	Table 6
Risk Free Rate	-0.53%		-0.53%	-0.75%		-0.75%	E	Table 6
Cost of equity (step 1)	3.85%		5.01%	3.87%		5.63%	F	$F = E + A * (B - E)$
Cost of equity (step 2)	4.00%	4.50%	5.00%	4.00%	4.80%	5.60%	G	Judgement based on Step 1 and Step 2
Expected outperformance		0.50%			0.50%		H	Paragraph 3.302
Allowed return on equity		4.00%			4.30%		I	$I = G - H$

4. Financeability

Financeability relates to licence holders' ability to finance the activities which are the subject of obligations imposed by or under the relevant licence or legislation.

In this section, we summarise the December 2018 proposals, the consultation responses and our thoughts, if any, on these. We also describe and evaluate stakeholder feedback from a further information document published on 26th March 2019 relating to financeability⁶⁹ and then we set out the sector-specific decisions.

Introduction

- 4.1 Ofgem has a duty to have regard to the need to secure that network companies are able to finance the activities which are the subject of obligations imposed by or under the relevant legislation.
- 4.2 Following the Framework Consultation and Decisions in March 2018 and July 2018 respectively, we narrowed the options for how any financeability concerns could be addressed by:
 - putting the onus on companies to take appropriate action, for instance by de-gearing (Option B)
 - introducing a cashflow floor to provide assurance to bondholders that debt costs would be met (Option C)

Summary of December proposals

- 4.3 We proposed to continue to focus on the notional company in assessing financeability but noted that we believe it is important for network companies to assess financeability of their RIIO-2 business plans on both a notional and actual basis.
- 4.4 In the event of material underperformance, we proposed to look to company actions or the operation of the cashflow floor to address any associated financeability issues, rather than relying solely on headroom in base case credit metrics.
- 4.5 We set out the actions network companies could take to address any financeability concerns, which were:
 - dividend policies can be adjusted to retain cash within the ring-fence during the RIIO-1 or RIIO-2 period
 - equity injections can be used to reduce gearing
 - expensive debt or other financial commitments could be re-financed
 - network companies can propose alternative capitalisation rates and/or depreciation rates, if appropriate
 - adjust notional gearing.⁷⁰

⁶⁹ <https://www.ofgem.gov.uk/publications-and-updates/financeability-assessment-riio-2-further-information>

⁷⁰ Although notional gearing was not listed in the financeability section of the December Finance Annex (it was discussed in paragraphs 7.17-.21), we included notional gearing as another potential lever for addressing financeability concerns in the "[Financeability Assessment for RIIO-2: Further Information](#)" document published on 26th March 2019.

- 4.6 We also proposed to develop the cashflow floor as an important additional measure to address potential downside financeability concerns and set out three main objectives of a cashflow floor and six design principles.
- 4.7 We developed a draft cashflow floor process based on actual company liquidity (Variant 3) to aid stakeholders in assessing the potential benefits of such a mechanism and asked stakeholders for views on the objectives, principles and the appropriateness of focusing on Variant 3 of the cashflow floor.
- 4.8 We proposed not to rule out either Option B (onus on companies) or Option C (cashflow floor) for addressing financeability at this stage and set out our intention to develop the cashflow floor further in 2019.
- 4.9 We stated our intention to provide network companies with more guidance with regards to how they should assess financeability, including a draft financial model for RIIO-2. Since December, we have held a number of meetings with the ENA and individual network companies to discuss financeability.
- 4.10 We provided network companies with a draft financial model for RIIO-2 along with a further information document published on 26 March 2019⁷¹ setting out further detail on our proposed approach to financeability and explaining the ratio calculations included in the model and their significance for a financeability assessment. This publication was followed by a conference call on 29 March for interested stakeholders and a further call with ENA members and other interested stakeholders on 10 April to discuss some network company concerns with the proposed approach.
- 4.11 Eleven network companies provided written responses to the further information document and we have carefully reviewed these responses, along with the responses on this topic to the December Sector-Specific Consultation. The 'Stakeholder views - Approach to Financeability' section below therefore incorporates views expressed in both the responses to the December Finance Annex and the responses to the further information document.
- 4.12 Ofgem asked the following questions in relation to financeability in the December Finance Annex:
- FQ22. What is your view on our proposed approach to assessing financeability? How should Ofgem approach quantitative and qualitative aspects of the financeability assessment? In your view, what are the relevant quantitative and qualitative aspects?
 - FQ23. Do you agree with the possible measures companies could take for addressing financeability? Are there any additional measures we should consider?
 - FQ24. Do you agree with the objectives and principles set out for the design of a cashflow floor?
 - FQ25. Do you support our inclusion of and focus on Variant 3 of the cashflow floor as most likely to meet the main objectives?
- 4.13 Ofgem also asked the following questions in the "Financeability Assessment for RIIO-2: Further Information" document:

⁷¹ <https://www.ofgem.gov.uk/publications-and-updates/financeability-assessment-riio-2-further-information>

- Do you have any comments on the proposed approach to assessing financeability?
- Do you have any suggestions for the appropriate scenarios to be run for stress testing?
- Do you have any comments on the proposed financial metrics to be calculated or formulation of these?
- Do you have any comments on the proposed information to be provided by companies?

Approach to Financeability

Stakeholder Views

- 4.14 Respondents to FQ22 expressed some differences of opinion on whether Ofgem's financeability duty allows a focus on the notional company in respect of setting financial parameters for the price control, or whether Ofgem has a duty to ensure actual company financeability. Four respondents, including two network respondents, felt a focus on the notional company is appropriate for Ofgem with network companies being responsible for actual company financeability and/or financing decisions. However, three respondents (all network companies) suggested that Ofgem has a duty to also ensure actual company financeability. Some respondents also asked Ofgem to clarify our interpretation of the financeability duty.
- 4.15 A number of networks (and a separate ENA letter) suggested that the financeability assessment should reference rating agency methodologies and the qualitative and quantitative aspects of their methodologies and threshold guidance levels.
- 4.16 Six network respondents (and a separate ENA letter) suggested that a longer-term financeability assessment is required to understand the impact of the switch to CPIH and the sustainability of the cost of capital proposals in terms of longer-term financeability.
- 4.17 Three network respondents (and a separate ENA letter) suggested that the immediate switch to CPIH distorts short-term metrics and is a short-term cash acceleration which may only defer a financeability problem for the future. They therefore further argued that the financeability test needs to be carried out on a RPI basis to test for any value leakage.
- 4.18 Some network companies suggested that Ofgem was placing too much emphasis on debt financeability to the potential detriment of equity financeability.

Analysis and response

- 4.19 Section 3A of the Electricity Act 1989 and section 4AA of the Gas Act 1986 set out Ofgem's principal objective and general duties. The relevant wording in relation to Ofgem's financeability duty in both Acts provides that "*the Authority shall have regard to.....(b) the need to secure that licence holders are able to finance the activities which are the subject of obligations imposed.....*".
- 4.20 The financeability duty requires us to "have regard to" the need to ensure that licensees are able to finance their activities, rather than a duty to ensure or secure the financeability of licensees. While financeability is an important consideration,

and one that we take very seriously, it is not the only consideration to which Ofgem's attention is directed by statute. The relevant sections of the Electricity Act and Gas Act, and relevant CMA authorities, require Ofgem to weigh these considerations in the round.

- 4.21 We therefore believe that a continued focus on the notional company for setting price control parameters is appropriate in light of our financeability duty and our other duties. We will consider actual company debt positions and structures to inform the notional structure and to inform our views on potential increased monitoring of actual companies with a less comfortable credit profile. However, we do not believe that Ofgem is required to "ensure" or "secure" that all licensees are actually financeable in any and all circumstances (whatever risks they have taken or however inefficient they may be).
- 4.22 An obligation to "ensure" or to "secure" actual company financeability would have the effect of the consumer underwriting all financing decisions of networks despite companies, their boards and management being better placed to manage risks associated with these decisions and benefitting from additional returns if those decisions lead to outperformance.
- 4.23 We do not believe it is our role to provide a specific methodology with explicit ratio guidance or factor weightings for assessing financeability. We see our role as critically assessing company business plans for financeability and performing the necessary modelling, assessments and other checks which we feel are necessary to satisfy ourselves that network companies are financeable on a notional basis (while also being informed by actual company positions and market data as set out above).
- 4.24 Our further information document on financeability, which was published on 26 March 2019, set out some commonly used financial ratios, including those used by rating agencies. However, a number of networks thought this did not go far enough in setting out a detailed methodology with thresholds and weightings for assessing financeability.
- 4.25 Although we are not proposing an explicit methodology we note that a number of network companies suggested that the Moody's methodology be used as a proxy as this is the most easily replicable methodology of the three main credit rating agencies.
- 4.26 We reiterate our position that we do not favour any particular agency's ratios or methodologies but that, as with RIIO-1, in practice we are likely to use a Moody's ratings methodology simulator (as this methodology is the clearest to simulate) as a tool when reviewing network companies' financeability assessments. However, we note that not all networks have a Moody's issuer rating and it is not a requirement of the licence to have a Moody's rating. Therefore, any use of this type of tool would not constitute the entire assessment, may not be applicable for every network, will not target any particular rating (this is a decision for company boards) and will be supplemented with an assessment of key ratios against other rating agencies' stated ratio guidance levels, evidence submitted by network companies and some judgement of all of these factors.
- 4.27 We remain of the view that the RIIO model of regulatory settlement is sufficient to ensure that network companies are financeable in the long term. However, financeability analysis (ie testing credit and equity metrics) remains focused on the upcoming price control period.

- 4.28 We believe the move away from RPI is in both consumers and network companies' interests as the RPI measure of inflation is no longer considered an accurate measure of inflation. We have said we want this change to be NPV-neutral for network companies and have suggested this is addressed through a one-off adjustment to the real rate of allowances equal to a reasonable ex ante assessment of the long-run 'wedge' between RPI and CPIH.
- 4.29 We therefore believe that in moving to a more credible measure of inflation than RPI we are basing our regulatory settlement on robust principles for the long term (continuing with a discredited measure of inflation that arguably undercompensates networks in real allowances cash flow and over compensates in RAV inflation would not be a robust principle for the long term).
- 4.30 We recognise that a RAV inflating at a probably lower rate than RPI will gradually limit balance sheet capacity, compared to the counter-factual of RAV inflating at RPI, and that network companies will need to manage a stable path of net debt/RAV to maintain ratings at their current levels. We believe this is appropriate in an environment where the broader corporate world will be similarly managing balance sheets in light of the current return and inflation environment.
- 4.31 We therefore remain of the view that financeability analysis and testing of ratios should be focussed on the upcoming price control. However, we invite network companies to submit any concerns they may have over longer-term notional or actual financeability as part of their business plan submissions along with supporting evidence on financial metrics and expected rating impact. If financeability concerns are identified in the long term we would need to consider whether these concerns need to be addressed as part of the RIIO-2 price control or whether they are better assessed at the relevant future price control in light of market conditions at that time.
- 4.32 We do not believe that it is appropriate to conduct a financeability assessment on an RPI basis because financeability assessments are generally performed on the price control package as a whole, not arbitrarily including or excluding certain aspects of it. Value neutrality of any individual measure should be assessed on its own merits, ie the cashflows associated with that measure and whether those lead to value neutrality over a chosen time period. We do not consider it appropriate to conflate the financeability assessment with the value neutrality of an individual measure or change.
- 4.33 In response to the suggestion that the switch to CPIH 'distorts' metrics, we suggest that another interpretation is that using RPI, which is now a widely discredited measure of inflation, would distort metrics by under-compensating network companies in real cash flow allowances and over-compensating network companies on RAV inflation because RPI is an artificially high (and volatile) measure of inflation. Using an artificially high measure of inflation would exacerbate the challenge faced by all regulated networks that have part of their returns in the form of RAV inflation because it increases the 'inflation gap' in key credit metrics between real cash allowances and largely nominal debt costs. Using an appropriate measure of inflation leads to an appropriate balance between real cash flow allowances and RAV inflation.
- 4.34 We note that a primary focus on debt metrics, which by definition provide some coverage that is typically then paid to equity holders, is consistent with the approach taken for previous price controls. However, we are also conscious that financeability refers to the licence holder being able to finance activities that are

the subject of obligations imposed under relevant legislation and hence is applicable to both equity and debt. In assessing equity financeability, we look primarily to ensure that our cost of equity assessment is robust and hence sufficient for the equity financeability of the notional company. We have also included a suite of equity metrics in the financeability further information document published on 26th March, which can be applied to the notional and actual company, to inform likely evolution of equity metrics over the price control period.

Next Steps

- 4.35 Given Ofgem's decision to focus on the notional company for assessing price control parameters, we set out below our initial assessment of notional company credit metrics. This analysis will be reviewed following business plan submission for individual notional licensees.

Notional company credit metrics

Stakeholder views

- 4.36 Five network companies argued that Ofgem should calibrate the price control adequately and this in itself would be sufficient to address financeability.
- 4.37 National Grid stated that "*the regulator has a duty to have regard to setting a price control at a level which would allow an efficient notional company to finance its licenced activities.*"

Analysis and response

- 4.38 We believe that the calibration of the price control parameters will be sufficient to ensure the notional company would be financeable and that any company-specific notional company financeability constraints (due to scale or timing of capital investment profile for example) could be addressed through NPV neutral measures (depreciation or capitalisation rate changes, if appropriate) with the onus on network companies to address any actual financeability concerns using the remaining available company measures.
- 4.39 We come to this view having conducted an extracted high-level analysis of some of the key credit ratios based on a sector average notional company using the working assumptions set out in this decision document and the economic form of the key ratios as shown in Table 13. In practice the key credit ratios are calculated from accounting information, may be subject to individual rating agencies' adjustments and will be influenced by the impact of incentives, timing, movements in working capital, actual company capital structures and actual debt costs.

Table 13: Economic form of key ratios

Credit Metric	Underlying economic form	Alternative underlying economic form
FFO ⁷² Interest cover	$\frac{WACC + (Dep/RAV)}{g * CoD_{cash}}$	$\frac{WACC_{vanilla} + (Dep/RAV)}{G * CoD_{expense}}$
PMICR ⁷³	$\frac{WACC}{g * CoD_{cash}}$	
FFO-to-net-debt	$\frac{WACC + (Dep/RAV) - (g * CoD_{cash})}{g}$	$\frac{WACC + (Dep/RAV) - (g * CoD_{expense})}{g}$

4.40 The following definitions are used in Table 13:

- WACC: Weighted average cost of capital (vanilla)
- Dep/RAV: Regulatory depreciation as a percentage of regulated asset value
- g: Gearing percentage (net debt divided by regulated asset value)
- CoD_{cash} : Cost of debt excluding any non-cash principal inflation accretion on inflation linked debt
- $CoD_{expense}$: Cost of debt including any non-cash interest expense for principal inflation accretion on inflation linked debt

4.41 This analysis resulted in the following metrics for the GD notional company:

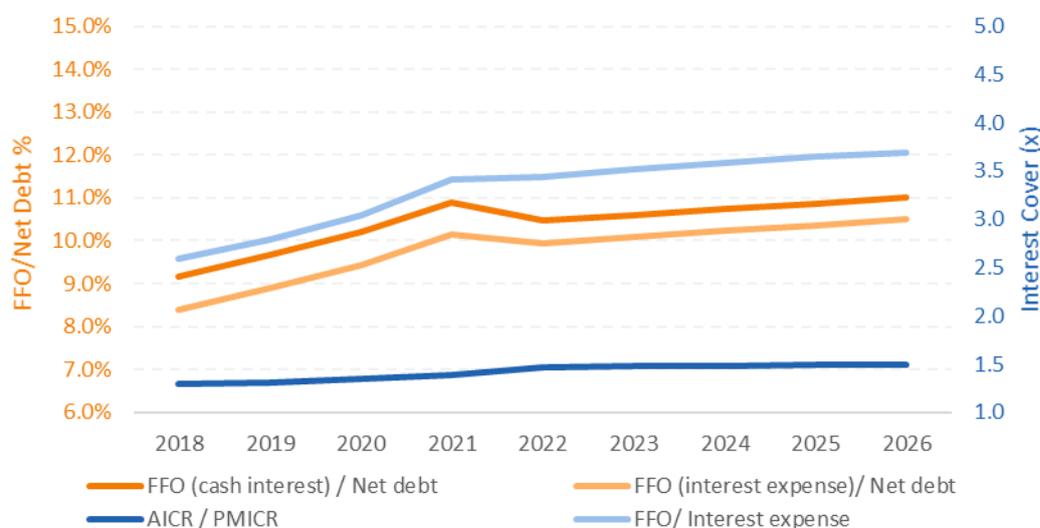
Table 14: Gas Distribution notional company working assumptions and metrics

Ye 31st March		2018	2019	2020	2021	2022	2023	2024	2025	2026
Equity Allowance	RPI or CPIH	6.7%	6.70%	6.70%	6.70%	4.27%	4.29%	4.30%	4.31%	4.31%
Incentive bias (AR/ER)	RPI or CPIH	0.0%	0.0%	0.0%	0.0%	0.5%	0.5%	0.5%	0.5%	0.5%
Expected Equity Return	RPI or CPIH	6.7%	6.70%	6.70%	6.70%	4.77%	4.79%	4.80%	4.81%	4.81%
Allowance for debt	RPI or CPIH	2.22%	1.91%	1.58%	1.16%	2.03%	1.96%	1.91%	1.88%	1.86%
Notional gearing	Net Debt / RAV	65.0%	65.0%	65.0%	65.0%	60.0%	60.0%	60.0%	60.0%	60.0%
WACC allowance	Real	3.79%	3.59%	3.37%	3.10%	3.13%	3.09%	3.07%	3.05%	3.04%
Cash Interest	Nominal rate	4.52%	4.20%	3.87%	3.44%	3.56%	3.49%	3.44%	3.40%	3.38%
Interest Expense	Nominal rate	5.29%	4.97%	4.63%	4.19%	4.07%	4.00%	3.95%	3.91%	3.89%
Deprn / RAV		5.10%	5.43%	5.77%	6.22%	5.28%	5.36%	5.44%	5.52%	5.60%
Key Ratios										
AICR / PMICR		1.29	1.31	1.34	1.39	1.46	1.48	1.49	1.49	1.50
FFO (cash interest) / Net debt		9.2%	9.7%	10.2%	10.9%	10.4%	10.6%	10.7%	10.9%	11.0%
FFO/ Cash Interest		3.03	3.30	3.64	4.17	3.93	4.04	4.12	4.20	4.25
FFO/ Interest expense		2.59	2.79	3.04	3.42	3.44	3.52	3.59	3.65	3.70
FFO (interest expense)/ Net debt		8.4%	8.9%	9.4%	10.1%	9.9%	10.1%	10.2%	10.4%	10.5%

⁷² FFO: Funds from operations

⁷³ PMICR: Post maintenance interest cover ratio, sometimes referred to as AICR or adjusted interest cover ratio

Figure 17: Gas Distribution notional company key metrics



Source: Ofgem analysis

4.42 The table and chart above illustrate that the key ratios are expected to be broadly similar or slightly improved for the GD notional company in RIIO-2 compared to RIIO-1 despite the lower equity allowance and lower expected equity return. This is due to the following factors:

- gradually decreasing cost of debt as historical debt is refinanced at lower interest rates
- lower notional gearing contributing to lower interest expense and cash interest costs
- reducing 'inflation gap' between the real cost of debt allowance and interest expense which includes inflation (or cash interest costs which are based on 75% nominal debt). This reducing inflation gap is due to the switch to CPIH-based allowances and RAV inflation.

4.43 Our analysis is based on the following assumptions:

- cost of debt working assumption for each year as set out in Table 4 above
- equity allowance for each year as set out in Table 4 above
- incentive bias of 0.5% leading to an AR/ER wedge of 0.5% and representing an earned amount for the notional company in RIIO-2. If the AR/ER wedge is recalibrated to 0% the equity allowance could be expected to increase to the middle of the range, 4.8%, so we believe it is appropriate to use an overall equity return of 4.8% for the notional company
- depreciation rates as a percentage of RAV based on expenditures at RIIO-1 average level (as per RFPR submitted data as at YE 2018, actual totex), capitalisation rates and asset lives the same as at the end of RIIO-1, with accelerated depreciation schemes rolling off as per the schedules in the PCFM.
- 25% inflation-linked debt throughout the RIIO-2 period⁷⁴

⁷⁴ We flexed this assumption and found that a reduction/increase of 5% on the assumption of inflation-linked debt would translate into a 4bps reduction/increase in the AICR ratio.

- RPI debt is switched to CPIH (this is not necessarily what we would assume would happen in practice but is the more conservative assumption from a ratio perspective as it reduces the AICR compared to the counterfactual of assuming RPI linked debt remains, which would have a ~1% lower real yield/coupon than if the debt were switched to CPIH)
- RPI assumed at 3% for RIIO-1, CPIH assumed at 2% for RIIO-2 for the purposes of calculating interest expense (including principal inflation accretion).

4.44 We note that the results of our high-level analysis of the notional company are reasonably similar to the results of Moody's analysis of the notional company AICR as set out in Figure 18 below⁷⁵ and their suggestion that if the proposals contained in the December Finance Annex are adopted together (including the switch to CPIH), "*[t]he notional company looks fine*"⁷⁶. However, we note Moody's additional point that actual companies will come under pressure as:

"GDNs have higher leverage and, with the exception of Cadent, either more expensive debt or less index-linked debt than the notional company. They are therefore more significantly exposed than the notional company to the proposed reductions in allowed returns".

4.45 In response to Moody's point that actual companies will come under pressure, we suggest that this is generally due to company financing decisions and therefore may be most appropriately addressed using the company measures discussed in the section that follows. However, the following adjustments ought to provide some improvement to actual company positions compared to the analysis Moody's conducted following the December Finance Annex:

- the adjustments to the working assumptions detailed in this decision document, if used at Final Determination, and
- incorporating an expected earned equity return that includes the working assumption for the AR/ER wedge because if an AR/ER wedge is calibrated above zero then there should be sufficient evidence to provide comfort that the additional return will be earned and should be included in the base case. However, if the AR/ER wedge is calibrated at zero or below, then the allowed return could be expected to be set at the middle or upper end of the cost of equity range respectively (4.8% or above).

⁷⁵ Moody's Sector in Depth Comment published on 14th February 2019, subscribers link: http://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_1158593

⁷⁶ Ibid, page 7

Figure 18: Moody's Gas Distribution notional company AICR analysis⁷⁷

Exhibit 8

Adjusted interest coverage ratio of notional company will be similar to RIIO-GD1

Moody's base case interest rate estimates



Source: Moody's Investors Service calculations

4.46 NGN also submitted a report by Oxera titled "Review of NGN's financial analysis for RIIO-GD2" which includes an assessment of financeability based on the NGN notional company. This report states that a number of the financial ratios will "fall significantly", however the report does not present the evolution of financial metrics from RIIO-1 to RIIO-2 and instead presents only average financial metrics for RIIO-GD2 compared to indicative ranges for investment grade from credit rating agencies. This makes it difficult to assess the trend or seek to replicate these calculations.

4.47 Oxera present the following average financial metrics for an NGN notional company based on two potential dividend policies:

Table 15: Oxera/NGN notional company financial metrics

Ratio	4% Dividend Yield	2.4% Dividend Yield
Net debt/RAV	63	60
FFO interest cover (x)	3.6	3.7
PMICR (or AICR) (x)	1.31	1.34
FFO/net debt (%)	9.3	9.8
RCF/net debt (%)	6.8	8.2

4.48 We believe the 2.4% dividend yield case is a more appropriate case because, as Oxera notes, it is common for dividend yields to be lower than the allowed return because part of the equity return will be in the form of growth in the value of the equity stake. This case also allows notional gearing to stay flat at the 60% working assumption rather than requiring borrowing to fund dividends.

4.49 This Oxera/NGN analysis uses the working assumptions from the December Finance Annex but assumes 4% CPIH equity return (in line with the stated working assumption for the allowance) and zero incentive rewards or penalties. As discussed above, we believe it would be appropriate to include an additional 0.5% in the assumed earned equity return in the base case.

4.50 We are able to replicate NGN/Oxera's AICR ratio using the economic form tool used to generate Table 14 and Figure 17, when inputting the same assumptions.

⁷⁷ Ibid, page 7, exhibit 8

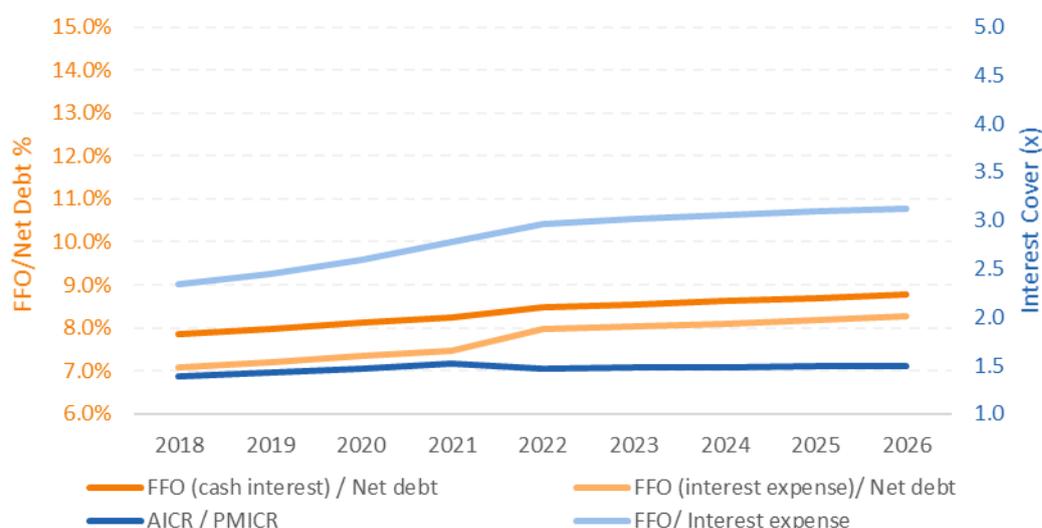
We note that when updated for current working assumptions, and including the AR/ER working assumption wedge, this ratio improves to 1.48x.

- 4.51 We were not able to fully replicate the other ratios presented by Oxera/NGN but note that these other ratios are dependent and sensitive to assumptions on depreciation rates, which are impacted by assumptions on Capex, Opex and Repex projections which NGN have not shared with us. In any case, we expect to consider these assumptions and the impact on ratios following business plan submission.
- 4.52 We have also performed a similar analysis for the Gas Transmission notional company and similarly find key metrics slightly improving compared to RIIO-1. We note the relatively weak FFO/net debt ratio, but this still shows an improvement compared to RIIO-1.

Table 16: Gas Transmission notional company key metrics

Ye 31st March		2018	2019	2020	2021	2022	2023	2024	2025	2026
Equity Allowance	RPI or CPIH	6.8%	6.80%	6.80%	6.80%	4.27%	4.29%	4.30%	4.31%	4.31%
Incentive bias (AR/ER)	RPI or CPIH	0.0%	0.0%	0.0%	0.0%	0.5%	0.5%	0.5%	0.5%	0.5%
Expected Equity Return	RPI or CPIH	6.8%	6.80%	6.80%	6.80%	4.77%	4.79%	4.80%	4.81%	4.81%
Allowance for debt	RPI or CPIH	2.22%	1.91%	1.58%	1.16%	2.03%	1.96%	1.91%	1.88%	1.86%
Notional gearing	Net Debt / RAV	62.5%	62.5%	62.5%	62.5%	60.0%	60.0%	60.0%	60.0%	60.0%
WACC allowance	Real	3.94%	3.74%	3.54%	3.28%	3.13%	3.09%	3.07%	3.05%	3.04%
Cash Interest	Nominal rate	4.52%	4.20%	3.87%	3.44%	3.56%	3.49%	3.44%	3.40%	3.38%
Interest Expense	Nominal rate	5.29%	4.97%	4.63%	4.19%	4.07%	4.00%	3.95%	3.91%	3.89%
Deprn / RAV		3.80%	3.86%	3.95%	4.02%	4.08%	4.13%	4.17%	4.22%	4.27%
Key Ratios										
AICR / PMICR		1.39	1.43	1.46	1.52	1.46	1.48	1.49	1.49	1.50
FFO (cash interest) / Net debt		7.9%	8.0%	8.1%	8.2%	8.5%	8.5%	8.6%	8.7%	8.8%
FFO/ Cash Interest		2.74	2.89	3.10	3.40	3.37	3.45	3.51	3.56	3.60
FFO/ Interest expense		2.34	2.45	2.59	2.78	2.95	3.01	3.05	3.09	3.13
FFO (interest expense)/ Net debt		7.1%	7.2%	7.3%	7.5%	7.9%	8.0%	8.1%	8.2%	8.3%

Figure 19: Gas Transmission notional company key metrics



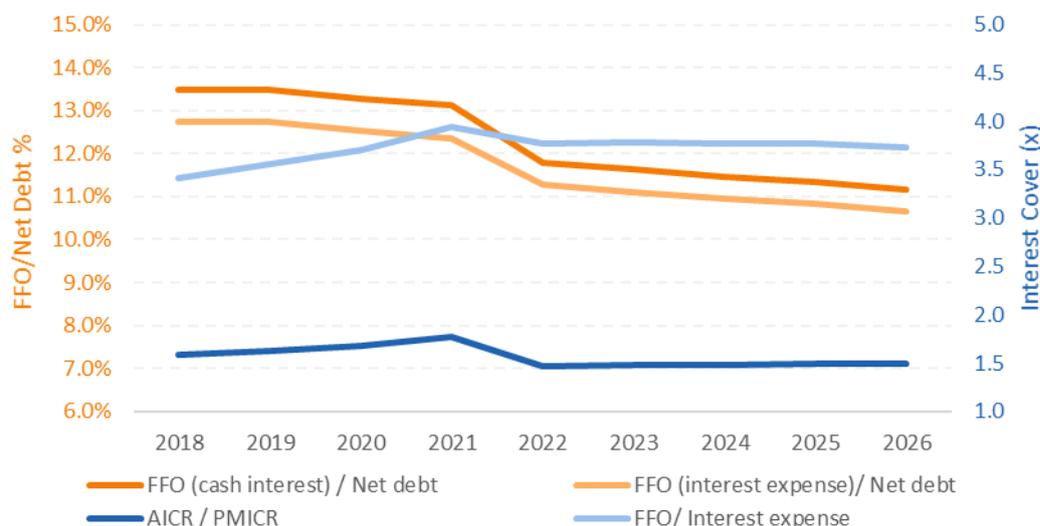
Source: Ofgem analysis

4.53 The Electricity Transmission notional company does exhibit some minor deterioration in key ratios from RIIO-1 to RIIO-2, as shown below. This is due to the higher magnitude drop in equity allowance compared to the other sectors (because it has a higher starting point in RIIO-1) and the working assumption of 60% representing an increase in notional gearing compared to RIIO-1. However, this could be mitigated by considering whether a sector-specific notional gearing assumption should be lower following receipt of business plans.

Table 17: Electricity Transmission notional company key metrics

Ye 31st March		2018	2019	2020	2021	2022	2023	2024	2025	2026
Equity Allowance	RPI or CPIH	7.0%	7.00%	7.00%	7.00%	4.27%	4.29%	4.30%	4.31%	4.31%
Incentive bias (AR/ER)	RPI or CPIH	0.0%	0.0%	0.0%	0.0%	0.5%	0.5%	0.5%	0.5%	0.5%
Expected Equity Return	RPI or CPIH	7.0%	7.00%	7.00%	7.00%	4.77%	4.79%	4.80%	4.81%	4.81%
Allowance for debt	RPI or CPIH	2.22%	1.91%	1.58%	1.16%	2.03%	1.96%	1.91%	1.88%	1.86%
Notional gearing	Net Debt / RAV	58.7%	58.7%	58.7%	58.7%	60.0%	60.0%	60.0%	60.0%	60.0%
WACC allowance	Real	4.19%	4.01%	3.82%	3.57%	3.13%	3.09%	3.07%	3.05%	3.04%
Cash Interest	Nominal rate	4.52%	4.20%	3.87%	3.44%	3.56%	3.49%	3.44%	3.40%	3.38%
Interest Expense	Nominal rate	5.29%	4.97%	4.63%	4.19%	4.07%	4.00%	3.95%	3.91%	3.89%
Deprn / RAV		6.38%	6.38%	6.25%	6.14%	6.07%	5.97%	5.87%	5.80%	5.69%
Key Ratios										
AICR / PMICR		1.58	1.63	1.68	1.77	1.46	1.48	1.49	1.49	1.50
FFO (cash interest) / Net debt		13.5%	13.5%	13.3%	13.1%	11.8%	11.6%	11.5%	11.3%	11.2%
FFO/ Cash Interest		3.99	4.21	4.44	4.82	4.30	4.33	4.33	4.33	4.30
FFO/ Interest expense		3.41	3.56	3.71	3.95	3.77	3.78	3.77	3.77	3.73
FFO (interest expense)/ Net debt		12.7%	12.7%	12.5%	12.4%	11.3%	11.1%	10.9%	10.8%	10.6%

Figure 20: Electricity Transmission notional company key metrics



Source: Ofgem analysis

4.54 In addition to calculating the key metrics, we ran these through a Moody's rating methodology grid simulator, along with qualitative factors consistent with RIIO-1 and noted no downward change in Moody's methodology implied rating for the notional company in each sector.

Next Steps

- 4.55 Based on the analysis above, we are currently of the view that the price control parameters will be adequate to support financeability of the notional company in each sector.
- 4.56 However, we recognise the iterative nature of the business planning and financeability analysis process and will review financeability again following business plan submissions and will update working assumptions throughout that process, if necessary for large market movements.

Company Measures to Address Financeability

Stakeholder views

- 4.57 In response to FQ23, three network companies broadly agreed the company measures outlined could be used to address financeability but two of those caveated that these measures should only be used for company-specific issues and not for issues resulting from mis-calibration of the price control.
- 4.58 Five network companies thought that depreciation rates and capitalisation rates should not be used to address long-term financeability or that they are short-term measures only. Centrica also noted that adjusting capitalisation or depreciation rates may work in the short term but may leave network companies (and therefore consumers) exposed in the long term.
- 4.59 NpG suggested that Ofgem should consider unwinding changes to asset lives to the extent these are giving discounts to current consumers, however, we assume this comment relates to the ED sector.
- 4.60 Some network respondents questioned the effectiveness of restricting dividends or equity injections for addressing financeability constraints. In addition, some respondents noted that any such equity action should only be assumed for short periods of time otherwise these actions could reduce the financeability of equity by lowering dividend yield and/or reducing future availability of equity.
- 4.61 Stakeholder responses to FQ33 in relation to the notional gearing assumption are discussed in paragraphs 7.24 to paragraph 7.28 below. Although networks were not generally supportive of changes to the working assumption for notional gearing from RIIO-1, there was some recognition from networks that notional gearing can impact financeability. Citizens Advice also considered that a lower level of notional gearing, such as 55%, would relieve pressure on financial ratios and be more consistent with measures of actual gearing of listed companies.
- 4.62 There was broad agreement that the level of notional gearing can only be reviewed when a network company's business plan has been assessed and the overall price control package is known.
- 4.63 There were a limited number of suggestions of other measures that could be used to reduce financeability constraints. Cadent suggested that workload profiling and a number of cashflow timing risk points being addressed through the annual iteration process (for example, uncertainty mechanisms, indexation and pass-through costs) could improve financeability. Centrica suggested that improved operational performance could be used to improve actual company financeability.

Analysis and response

- 4.64 We believe it is appropriate to leave open the option of adjusting capitalisation or depreciation rates to address financeability constraints because these measures can increase revenue in the short-medium term in return for lower RAV growth and are, therefore, NPV-neutral levers. We believe these measures can be used to improve cashflow and some metrics but we recognise that it may not impact Moody's AICR (or Fitch's PMICR) if viewed as 'excess fast money'. We note that four companies in the water sector have used PAYG or RCV run off⁷⁸ to address notional financeability in their PR19 business plans and that those companies and Ofwat view these as appropriate mechanisms if they do not have a material impact on financial resilience over the long term, and if there is sufficient evidence of customer support. *"We consider the use of PAYG or RCV run-off to address a financeability constraint to be preferable to increasing the cost of equity above the level expected by market participants"*.⁷⁹
- 4.65 We recognise there are certain limitations to adjustments to capitalisation rates and will assess any proposed adjustments in light of the evidence and justification provided through business plans. Similarly, we will look at any proposed adjustments to depreciation rates in company business plans, primarily in light of evidence provided by the network companies on asset lives and/or decommissioning risk. However, network companies should also assess the financeability impact of any such changes to depreciation and/or capitalisation rates, if the company considers such changes are appropriate and justified.
- 4.66 As discussed in the notional company credit metrics section above we believe the credit metrics for the notional company are mainly improved compared to RIIO-1 so we do not believe long term dividend restraint for the notional company would be required. Therefore, any requirement for dividend restraint would likely be due to company specific actual financeability constraints, which it is appropriate for network companies to consider addressing through dividend restraint or equity injection. Ofgem considers that restricting dividends can be an effective measure for addressing company-specific financeability constraints as this would increase funds available for making debt service payments or, if used to pay down debt (either at maturity or before to pay for refinancing high coupon debt or other financial commitments), it can reduce gearing and/or debt interest costs and improve key credit metrics.
- 4.67 Recent examples of companies proposing dividend restrictions to aid financeability include Thames Water's business plan for PR19⁸⁰, which includes dividend restraint with no dividends planned for the remainder of AMP6 and a dividend yield of c.2% for AMP 7 -, significantly lower than the 5% Ofwat reference level. This is stated by Thames Water to be used to support de-gearing, financial resilience and legitimacy⁸¹. Anglian Water's PR19 business plan also states that *"we reconfirm our commitment to reduce gearing, achieved by a substantial reduction in dividends to shareholders."*⁸²

⁷⁸ PAYG or "Pay as you go" in water sector terminology is equivalent to "capitalisation rates" terminology used by Ofgem and "RCV run off" in water sector terminology is equivalent to "regulatory/RAV depreciation rates" used by Ofgem.

⁷⁹ Ofwat [Technical appendix 3: Aligning risk and return](#), January 2019. Page 25

⁸⁰ [Thames Water TW-RR-A2 Finance and Financeability](#) 1st April 2019, Page 9-10, paragraph 2.5

⁸¹ Paragraph 1.2, [Thames Water Appendix 9 Delivering trust, confidence and assurance, September 2018](#)

⁸² [Anglian Water PR19 Business Plan 2020-2025](#), page 260

- 4.68 We consider that equity injection can be used similarly to dividend restriction to improve the financeability position of a network company. A recent example of a company proposing equity injection to aid financeability is Southern Water's PR19 business plan⁸³, which states that “[e]arly identification of financeability constraints has allowed us to put in place mitigating action in the form of a £700m equity injection.... The outcome of our strategic review was a requirement to reduce our interest costs, which will be implemented through series of actions, noted below. They will be implemented through a £700m equity injection into the operating business, equivalent to a rights issue of that amount....£425m reduction in interest costs in the 10 years to 2030 – targeted to reduce the ongoing interest expense and increase interest coverage ratios....”
- 4.69 We see no reason why the proactive action being proposed by water companies (dividend restraint and equity injection), in response to financeability concerns identified through their business planning process, could not also be used by network companies who identify financeability concerns.

Next Steps- Scenario analysis

Stakeholder Views

- 4.70 Networks provided some feedback on the stress test scenarios they believed were appropriate, although most did not provide quantitative boundaries for these scenarios.
- 4.71 Generally, networks suggested scenarios that cover the following factors should be included. Where provided, we have included initial suggestions from networks on the levels at which these scenarios should be tested. We note that where networks have provided suggested levels for scenarios they have said that precise calibration should be updated in line with network companies’ final business plans and the final price control package, and also as thinking evolves in this area. We agree with this approach and thank those networks that have provided initial suggestions of levels for discussion.

Table 18: Network suggested scenarios

Factor	Network Suggestions on Level (where provided)
<i>Macro Scenarios</i>	
Interest rate scenarios	±1% to ±1.5% ⁸⁴
CPIH scenarios	±2% from the base assumption
RPI-CPIH divergence scenarios	±1% from assumed wedge
Tax scenarios	
<i>Performance scenarios</i>	
Debt refinancing underperformance	+2% compared to base assumption
Totex underperformance	±10-15%

⁸³ https://www.southernwater.co.uk/media/1859/16_risk_return_and_financeability.pdf, pages 270-271

⁸⁴ SGN suggested risk-free rate 1% below base rate assumption but others suggested interest rate scenarios more generally and we would expect this to include both low and high scenarios. The NERA report includes iBoxx scenarios +/- 150bps for the iBoxx index, but this was over a 7-year period. ENWL suggested "rapid interest rate reversion to pre financial crisis historic levels", but no GD or T companies suggested this scenario.

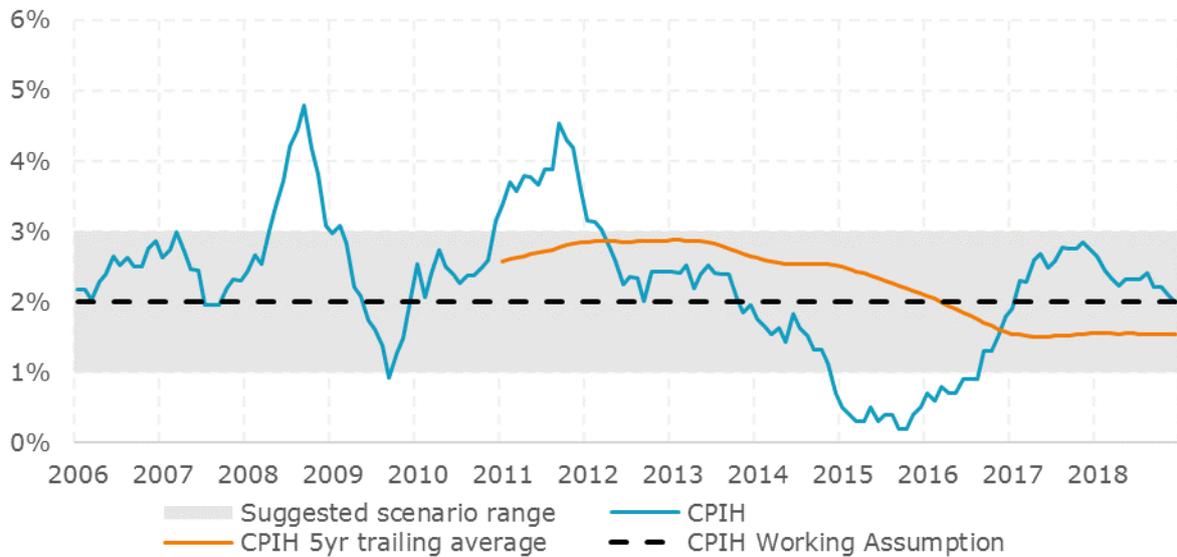
ODI penalty	£10m post sharing ⁸⁵
RoRE	±2% compared to base assumption
<i>Other scenarios</i>	
Real price effect indexation	
Gearing	
Proportion of inflation linked debt	
Impact of RAMs if introduced	
Impact of Cashflow Floor if introduced	

Analysis and response

- 4.72 We suggest that network companies assess appropriate scenario testing as part of their business plan submission process and set out the scenarios they feel are appropriate given the assessment of risk. We will discuss scenario testing further through the ENA finance workshops and with network companies throughout this process and may provide updated guidance. As a starting point, we would suggest that scenarios are designed to cover realistic high and low cases, rather than extreme scenarios. This is because any extreme cases might be expected to lead to reopening the price control or network companies requesting disapplication of the price control.
- 4.73 We propose that risk factor scenarios are calibrated at P10/P90 range of probabilities, estimated using historical or forward evidence and /or expert judgement where applicable.
- 4.74 Our observation on the network suggestion for an interest rate scenario of ±1% is that this seems like a reasonably plausible scenario.
- 4.75 The network suggestion of a CPIH scenario of ±2% CPIH was unclear whether this would be ±2% in each year or a gradual divergence to ±2% over the 5-year price control. Given the trailing average CPIH data shown in Figure 21 below and Ofwat's proposed common scenario of ±1% for each of the 5 years of PR19, we believe ±1% for each of the 5 years of RIIO-2 is a reasonable and plausible scenario. We believe ±2% in each year would represent an extreme scenario.

⁸⁵ Suggested by SGN. ODI potential performance will likely vary significantly from company to company due to variations in scale.

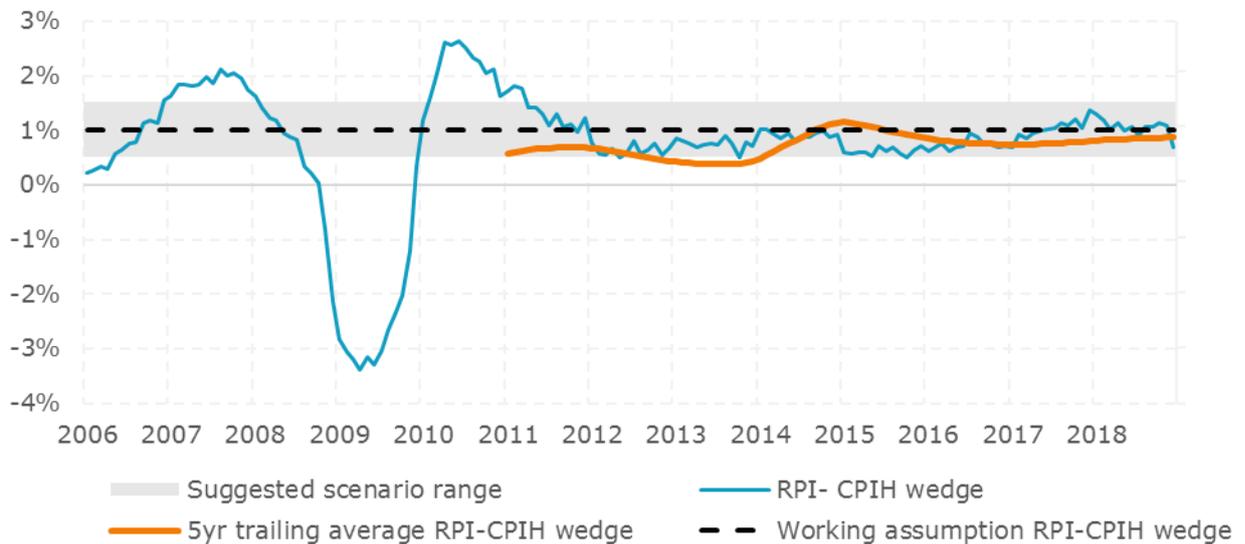
Figure 21: CPIH historical data



Source: Ofgem analysis of ONS data

4.76 The data provided in Figure 22 below shows the historical RPI-CPIH wedge and the 5 year trailing average of this. Although there have been some individual years of significant divergence we think it is appropriate to look at the 5 year trailing average for the purposes of assessing plausible scenarios for a five-year price control. Looking at the trailing average, which has been between 0.38% and 1.15% we believe a scenario of $\pm 0.5\%$ from a base working assumption⁸⁶ is reasonable.

Figure 22: RPI-CPIH wedge historical data



Source: Ofgem analysis of ONS data

4.77 A Totex scenario of $\pm 10\%$ is consistent with the scenario tested in RIIO-1 and also with Ofwat’s PR19 proposed common scenario.

⁸⁶ Current RPI-CPIH working assumption of 1.049% based on current OBR 5 year forecasts.

4.78 We agree that the network suggestion of RoRE scenario $\pm 2\%$ compared to base assumption in each year seems reasonable and plausible.

4.79 In the absence of network companies' forecast data on debt issuance we suggest an initial scenario of $\pm 5\%$ compared to the base assumption of the proportion of inflation linked debt in each year of the price control.

Next Steps

4.80 Considering the above analysis, we expect all network companies to run the following common set of scenarios as a minimum as part of their July business plan submissions to the RIIO-2 Challenge Group (along with any individual company scenarios):

Table 19: Ofgem suggested scenarios

Factor	Ofgem Proposed Level (relative to working assumption level)
<i>Macro Scenarios</i>	
Interest rate scenarios	$\pm 1\%$ compared to forward implied rates as per the base case in each year (for RFR, Libor and iBoxx inputs)
CPIH scenarios	$\pm 1\%$ in each year
RPI-CPIH divergence scenarios	$\pm 0.5\%$ from assumed wedge
<i>Performance Scenarios</i>	
Totex performance	$\pm 10\%$
RoRE	$\pm 2\%$ compared to base assumption
<i>Other Scenarios</i>	
Proportion of inflation linked debt	$\pm 5\%$ ⁸⁷

Cashflow Floor

Stakeholder Views

4.81 Moody's, Standard & Poor's and Fitch have all published notes⁸⁸ since the December Finance Annex which included comments on the proposals for a cashflow floor. Although these notes were not submitted as formal responses to the consultation, we have carefully considered these notes because we consider the rating agencies to be important stakeholders and representatives of debt holders in assessing credit profiles of network companies. We also note that their comments are accessible in published documents.

⁸⁷ Compared to notional company assumption of 25% for notional company analysis and compared to actual company proportion forecast at end of RIIO-1 for actual company analysis.

⁸⁸ Moody's Sector in Depth Comment published on 14th February 2019, subscribers link:

http://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_1158593.

S&P Global Ratings, "Ofgem's Proposed RIIO-2 Regulatory Framework Will Test UK Energy Networks", 20th February, 2019.

Fitch Ratings: [Ofgem's Credit Enhancing Mechanisms Unlikely to Benefit Ratings](#), 28 February 2019

- 4.82 In relation to the cashflow floor, Moody's raise uncertainties around timeliness of payment, legal enforceability and limitations of the scheme, including the limited number of times it could be accessed, the proposed gearing cap and lack of legislation for certainty of continuation/renewal of the mechanism. However, Moody's state that *"[d]espite its limitations, the mechanism is likely to provide some support for operating companies that would otherwise be in danger of breaching licence conditions or entering special administration"*.
- 4.83 Standard & Poor's published a comment on the RIIO-2 proposals outlined in the December Consultation on 20 February 2019 in which they note *"[w]e recognize Ofgem's effort to balance the interests of consumers and investors by introducing new mechanisms such as the cash flow floor and return adjustment mechanisms"*. They go on to state that *"[w]e see Ofgem's proposed cash flow floor mechanism as having limited credit value, notably because of its complexity, and because we expect that investment-grade networks will maintain sufficiently solid liquidity profiles not to trigger them"*. They also comment that *"[c]ash flow stress is generally associated with low-rated companies, and under our methodology, a company that experiences a liquidity shortfall cannot maintain an investment-grade rating"*, indicating that the credit support offered by the cashflow floor might only be relevant if the company were already sub-investment grade.
- 4.84 Fitch published a comment on 28 February 2019 in which they state the following in relation to the cashflow floor: *"[i]n Fitch's view, the benefit of this mechanism in its proposed form is limited for companies with investment-grade ratings. Firstly, liquidity is rarely a core concern at investment grade, as we would generally expect liquidity concerns to arise towards the low 'B' rating territory. Good liquidity is a necessary but not sufficient feature for a company to have investment grade rating. In the most likely scenario, the liquidity support and dividend lock-up would come into force after a network migrates to speculative grade and its license is either revoked or questioned. Secondly, the cashflow floor appears to merely buy time rather than address the underlying issue causing the liquidity emergency"*.
- 4.85 On balance, the rating agencies' feedback suggests that they do not believe a cashflow floor designed on a liquidity basis, absent adequate credit ratios, would support investment grade ratings and that they would not expect an investment grade network company to need to use the cashflow floor on this basis. In order for the rating agencies to provide ratings credit, it is likely that the cashflow floor would need to be restructured to provide support to specific credit metrics, rather than ensuring liquidity.
- 4.86 All 11 network companies responded negatively to FQ24 and FQ25 and the concept of the cashflow floor generally, many citing ineffectiveness of the mechanism for credit support and concept bias of favouring debt over equity.
- 4.87 Some network companies suggested that the cashflow floor would not maintain incentives and would protect poor management. They suggested that there are many actions a company can take to avoid cash shortages so entering cashflow supported status would be largely decided at management and shareholder discretion, which could lead to manipulation of the cashflow floor and bad outcomes for consumers.
- 4.88 National Grid ESO expressed concern that the proposal for the ESO to facilitate the cashflow floor would considerably increase the scope of their role and create

- greater volatility in charges. They also suggested that it would increase cashflow risk of the ESO, which could negatively impact the ESO's financeability.
- 4.89 Centrica agreed with the objectives of the cashflow floor but prefer to put the onus on network companies to address financeability constraints. Centrica were also concerned about charging volatility and timing.
- 4.90 Citizens Advice were sympathetic to the cashflow floor's objectives but said it needs to be mechanistic, rigorous and enduring so that it leads to improved ratings with ratings agencies.
- 4.91 The RIIO-2 Challenge Group had some reservations but could see benefits if it helps set a lower cost of capital.
- 4.92 The ENA submitted a report by KPMG reviewing the cashflow floor and potential implications and provided their assessment against a set of six criteria, as follows:
- Objectives and justification- does the floor address a clear market failure that justifies regulation?
 - Financeability help - is the floor required to ensure financeability of networks?
 - Financial impact - what is the impact from a debt and equity perspective?
 - What incentives could the floor have?
 - Complexity distortions - could the floor introduce additional complexity?
 - Alternative mechanisms - could other mechanisms (existing or new) achieve the same objectives?
- 4.93 In summary, in KPMG's view:
- Ofgem do not clearly identify a market failure that the cashflow floor is seeking to address. Introducing the mechanism could risk distorting the market and network company behaviours, potentially increasing actual or perceived risk and reducing the potential of natural market mechanisms to manage and price risk efficiently
 - the floor could undermine the extent to which financeability tests are meaningful, binding and robust as a cross-check on the calibration of the RIIO-2 package. The non-permanent short-term liquidity provided by the cashflow floor may not aid financeability or support ratings and may have a negative impact on the attractiveness of the sector for equity investors
 - the floor could negatively impact the incentives on management and capital providers to undertake efficient financial restructuring as well as negatively affect corporate governance
 - the floor could impact existing stakeholder claims, which are complex in nature, and either adds complexity or risks mis-calibration if kept simple.
 - the mechanistic nature of the floor risks manipulation
 - a hard revenue floor on a non-repayable basis could improve financeability but was ruled out by Ofgem due to its distortive effect on incentives and removal of company responsibility for mitigation action. A reopener would be a more appropriate mechanism to deal with catastrophic risks.

Analysis and response

4.94 The market failure Ofgem would be seeking to address with the cashflow floor is caused by the combination of the following factors:

- a high proportion of long-term fixed rate debt raised at rates that were significantly higher than today's rates
- low current yield and return environment leading to a low current market based cost of equity
- rating agency and market debt metrics that constrain ratings of regulated networks with a natural mismatch between real allowances and largely nominal debt, sometimes referred to as the 'inflation gap' in metrics
- the inflation gap being exacerbated by an inaccurate measure of inflation.

The above may risk an overinflated and non-market based equity allowance being paid to monopoly network companies that would be misaligned with equity returns available in the broader corporate market. This could bring into question the legitimacy of the sector as a whole.

4.95 However, we are currently of the view that based on our latest working assumptions set out in this document, the notional company is as strong as it was for RIIO-1 in terms of credit ratios.

4.96 The decision to switch to CPIH, while not directly related to financeability, has the impact of reducing the inflation gap between real allowances and mainly nominal debt costs and normalises ratios compared to the counterfactual of RPI real allowances that result in a distortion between artificially low real allowances (and correspondingly high RAV inflation growth) and largely nominal debt costs. We believe that actual company financeability constraints (if identified) can be adequately addressed by the other measures discussed above. Therefore, based on the combination of policies and working assumptions set out in this decision document, we do not currently consider there to be a market failure to address.

4.97 We agree with KPMG that if the cashflow floor were developed further then the incentive properties, the impact on existing stakeholder claims and the risk of company manipulation of the cashflow floor would all need to be carefully considered.

4.98 In principle, we still see potential value in a cashflow floor as a concept. However, given the feedback that the variant proposed would not have value for ratings, the lack of support from networks, the lack of any submissions suggesting support from any debtholders, and our current view that it is not required for networks to be financeable, we have decided to suspend work on the cashflow floor. Our intention is that work would only resume on any alternative variants of the cashflow floor following business plan submission if deemed necessary due to any relevant financeability concerns that could not be better addressed by other measures.

Decision

4.99 We have decided to suspend work on the cashflow floor and to focus on notional company financeability for setting price control parameters. Network companies will be expected to provide assurance in business plans on notional and actual financeability.

- 4.100 The combination of our notional company credit metrics analysis and recent evidence of other regulated companies proposing amendments to capitalisation rates, depreciation rates, dividend restriction, equity injection, de-gearing and/or refinancing to address financeability constraints, provides support for our decision to suspend work on the cashflow floor and to focus on the other measures available without further regulatory intervention at this stage.
- 4.101 We intend to only resume work and consultation on alternative variants of the cashflow floor if considered necessary (and potentially effective) following business plan submission.

Next Steps- Financial Metrics and Financial Model

- 4.102 The further information document published on 26th March set out the basis of calculation of various debt and equity metrics that are included in the business plan financial model, a draft of which was provided to the ENA on 29th March.

Stakeholder Views

- 4.103 Eight network companies submitted responses to the question in the further information document published on 26th March relating to the proposed forms of financial metrics as set out in that document.
- 4.104 No networks suggested any additional metrics that were not included in the list of metrics in that document, and most agreed that the list included the main metrics used by the rating agencies (subject to some potential adjustments discussed below).
- 4.105 One network company suggested the core ratio guidance published by Moody's in its recent sector report be incorporated into threshold levels and argued that consideration of these core metrics can dominate Moody's committee decisions.
- 4.106 Four network companies mentioned either generally or specifically the nuanced adjustments that each rating agency makes to certain ratio calculations and one company suggested Ofgem remain open to networks proposing their own metrics based on their individual business plans.
- 4.107 One network company asked for clarity on the proportion of inflation-linked debt assumed for the notional company.

Analysis and response

- 4.108 As the model has primarily been developed for a notional company, some of the adjustments networks suggest for the ratios (eg adjustments for leases) would not necessarily apply to the notional company. However, we recognise that networks may want to precisely replicate certain rating agency or debt covenant metrics when assessing actual financeability so we will discuss with the ENA modelling working group whether to allow space in the business plan financial model for network companies to provide the calculations of additional ratios. If any additional ratios are included by network companies, we would expect supporting explanatory commentary.
- 4.109 As a working assumption, we have included 25% inflation-linked debt in the draft business plan financial model (consistent with RIIO-1). This is also consistent with RFP data on the level of inflation-linked debt across the industry. However, we have included a suggested scenario where this assumption is flexed by $\pm 5\%$ (to 20% or 30%). We also expect to review this assumption following receipt of

business plans and to decide on the appropriate proportion of inflation linked debt for the notional company at Final Determination.

- 4.110 We are aware of the Moody's published guidance as part of a recent sector comment⁸⁹ but as stated in paragraph 4.23 above, we do not propose to set specific thresholds for individual metrics because we believe it is for network companies to assess their target rating and target metric threshold levels.

Next Steps- Company Business Plan Financeability Assessment

Stakeholder Views

- 4.111 The majority of network companies stated that they did not agree with submitting business plans on the basis of the working assumptions presented by Ofgem because those working assumptions (particularly the cost of equity) are subject to debate and challenge.
- 4.112 Network companies suggested that they should be permitted to submit business plans using their own working assumptions and that this would be in line with previous regulatory precedent.
- 4.113 A number of network companies suggested it would not be practical or possible to provide board assurance on financeability for the July RIIO-2 Challenge Group business plan submission because there may be insufficient time for quality assurance of the financial model for this submission, and it may not be possible to incorporate all decisions and policy developments from this Decision document into this draft business plan submission.
- 4.114 Some network companies asked Ofgem to clarify how the actual company should be modelled for the purposes of an actual financeability assessment, including confirmation of which parameters would change compared to the notional company.

Analysis and response

- 4.115 We recognise that the financial parameters are subject to some disagreement with network companies, however, we consider it important that all network companies submit business plans using consistent assumptions for the key financial parameters in order for them to be meaningful and comparable in terms of an initial financeability assessment. We therefore consider it inappropriate for network companies to use their own assumptions for cost of capital allowances in their business plans.
- 4.116 We would not consider use of the working assumptions as conferring network companies' agreement with them and we are comfortable with network companies submitting their concerns about the working assumptions. However, we strongly encourage and expect submission of compliant business plans which use the working assumptions.
- 4.117 We expect network companies' boards to provide assurances that they are satisfied that the licensee is financeable on a notional and actual basis as part of the December formal business plan submission. However, this is not required for

⁸⁹ Moody's: Regulated electric and gas networks- UK; Risks are rising, but regulatory fundamentals still intact, 24th May 2018, Exhibit 4. Subscriber content.

the July RIIO-2 Challenge Group submission. This will allow time for appropriate model quality assurance prior to the December submission.

4.118 We intend to set out in revised business plan guidance some information on how we will conduct our qualitative assessment of the finance aspects of the business plan for the purposes of the business plan incentive.

4.119 We intend to discuss actual company modelling further with ENA members through the finance and modelling working groups, but suggest that the actual company is modelled (for all submissions) by adjusting for:

- actual gearing for each year
- actual cost of debt for each year (which will incorporate actual debt issuance forecast for each year). This should include the impact of derivatives⁹⁰
- actual tax payable for each year
- actual dividend policy/dividend forecast for each year
- actual equity issuance for each year
- any other material divergence from the notional company (for example in consideration of timing differences or directly remunerated services).

⁹⁰ Inclusion of the impact of derivatives for actual financeability does not imply derivatives will be included in the assessment of debt allowances, which are to be based on what would be considered appropriate for the notional company and is to be determined following further analysis post business plan submission.

5. Corporation tax

We provide allowances within the price control for network companies to pay corporation tax. We expect these allowances to be broadly equal over time to the payments made to HMRC.

In this section we summarise our December 2018 proposals for our tax policy in RIIO-2, the consultation responses, our analysis and response to these, and then set out our sector-specific decisions.

Introduction

- 5.1 In RIIO-1, a financial model is used to calculate a tax allowance on a notional basis, as a proxy for efficient corporation tax costs, for each of the relevant licensees.
- 5.2 The RIIO-1 allowance is supplemented by two specific uncertainty mechanisms:
 - A tax trigger mechanism that reflects changes in tax rates, legislation and accounting standards; and
 - A tax clawback mechanism that claws back the tax benefit a licensee obtains as a result of gearing levels that are larger than assumed.
- 5.3 We considered three options for RIIO-2, as follows:
 - Option A – Notional allowance with added protections
 - Option B – Pass-through for payments to HMRC
 - Option C – The "double-lock": the lower of notional (Option A) and actual (Option B)
- 5.4 We also noted that one company (SSE) had achieved a Fair Tax Mark recognition. The Fair Tax Mark is awarded and published by Fair Tax Mark Ltd, a not-for-profit Community Benefit Society registered under the Industrial and Provident Societies Act (registration 32308R).
- 5.5 We have reviewed the tax trigger mechanism that is currently in place in RIIO-1 and found that it is working relatively well; it will adjust tax allowances downwards by approximately £70m as part of the Annual Iteration Process, primarily as a result of tax rates being lower than expected.
- 5.6 We have also reviewed the tax clawback mechanism that is currently in place in RIIO-1, to check if it is reflecting the degree to which tax allowances should be adjusted to reflect high gearing. At least two network companies will be affected during RIIO-1 under this mechanism, with tax allowances adjusted downwards by approximately £30m to reflect the benefits of high gearing.

Summary of December proposals

- 5.7 We proposed that, wherever possible, all network companies should seek to obtain the "Fair Tax Mark" certification. We recognised that at present the "Fair Tax Mark" is not available to companies owned outside the UK, however, we understand that Fair Tax Mark Ltd intends to issue (within the next two years) accreditation to companies that are non-UK owned, and therefore, we proposed

network companies to work with Fair Tax Mark Ltd towards obtaining accreditation.

- 5.8 Schedule 19 to the Finance Act 2016 requires companies to annually review and publish their tax strategies. Schedule 46 to the Finance Act 2009 requires companies to appoint a Senior Accounting Officer to ensure that appropriate tax accounting arrangements are established and maintained. We proposed to consider how these duties are reflected in the implementation and operation of RIIO-2.
- 5.9 We proposed to retain all three options open for further consideration and that we expect network companies to provide substantial evidence that there are not material differences between allowances received under the price control compared to payments made to HMRC. The added protection we proposed for Option A is for us to revisit the notional allowances, during the RIIO-2 period or at its close-out, should we find that allowances are materially greater than payments to HMRC.
- 5.10 We proposed to continue working closely with the network companies, through a specific working group which will discuss tax issues, and through gathering information via our reporting templates.

Stakeholder views

- 5.11 We received 13 responses to our corporation tax proposals: 12 from network companies (one being National Grid Electricity System Operator) and one from Citizens Advice.
- 5.12 Citizens Advice and four of the network companies were supportive of the proposal for fair tax accreditation. SSE noted that they had proposed the accreditation and that it should allow Ofgem to adopt a pass-through policy on tax costs. SGN also considered that there should be an incentive to obtain the Fair Tax Mark accreditation, such as pass-through of actual tax costs where those exceed the tax allowance. WWU supported the proposal but noted that the Fair Tax Mark is not currently available to them as WWU is not UK owned. Citizens Advice were strongly supportive of the Fair Tax Mark and considered that Ofgem should publicly name network companies who do not sign up ahead of RIIO-2.
- 5.13 The other seven network companies that responded did not support the proposal for the Fair Tax Mark certification. The arguments against the proposal included:
- Fair Tax Mark is a privately run third-party accreditation scheme that is not endorsed or supported by HMRC, which remains the authority on tax.
 - Companies can achieve accreditation even if they have not paid the correct level of taxes in accordance with tax legislation.
 - Non-UK owners are currently ineligible to join and, whether or not this requirement is changed, there may be other barriers to wider participation.
 - SSE's prominent role in the development and governance of the scheme, with an SSE director represented on its board, may lead to questions regarding impartiality.
 - The additional cost of seeking to get and maintain this certification would generally be passed on to customers with little additional benefit.

- 5.14 The network companies that did not support the proposal for the Fair Tax Mark accreditation argued that UK companies are required to comply with UK tax laws. HMRC is responsible for and best placed to monitor compliance. HMRC has introduced legislation to ensure large companies' tax affairs are more transparent and sufficiently internally scrutinised in the form of the requirement to publish the tax strategy and to appoint a Senior Accounting Officer.
- 5.15 The network companies were supportive of either Option A or Option B, whilst some network companies re-iterated their concerns regarding Option C, the double-lock for addressing corporation tax in RIIO-2. There was general consensus that the RIIO-1 tax framework does a good job of protecting consumers and promoting tax legitimacy. Cadent stated that the calculation of tax allowances for regulatory purposes should remain on the basis of a notionally geared efficient company. National Grid remained supportive of Option A and considered that an incentive to negotiate tax with HMRC and to maximise reliefs and incentives that the government has chosen to make available to investors in UK infrastructure must be retained.
- 5.16 For any adjustment mechanisms retained from RIIO-1 and introduced for RIIO-2, three of the network companies suggested retaining an adjustment threshold based on materiality, with a dead-band.

Analysis

- 5.17 HMRC will have more detailed knowledge of tax positions companies are adopting and has taken steps to increase transparency through the requirement to publish tax strategies. We will consider the merits of the Fair Tax Mark in relation to how HMRC determines tax and explore this further before taking a decision as to whether to add a requirement to obtain accreditation.

Next Steps

- 5.18 We will further consider the merits and applicability of the Fair Tax Mark before deciding whether to make it a requirement for all network companies to obtain, including whether it adds further consumer value.
- 5.19 We will retain all three options open for further consideration as part of our assessment of business plan submissions. For Option A, we will continue to explore a methodology for a potential reopener to be triggered under certain conditions. These conditions could include information from HMRC or whistleblowers or following major transactions, for example.
- 5.20 We have not yet received sufficient evidence that there are not material differences between allowances received under the price control compared to payments made to HMRC to rule out any of the options. We are gathering better information through the RFPR process and we expect to work closely with the network companies to discuss tax issues and understanding business plans will help us develop our tax methodology.

6. Indexation of RAV and calculation of allowed return

Inflation assumptions are required to calculate the baseline allowed return and, on an ongoing basis, the value of the Regulated Asset Base. We summarise progress to date, responses we received to our sector specific consultation, and our analysis of these. We conclude with a decision to implement an immediate switch at the beginning of RIIO-2, from RPI to either CPIH or CPI.

Introduction

- 6.1 For previous price controls, including RIIO-1, we decided to use the Retail Prices Index (RPI) to index the RAV and to allow returns in real terms.
- 6.2 However, RPI is no longer seen as a credible measure of inflation. The Office for National Statistics (ONS) has now adopted CPIH as the lead measure of inflation for household costs.
- 6.3 Other regulators are moving away from RPI within their respective price control frameworks. In 2014, Ofcom concluded that CPI was preferable to RPI. In 2015, the Water Industry Commission for Scotland (WICS) started to use CPI. More recently, Ofwat decided in December 2017 that it would use CPIH. In October 2018, ORR decided to use CPI instead of RPI.

Summary of progress to date

- 6.4 In the Framework Consultation (March 2018), we proposed to move away from RPI to either CPIH or CPI, and in the Framework Decision (July 2018) we stated our intention to use CPIH, while leaving open the option to decide whether the transition should be phased.
- 6.5 In the Sector Specific Consultation (December 2018), we proposed an immediate switch from RPI after considering the cashflow impact on network companies and consumers. We argued that an NPV-neutrality is best secured by a one-off point-in-time switch from RPI to CPIH (or CPI), reflecting the expected difference at that time. We proposed not to attempt to secure unconditional NPV-neutrality over time relative to multiple measures of inflation.
- 6.6 We therefore proposed to make an un-phased transition to CPIH from RIIO-2 onwards, but to consider again the choice of CPI or CPIH prior to implementation in our draft determinations in summer 2020.
- 6.7 We asked stakeholders the following two questions:
 - FQ29. What is your view on our proposal for an immediate switch to CPIH from the beginning of RIIO-2 for the purposes of RAV indexation and calculation of allowed return?
 - FQ30. Is there a better way to secure NPV-neutrality in light of the difficulties we identify with a true-up?

Stakeholder views

Immediate switch

- 6.8 Six network companies and Centrica supported an immediate switch, though most network companies indicated this was conditional on ensuring NPV neutrality. Citizens Advice did not explicitly comment on phasing.

- 6.9 Three network companies responded that the bill impact should be examined, or may justify phasing or smoothing.
- 6.10 ENWL and SGN submitted that phasing was likely required. ENWL cited their relatively high volumes of RPI-linked debt, while SGN responded that an immediate switch harmed investor confidence.
- 6.11 Some network companies argued that the immediate switch was being used inappropriately to bridge financeability issues.
- 6.12 Network companies clearly stated a preference for using CPI over CPIH, challenging our approach of using CPI forecasts as a proxy for CPIH expectations. SGN argued that Ofgem should wait until it becomes clearer which measure the Bank of England will use for inflation targeting.

NPV Neutrality

- 6.13 Three network companies and Centrica agreed with our approach of not attempting to secure unconditional NPV neutrality over time, while three clearly expressed their preference for a true-up.
- 6.14 Several network companies responded that 'neutrality' was being defined too narrowly, and that additional financing or other wider costs should be considered.
- 6.15 WWU cite a Moody's report stating that "*...the change from RPI to CPIH is likely to be NPV negative*", and also suggested that any wedge should have a high degree of confidence (as opposed to there being a 50% chance of the outturn wedge being higher or lower).

Analysis

Immediate switch and legitimacy

- 6.16 Stakeholders did not argue that a phased transition would be a better option than an immediate switch, in terms of securing NPV neutrality. We continue to believe that moving away from RPI will be in consumers' interests in both the short and long term due to legitimacy and accuracy benefits.
- 6.17 We considered the issues raised by consultation responses in light of the flaws with RPI. In January 2013, the National Statistician found that the formula used to calculate the RPI does not meet international standards. In March 2013, the RPI was de-designated as a national statistic by the UK Statistics Authority (UKSA). Subsequently, in January 2015, a review by Paul Johnson explained that: "*the use of the Carli formula (within RPI) is statistically flawed and can result in an upward bias in recorded inflation*". Mr Johnson went on to state⁹¹:

"...it is not just the use of the Carli which is problematic in the construction of the RPI as a measure of consumer price inflation. Issues with the data source of the weights, population coverage and treatment of some goods... make the RPI less suitable as a measure of overall inflation."

"Government and regulators should work towards ending the use of the RPI as soon as practicable. Where they decide to keep using it the UK Statistics Authority should ask them to set out clearly and publicly

⁹¹ See page 13 and page 15 here: https://www.statisticsauthority.gov.uk/wp-content/uploads/2015/12/images-ukconsumerpricestatisticsarevie_tcm97-44345.pdf

their reasons for doing so. Where the Authority judges the continued use of the RPI to be inappropriate, it should say so.”

6.18 These issues, and recommendations to avoid RPI, are, in our view, more tangible than any potential benefits of a phased transition.

NPV neutrality

6.19 Network companies signalled support for moving away from RPI, so long as the switch is NPV neutral. In our view, the required change to the real cost of capital to achieve neutrality is given formulaically as follows:

- $(1 + WACC_{RPI}) * (1 + Inflation_{RPI}) - 1 = WACC_{Nominal}$
- $(1 + WACC_{CPI/H}) * (1 + Inflation_{CPI/H}) - 1 = WACC_{Nominal}$

6.20 Each term⁹² in the above formulae represents Ofgem’s view of investors’ expectations at final determinations, of the following values (in annual percentage terms):

- $WACC_{Nominal}$ is the nominal return
- $WACC_{CPI/H}$ is the real return relative to CPI or CPIH measured inflation
- $WACC_{RPI}$ is the real return relative to RPI measured inflation
- $Inflation_{RPI}$ is RPI measured inflation
- $Inflation_{CPI/H}$ is CPI or CPIH measured inflation

6.21 In other words, given inflation expectations, the anticipated *nominal* return is the same under CPI/H or RPI indexation.

6.22 This ensures that regardless of the measure of inflation, the expected net present value (at WACC) of an allowance through the RAV equals the amount of the initial RAV addition. Formulaically, for a sequence of allowances indexed to any price base, then converted to nominal, the following is satisfied in expectation⁹³:

$$\sum_{t=1}^{45} \frac{Return_t + Depreciation_t}{(1 + WACC_{Nominal})^t} = Initial\ RAV\ Addition$$

6.23 As proposed in the Sector Specific Consultation⁹⁴ this approach is based on expectations. Therefore, and as we explain above at paragraph 3.39, a true-up cannot be applied. Further, it is not feasible to revisit final determinations at a later date to take a different view on the allowed returns, in either nominal, RPI, CPI or CPIH terms.⁹⁵ However, at final determinations, stakeholders can derive the WACC relative to RPI, given the WACC in CPIH (or CPI) terms, and given expectations for RPI and CPIH (or CPI). Defined this way, stakeholders will see

⁹² For illustrative simplicity, we ignore annual updates during the RIIO-2 period to reflect, for example, equity or debt indexation.

⁹³ Assumes a 45-year asset life and t is the years since the RAV addition. Formula omits some implementation detail about opening and closing RAVs for brevity. Equivalent to using opening RAV as the return base.

⁹⁴ See paragraph 6.13 here: https://www.ofgem.gov.uk/system/files/docs/2018/12/riio-2_finance_annex.pdf#page=67

⁹⁵ For illustrative simplicity, we ignore annual updates during the RIIO-2 period to reflect, for example, equity or debt indexation.

that the approach is inflation-switch-neutral. SPEN's response to the consultation is consistent with this concept:

"In principle any change in the inflation index used for price setting purposes should in theory be revenue neutral (ie it will not affect the present value of expected revenues charged to customers), if the "real RPI" allowed rate of return is adjusted upwards by the difference between RPI and CPIH inflation such that investors earn the same nominal return. Importantly, all other elements of the price setting formula must be appropriately adjusted to reflect the new inflation index (eg forecast totex allowances are appropriately adjusted for real price effects relative to CPIH to ensure nominal costs will be recovered). As long as the same inflation index is used to calculate the real cost of capital and to index the RAV over time, the choice of inflation index used for regulatory purposes should have no impact on the present value of revenues charged to customers."

- 6.24 Network companies including SPEN, and other stakeholders, may have a different view on the quantum of returns that are most appropriate, however, this is distinct and separable from the concept of switch-neutrality. Insofar as the estimation of real returns is correct, for example by avoiding erroneous interpretations of inflation data (ex-post or ex-ante), the use of the same inflation measurement to update the RAV, will result in neutrality.
- 6.25 As set out in chapter 2 and chapter 3, our methodology for setting returns is cross-checked in multiple ways, such that any risk of inflation-related-errors is reduced. We also note that, in terms of financeability, credit rating agencies such as Moody's present analysis in CPI terms (Figure 18), using metric thresholds that are consistent with previous price controls.

Decision

- 6.26 Following our consultation on these issues, and consideration of the responses received, we have decided to:
- implement an immediate switch from RPI to either CPIH or CPI from RIIO-2 onwards (1st April 2021 for GT, ET and GD) for the purposes of calculating RAV indexation and allowed returns. We will not phase the move away from RPI.
 - consider again whether to use CPIH or CPI, in light of factors listed in the consultation⁹⁶ and in terms of the most accurate reference point for estimating real returns. We will provide an updated position in this regard at draft determinations.

Next steps

- 6.27 At this time, business plans, cost assessment, and our estimation of real returns, will progress relative to CPIH.

⁹⁶ See paragraph 6.16 here: https://www.ofgem.gov.uk/system/files/docs/2018/12/riio-2_finance_annex.pdf#page=68

7. Other finance issues

In December we consulted on a number of other finance issues, including regulatory depreciation and economic asset lives, capitalisation rates, notional gearing, notional equity issuance costs, pensions, Directly Remunerated Services (DRS), and amounts recovered from the disposal of assets.

For each of these areas, this section summarises our December proposals, consultation responses, our analysis of these responses, and then sets out any sector-specific decisions.

Regulatory depreciation and economic asset lives

Introduction

- 7.1 Our existing policy is to depreciate the RAV at a rate that broadly approximates to the useful economic life of the network assets and incentivises investment efficiency. The approach both for historical RAV elements and new additions to the RAV differs by sector.
- 7.2 It is important to understand that, following the introduction of the totex approach in DPCR5/RIIO-1, the RAV no longer precisely corresponds to physical assets. Rather, the RAV represents simply the balance of unrecovered financial investment in the networks and also the licensee's share of incentivised out- or underperformance, not already accounted for.
- 7.3 A return is paid on the RAV through the allowed cost of capital, and the RAV is repaid through depreciation allowances. Therefore, the rate of depreciation should be set so that different generations of consumers pay network charges broadly in proportion to the value of network services they receive.
- 7.4 In the Framework Decision, we decided to maintain the existing depreciation policy of using economic asset lives as the basis for depreciating the RAV.

Summary of December proposals

- 7.5 In December, we stated that we are open to exploring further changes in the depreciation methodology in line with the economic principle of intergenerational fairness. We noted that in relation to Gas Distribution and Gas Transmission, in particular, we would look to develop a price control that is flexible to the uncertain pathway towards the decarbonisation of heat to ensure consumers are protected from unnecessary or stranded costs. Part of this assessment will be careful consideration of the useful economic lives of network assets and therefore appropriate regulatory depreciation rates.
- 7.6 We did not have any sector-specific proposals but invited views or evidence relating to the useful economic lives of assets that may impact the assessment of appropriate depreciation rates.

Stakeholder views

- 7.7 We received 13 responses: 12 from network companies (one being National Grid Electricity System Operator) and one from Citizens Advice. There was general agreement with considering asset lives and depreciation as part of the business planning process.

- 7.8 Many respondents believed current useful economic lives are appropriate and that there would need to be a high bar of evidence and justification to make changes.
- 7.9 SPEN, ENWL and UKPN were of the opinion that network companies should be able to propose different asset lives as levers to improve financeability.

Analysis

- 7.10 We believe it is too early to decide on the useful economic lives of assets and treatment until we receive information from business plans. The assumptions and scenarios underpinning business plans will influence our review of regulatory depreciation.

Next steps

- 7.11 We confirm that we are open to exploring further changes in the depreciation methodology in line with the economic principle of intergenerational fairness. Part of this assessment will involve careful consideration of the useful economic lives of network assets and therefore appropriate regulatory depreciation rates.
- 7.12 Network companies should consider regulatory depreciation and asset lives as part of the RIIO-2 business plan submissions, providing evidence that any changes are appropriate and justified.

Capitalisation rates

Introduction

- 7.13 Capitalisation rate refers to the level of company expenditure paid for by consumers over time ('slow money'), rather than immediately ('fast money'). In general, capitalisation rates broadly reflect the mix of capital and non-capital expenditure in company spending plans.

Summary of December proposals

- 7.14 We proposed to review our assumptions for the fast/slow money split in light of operational practice to date and the information in company business plans. In addition, we will consider the impact of the implementation of IFRS16, which effectively brings all leased assets on to company balance sheets, following submission of company business plans.

Stakeholder views

- 7.15 We received 12 responses, all from network companies (one being National Grid Electricity System Operator).
- 7.16 There was universal support for our proposal to consider capitalisation rates on receipt of company business plans.

Analysis

- 7.17 We believe it is too early to decide on the categories and treatment of capitalisation until we receive information from business plans.

Next steps

- 7.18 We will review our assumptions for the fast/slow money split in light of operational practice to date and the information in company business plans. In addition, we will consider the impact of the implementation of IFRS16, which effectively brings

all leased assets on to company balance sheets, following submission of company business plans.

- 7.19 Network companies should submit fast/slow money splits as part of the RIIO-2 business plan submissions, providing evidence that their proposed capitalisation rates are appropriate and justified.

Notional gearing

Introduction

- 7.20 Notional gearing represents the assumed percentage of net debt to RAV for the notional company. This in turn impacts the percentages of RAV that attract debt and equity allowances.
- 7.21 For RIIO-1, notional gearing was set at 62.5% for gas transmission, 55-60% for electricity transmission and 65% for gas distribution.

Summary of December proposals

- 7.22 We proposed that network companies assess the overall risk of their business plans and make realistic and well-justified proposals for notional gearing.
- 7.23 We also proposed to review notional gearing in light of the riskiness of the overall price control settlement and the ability of the notional efficient company to sustain downsides. We are currently assuming, as a working assumption in advance of receiving business plans, a notional gearing value of 60% for both RIIO-GD2 and T2.

Stakeholder views

- 7.24 We received 13 responses to our notional gearing proposals: 12 from network companies (one being National Grid Electricity System Operator) and one from Citizens Advice.
- 7.25 Citizens Advice considers that a lower level of notional gearing, such as 55%, would relieve pressure on financial ratios and be more consistent with measures of actual gearing of listed companies.
- 7.26 One network could see the rationale for a notional gearing that is lower than the RIIO-1 assumption for distribution sectors. Lower gearing helps provide financial resilience and gives capacity to meet future challenges, as long as the cost of equity is appropriately set.
- 7.27 The other network companies were generally not supportive of changing the proposed working assumption from the current levels set for RIIO-1, and that any change from those levels should be clearly explained based on evidence of changes to the overall financeability of the RIIO-2 price control settlement. One network suggested that the frequent basis upon which Ofgem changes its view on the appropriate level of notional gearing is not good regulatory practice, given the direct impact upon funding levels, cash flows, rates of return and actual funding decisions. One network called for an impact assessment for the change in gearing level for the working assumption.
- 7.28 There was broad agreement that the level of notional gearing can only be reviewed when a network company's business plan has been assessed and the overall price control package is known. The network companies noted the

requirement to provide well-justified proposals for notional gearing in business plan submissions, as part of an overall assessment of risk and financeability.

Analysis

- 7.29 We believe it is too early to decide on the level of notional gearing until business plans have been assessed and the overall price control package is known.
- 7.30 Notional gearing values of 60% for both RIIO-GD2 and T2 are, at this stage, only working assumptions.
- 7.31 . We intend to conduct further analysis following receipt of company business plans.

Next steps

- 7.32 We confirm that we expect network companies to assess the overall risk of their business plans and make realistic and well-justified proposals for notional gearing.
- 7.33 We will continue to review notional gearing in light of the riskiness of the overall price control settlement and the ability of the notional efficient company to sustain downsides. We confirm our notional gearing working assumption, in advance of receiving business plans, is 60% for both RIIO-GD2 and RIIO-T2.
- 7.34 Network companies should assess the overall risk of their business plans and make realistic and well-justified proposals for notional gearing.

Notional equity issuance costs

Introduction

- 7.35 Notional equity issuance costs are transaction costs associated with notional equity issuance during a price control period. The RIIO-1 assumption was that equity issuance costs should attract an allowance of 5% of the value of any notional equity raised.
- 7.36 In our Framework decision, we proposed to maintain the current approach while considering further what the level of funding should be. We reviewed the equity RIIO-1 mechanism further and found the volume of equity issuance, and therefore the allowances for costs, are lower in RIIO-1 than we expected at final determinations.

Summary of December proposals

- 7.37 We proposed to consider further the equity issuance cost assumption in light of RIIO-2 business plans and notional gearing. After receiving this further information, we would consider whether the issuance cost should be lower than the 5% assumed in RIIO-1 and whether the overall modelled volume of equity issuance is reliable, compared to actual company equity issuances.

Stakeholder views

- 7.38 We received 12 responses, all from network companies (one being National Grid Electricity System Operator).
- 7.39 There was broad agreement that the cost of raising equity should continue to be set as an allowance in the financial model. It was also felt that Ofgem is correct to consider business plans in assessing the allowance for equity issuance costs.

There was a view that Ofgem should also consider financeability and proposed changes in gearing in the assessment of the issuance of new equity.

- 7.40 There was a general view that 5% remains a good working assumption for the cost of new equity issuance with some considering that this is too low. There was no agreement that the level should be reduced and that any move away from the RIIO-1 assumption of 5% issuance cost must be clearly understood and backed by evidence.

Analysis

- 7.41 We believe it is too early to decide on the potential impact of any equity issuance methodology until we receive information from business plans and taking into account the overall price control package.

Next steps

- 7.42 We will consider further the equity issuance cost assumption in light of RIIO-2 business plans and notional gearing. After receiving this further information, we will consider whether the issuance cost should be lower than the 5% assumed in RIIO-1 and whether the overall modelled volume of equity issuance is reliable, compared to actual company equity issuances.
- 7.43 Network companies should consider and report potential and planned equity issuance as part of their RIIO-2 business plan submissions.
- 7.44 We will continue to consider other information, from stakeholders and from our own research, on actual equity issuance costs, that may be useful in proposing an appropriate allowance for this area.

Pension scheme established deficit funding

Introduction

- 7.45 We have a long-standing commitment to consumer funding of deficits in defined benefit pension schemes, which were generally in existence before the energy network sector was privatised. To reflect this commitment, our price controls provide a form of pass-through funding by consumers of 'Pension Scheme Established Deficits' (those attributable to service before certain specified cut-off dates) (PSEDs).
- 7.46 We updated our policy on this in April 2017.⁹⁷

Summary of December proposals

- 7.47 We stated that we will review the allowed revenue the network companies can recover as part of the next triennial reasonableness review, which we will complete in November 2020, this will set the established deficit pension allowance from 1 April 2021. This review will sit outside the RIIO-2 price control review.
- 7.48 We also proposed that we would align transmission and gas distribution with electricity distribution⁹⁸ in how we treat pension scheme administration (Admin)

⁹⁷ [Decision on Ofgem's policy for funding Pension Scheme Established Deficits](#)

⁹⁸ We are not making any changes to electricity distribution policy relating to Admin and PPF policy as part of RIIO-ED1.

and pension protection fund levy (PPF) costs to form part of totex, and asked for stakeholder views on this.

- 7.49 For the business plans, we said we expected network companies to assume the pension allowances for RIIO-2 to be equal to their 2020-21 allowances.⁹⁹

Stakeholder views

- 7.50 We received 11 responses, these all came from network companies.
- 7.51 There was support for our commitment to maintain our policy for funding of PSEDs, and there were no responses to say we should not.
- 7.52 With regards to the funding of Admin and PPF costs, there was broad agreement with our proposal, apart from NG and Cadent, who disagree with aligning the treatment of these costs with electricity distribution.
- 7.53 Both NG and Cadent noted that the past pension liabilities for gas distribution and transmission are not spread evenly across networks. GDN sales in 2005 involved the transfer of only limited pension liabilities leading to large disparities between the various schemes sponsored by the GDNs. The four Cadent networks carry the full scheme administration costs associated with all its liabilities, whereas the other four networks support only a proportion of their historical liability costs, as the remaining costs were transferred to NGGT. Because of this complicated liability and administration cost transfer from gas distribution to gas transmission, they consider it will be difficult to take account of these historical differences in setting overall totex allowances.
- 7.54 NG and Cadent also said that including Admin and PPF costs in totex could incentivise distribution networks to encourage Trustees to minimise these specific costs with the unintended consequence of ultimately increasing the established deficits which are funded by customers.
- 7.55 NG and Cadent also highlighted a recent High Court judgment on pensions¹⁰⁰ that may affect their schemes.
- 7.56 Additionally, NG and Cadent raise a concern that information transparency will be lost. SGN also suggest we should benchmark cost across all sectors; this would require electricity distribution companies to provide additional information.

Analysis

- 7.57 We said in our 2017 reasonableness review that we wanted to align the treatment of Admin and PPF costs, for transmission and gas distribution, the same as in electricity distribution. The total allowances per annum for Admin and PPF in transmission and gas distribution is less than £9 million (of which approximately £6.5 million is for gas transmission and gas distribution Admin and PPF costs, broadly split equally between NGG, Cadent and the other four GDNs. PPF costs account for less than £2 million of the £9 million).
- 7.58 NG and Cadent say that they have a greater administrative burden. They can highlight this as part of their business plans and we will consider it as part of the overall cost assessment.

⁹⁹ As set out in our [November 2017 triennial review decision](#), reporting separately their historical RIIO-1 and forecast RIIO-2 Admin and PPF costs.

¹⁰⁰ Guaranteed Minimum Pension (GMP) Equalisation ruling in October 2018

- 7.59 They also say there may be unintended consequences of treating Admin and PPF costs as totex. However, one of the price control pension principles under RIIO is Principle 3 - Stewardship - ante/post investment - Adjustments may be necessary to ensure that the costs for which allowance is made do not include excess costs arising from a material failure of stewardship.
- 7.60 All network companies should be aware of the recent High Court judgment and should already be identifying the potential impact, which may lead to an increased administrative burden. They have the opportunity to include this as part of their 2020 triennial reasonableness review submissions and/or RIIO-2 business plans.
- 7.61 With regards to transparency of information, we will continue to require TOs and GDNs to report Admin and PPF costs as part of their annual reporting. We may also request that ED companies provide RIIO-ED1 actual costs for Admin and PPF if we consider we require them as part of our cost assessment of RIIO-GD1 and T1 submitted business plans.

Decision

- 7.62 We confirm that we will not change the current policy for PSEDs and will set allowances as part of the next triennial review.
- 7.63 We have decided that we will align transmission and gas distribution with electricity distribution in how we treat Admin and PPF costs, with these costs being included as part of totex.

Next steps

- 7.64 Network companies should submit RIIO-2 costs for PSEDs and Admin and PPF costs as per the business plan guidance.

Directly remunerated services

Introduction

- 7.65 Directly Remunerated Services¹⁰¹ (DRS) are specific activities of the network companies that are settled outside of the normal regulatory price control. Network companies are allowed to charge their customers directly for certain services performed. For instance, a network company may enter into a commercial agreement with a third party such as a telecoms provider to lease out unused space on its grid infrastructure for the placement of satellite dishes or pylons. The Telecoms provider will then pay a rental fee directly to the network company, according to the terms of that agreement. These services are “directly remunerated” by the customer rather than through Ordinary Transportation Charges.
- 7.66 The policy intent across sectors is to avoid consumers paying for a service for which the network companies have already been remunerated. Costs associated with these services are paid for directly by the specific party (or parties) requiring the service. As such, these costs should not be factored into the network companies’ cost allowances, to avoid double-counting.

¹⁰¹ These are referred to as “Excluded Services” in Special Condition 8B (Services treated as Excluded Services) of the electricity transmission licence, Special Condition 11C (Services treated as Excluded Services) of the gas transmission licence and in Special Condition 4C (Services treated as Excluded Services) of the gas distribution licence.

7.67 Ofgem will forecast the expected revenues and costs from providing these services and reflect these when setting the allowances at the beginning of the price control. Where the actual revenue earned or cost incurred differs from original forecasts, in some cases, it may be appropriate to true-up this difference. The need for a true-up depends on the category of services and whether the costs and revenues are incentivised.

Summary of December proposals

7.68 Under RIIO-1, there are different categories of DRS in each sector. For RIIO-2, we proposed to clarify the treatment of revenues and costs for each category and to harmonise the categories across sectors.

Stakeholder views

7.69 We received 6 responses, all from network companies. There was general support for our policy intent to avoid consumers paying for a service for which the network companies have already been remunerated and for clarifying the mechanisms and reporting applicable to the existing DRS categories.

7.70 There was also agreement that the actual revenue earned, or costs incurred, may differ from original forecasts and that we investigate true-up methodologies to maximise consumer value.

7.71 NPG did not think there would be any benefits in fitting the DRS categories for all of the sectors against a set of generic categories, as the services being provided differ between sectors.

Analysis

7.72 This price control is a good opportunity to clarify the DRS mechanisms and applicable reporting structures. We intend to align existing policies, where possible, in order to provide a coherent and consistent approach. We accept that this may not always be possible without making the mechanism too generic, but we believe that there is certainly scope to simplify and clarify the process.

7.73 We believe it is too early to decide on the categories and treatment until we receive information from business plans.

Next steps

7.74 For RIIO-2, we intend to clarify the treatment of revenues and costs for each category and to harmonise the categories across sectors following submission of company business plans. We will also review DRS to investigate whether there is a need for any adjustment to enable whole system activities (for further information, see Chapter 8 Enabling whole system solutions, in the Core document).

7.75 Network companies should submit their plans for DRS as part of their business plans.

7.76 We will consider treatment of DRS in light of operational practice to date and the information in company business plans. Where costs incurred differ from original forecasts, we will consider true-up methodologies if we believe it is in the consumer interest. We will also consider where regulatory reporting could be further improved to enhance understanding.

Amounts recovered from the disposal of assets

Introduction

- 7.77 Where network assets are no longer required, network operators may dispose of or relinquish operational control, subject to consent. They may also recover from third parties, any costs in respect of damage to their network. Some of these transactions may include the disposal of land.
- 7.78 In the December proposals, we set out the financial impact of disposing of assets, these included the following:
- cash proceeds of sale at an arm’s length transaction to a third party external to the licensee group
 - transfer at an arm’s length fair market value of assets within the licensee group
 - cash proceeds of sale of assets as scrap
 - amounts recovered from third parties, including insurance companies, in respect of damage to the network.
- 7.79 Under RIIO-1 the policy on the treatment of financial proceeds is different between sectors as follows:
- RIIO-GD1 – cash proceeds are netted off calculated additions to RAV, subject to a five-year delay from the year in which the proceeds occur
 - RIIO-T1 - cash proceeds are netted off calculated additions to RAV from the year in which the proceeds occur
 - RIIO-ED1 – cash proceeds are netted off against totex from the year in which the proceeds occur

Summary of December proposals

- 7.80 We said that we will consider whether it is in the consumer interest to ensure there are incentives on the financial proceeds from disposals together and, if so, how the fair value is established and how the incentive is set.
- 7.81 We proposed that licensees should include a strategy as part of their Business Plans on how they treat the disposal of assets. As part of their submissions, they should demonstrate how consumers would benefit from that strategy. We also sought views on the potential treatment of financial proceeds or fair value transfers of asset (including land) disposals for RIIO-2.

Stakeholder views

- 7.82 We received 11 responses, all from network companies; they all supported an incentive-based approach for disposals. With electricity distribution and transmission companies supporting an incentive where cash proceeds are netted off against totex, in line with the current RIIO-ED1 approach. Cadent, NGN and WWU were of the view we should continue with the RIIO-GD1 approach, where cash proceeds are netted off calculated additions to RAV, subject to a five-year delay.

Next steps

- 7.83 We agree that network companies should be incentivised to dispose of assets where it is clear they are no longer required. Consumers should also benefit from this. Our initial view is that the RIIO-ED1 treatment is likely to be the most appropriate, but we consider that network companies should propose as part of their Business Plans their strategy on the disposal of assets. This should clearly demonstrate how consumers would benefit from financial proceeds or fair value transfers of asset (including land) disposals during RIIO-2.
- 7.84 This strategy may include a different treatment of the financial proceeds of the disposal of any assets to the RIIO-ED1 approach. We consider it appropriate to assess and compare network companies' strategies, and then make our decision on how financial proceeds are treated, which considers the best interests of consumers.

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Appendix 1 – Working assumptions for the allowed return on capital

This appendix summarises our current position on allowed returns.

Table 20: Allowed return on capital (CPIH-real), working assumption May 2019, CPIH-real

Component	Financial year ending March 31					Average	Ref	Source
	2022	2023	2024	2025	2026			
Cost of debt (11 - 15yr trombone)	2.03%	1.96%	1.91%	1.88%	1.86%	1.93%	A	Table 5
Allowed return on equity	4.27%	4.29%	4.30%	4.31%	4.32%	4.30%	B	Table 21
Notional gearing	60%	60%	60%	60%	60%	60%	C	Paragraph 7.33
Allowed return on capital	2.93%	2.89%	2.87%	2.85%	2.84%	2.88%	D	$D = A * C + B * (1-C)$

Table 21: Equity methodology, by year and by step, working assumption May 2019, CPIH-real

Component	Financial year ending March 31					Average	Ref	Source
	2022	2023	2024	2025	2026			
Step 1								
Cost of equity (low)	3.84%	3.86%	3.87%	3.89%	3.90%	3.87%	A	F (Table 22) + I (Table 23)
Cost of equity (high)	5.61%	5.62%	5.63%	5.63%	5.64%	5.63%	B	F (Table 22) + J (Table 23)
Step 2								
Cost of equity (low)	3.96%	3.99%	4.00%	4.02%	4.03%	4.00%	C	G (Table 22) + I (Table 23)
Cost of equity (high)	5.58%	5.59%	5.60%	5.61%	5.61%	5.60%	D	G (Table 22) + J (Table 23)
Working assumption	4.77%	4.79%	4.80%	4.81%	4.82%	4.80%	E	$E = (C + D) / 2$
Step 3								
Allowed return on equity	4.27%	4.29%	4.30%	4.31%	4.32%	4.30%	F	$F = E - 0.5\%$

Table 22: Equity methodology, working assumptions, December 2018 compared to May 2019, CPIH-real

Component	Low	Mid	High	Low	Mid	High	Ref	Source
	December 2018			May 2019				
Notional equity beta	0.646		0.762	0.66		0.85	A	Table 8
Total Market Return	6.25%		6.75%	6.25%		6.75%	B	Table 7
Risk-free rate	-0.69%		-0.69%	-0.96%		-0.96%	C	Table 23
Forward curve uplift	0.15%		0.15%	0.22%		0.22%	D	Table 23
Risk Free Rate	-0.53%		-0.53%	-0.75%		-0.75%	E	Table 23
Cost of equity (step 1)	3.85%		5.01%	3.87%		5.63%	F	$F = E + A * (B - E)$
Cost of equity (step 2)	4.00%	4.50%	5.00%	4.00%	4.80%	5.60%	G	Judgement based on Step 1 and Step 2
Expected outperformance		0.50%			0.50%		H	Paragraph 3.302
Allowed return on equity		4.00%			4.30%		I	$I = G - H$

Table 23: Risk-free rates as at 29th March 2019¹⁰²

Component	Financial year ending March 31					Average	Ref	Source
	2022	2023	2024	2025	2026			
Risk-free rate (RPI, spot)	-1.99%	-1.99%	-1.99%	-1.99%	-1.99%	-1.99%	A	Bank of England
Forward curve (RPI)	0.11%	0.17%	0.22%	0.26%	0.30%	0.21%	B	Bank of England
Risk-free rate (RPI, forward)	-1.88%	-1.82%	-1.77%	-1.73%	-1.69%	-1.78%	C	$C = A+B$
Risk-free rate (CPIH, spot)	-0.96%	-0.96%	-0.96%	-0.96%	-0.96%	-0.96%	D	$D = (1+A) * (1+1.049\%)-1$
Risk-free rate (CPIH, forward)	-0.85%	-0.79%	-0.74%	-0.70%	-0.66%	-0.75%	E	$E = (1+C) * (1+1.049\%)-1$
Uplift (CPIH)	0.11%	0.17%	0.22%	0.26%	0.30%	0.22%	F	$F = E - D$
Cost of equity uplift (low)	0.04%	0.06%	0.08%	0.09%	0.10%	0.07%	G	$G = F * (1 - 0.66)$
Cost of equity uplift (high)	0.02%	0.03%	0.03%	0.04%	0.05%	0.03%	H	$H = F * (1 - 0.85)$
Cost of equity uplift (low) profile	-0.04%	-0.01%	0.00%	0.02%	0.03%	0.00%	I	$I = G - G(\text{average})$
Cost of equity uplift (high) profile	-0.02%	-0.01%	0.00%	0.01%	0.01%	0.00%	J	$J = H - H(\text{average})$

¹⁰² Values in Average column subject to rounding to two decimal places.

Appendix 2 – A summary of consultants’ arguments and our initial analysis

Consultancy report 1:

Author	Prepared for	Report
Oxera	ENA	Rates of Return used by Investment Managers

Arguments raised	Ofgem comment
<p>Oxera argue that the FCA’s 6-7% nominal range for the TMR is likely to be below a central estimate of the expected TMR for two reasons. First, the FCA’s intention to protect consumers from optimistic forecasts. Oxera argue that the purpose of the FCA’s work is different to the purpose of setting a regulatory return, such that for investment managers and the FCA, a low number carries less risk than a high number, contrary to price controls where a high number may carry less risk than a low number. Second, that the welfare-enhancing TMR assumption for the purpose of investment advice would sit towards the lower end of the evidence is borne out by the data.</p>	<p>We agree to consider the FCA range with caution, in light of Oxera’s argument. We note the FCA range does not materially affect the average observation we interpret from market sources. Therefore, the evidence base we refer to is not sensitive to these issues. Oxera did not provide quantitative evidence to support the bias claim.</p>
<p>Oxera suggest that no weight is placed on investment management forecasts for three reasons: observations are not estimates of future returns; survey evidence should be given little weight; and, there is a downward bias of 2% as per academic literature.</p> <p>Oxera argued that an adjustment should be made to convert geometric averages into arithmetic averages.</p>	<p>We continue to believe that this evidence is informative and therefore we are not convinced that it should receive zero weighting. Oxera did not refer us to relevant academic literature to support its argument that there is a 2% bias.</p> <p>We agree that an adjustment for arithmetic to geometric averages may be appropriate. In our updated analysis, we assume an uplift of 1%, which we believe, based on the JP Morgan differential of 0.82%, may be an appropriate simplification for the purposes of demonstration rather than necessarily appropriate for all values.¹⁰³</p>

Consultancy report 2:

Author	Prepared for	Report
Oxera	ENA	Infrastructure Funds Discount Rates

¹⁰³ See here: <https://am.jpmorgan.com/blob-qim/1383582205822/83456/JPM51230%20LTCMA%202019%20-%20EMEA.PDF#page=104>

Arguments raised	Ofgem comment
<p>Oxera argue that there is no divergence between the discount rate used by the funds and the rate used by investors in the funds. Oxera also argue funds’ discount rates are not an appropriate cross-check because funds are less risky than energy networks and that Net Asset Value premia (NAVs) have decreased since 2017.</p>	<p>One of the funds, BBGI, reported to its investors that regulated utilities yield very similar returns to PPP assets. We agree with Oxera that NAV premia can increase and decrease – however, we do not believe this invalidates the discount rates that were presented in the consultation. Technically, the discount rates should be adjusted downwards (upwards) for positive (negative) NAV premia. Although this is not an adjustment that we made in the consultation, we are happy to consider this further. Oxera still identify a positive NAV premia using their approach, therefore, we are comfortable that discount rates are not underestimating required returns.</p>
<p>Oxera argued that infrastructure funds had a different (lower) risk-return profile compared to network assets.</p>	<p>There may be some assets within infrastructure funds that are lower risk than network utilities. However, Oxera appear to overstate the materiality of this. We present updated risk information for each of the infrastructure funds in Appendix 2 below.</p>
<p>Oxera agreed with the approach taken by Ofgem in December, to exclude 3i infrastructure. Oxera argued that 3i infrastructure should be excluded from the sample due to the risk profile being higher than that of network utilities.</p>	<p>We agree with Oxera in this regard. Although we note that Oxera’s advice may not be accepted by all the network companies, or by KPMG (see consultancy report X below), given that some companies continue to argue that Ofgem should include 3i within the sample.</p>

Consultancy Report 3:

Author	Prepared for	Report
Oxera	ENA	Risk Premium on Assets relative to Debt

Arguments raised	Ofgem comment
<p>Oxera argue that the risk of assets is always greater than the risk of the debt in the same company. Oxera argue that the relative ARP-DRP differential is not large enough.</p>	<p>We acknowledge the principle set out by Oxera and note that the ARP calculated by Oxera is higher than the DRP. We consider our approach is consistent with this principle. We note that Oxera’s argument does not focus on the absolute difference.</p>

<p>Oxera argue that the RIIO-2 proposals can be benchmarked, in terms of the relative returns between assets and debt, against a) bond returns, and b) regulatory precedents to check if the premium for risk is commensurate with remuneration hitherto.</p>	<p>By proceeding in this manner, Oxera’s analysis is based on outturn data, and assumes that the differential between the Asset Risk Premium (ARP) and Debt Risk Premium (DRP) should be constant over time.</p>
<p>Oxera take two approaches to estimating the ARP-DRP differential.</p>	<p>Both Oxera’s approaches rely on a number of subjective assumptions.</p> <p>Approach 2 appears to be sensitive to the debt beta assumption and Oxera did not provide evidence for debt betas up to 0.15 as per our consultation. So the analysis may in fact evidence a debt beta argument rather than a relative risk argument.</p> <p>Oxera’s approaches are limited due to a reliance on a nominal spot cost of debt and a nominal spot cost of equity. This therefore ignores embedded debt and the impact of indexation on the future ARP-DRP differential. It also ignores the treatment of inflation and requires adjustments which might be subjective. Ofgem has also included debt transaction costs implicitly within the iBoxx index in the past, so there is a potential inconsistency with the Oxera approach.</p>
<p>Oxera argue that for Ofgem’s proposals to be at the 60th percentile of the UK utilities distribution, 2% would need to be added to the allowed return on equity.</p> <p>Oxera accept that a larger adjustment is required, when using their view of ‘market evidence’ compared to when using their view of regulatory precedents, as the benchmarks.</p>	<p>Oxera did not consider in detail whether the allowance for the cost of debt may in the past have been too high.</p> <p>Oxera’s analysis implies that previous price control settlements were too low, compared to market data. Raising doubts as to why this precedent was not successfully challenged at the time, based on the same prevailing ‘market evidence’ to which Oxera refer.</p> <p>Inflation and risk assessment issues are therefore a notable omission from Oxera’s suggested solution. For example, demand risk is a factor in other sectors (aviation and telecoms). In our view, it is overly simplistic to assume that Oxera’s analysis necessarily indicates that the allowed return on equity would be too low if set in line with the December Finance Annex.</p> <p>An assumption of 10yrs+ for the debt premium adjustment may misrepresent risk – for example, in telecoms, the debt tenor may be as short as 7yrs.</p> <p>We note that unlisted companies represent 74 out of 86 data points within the sample and that the asset beta and TMR are therefore based on regulatory precedent. The other 12 data points (listed companies), rely upon a TMR drawn from regulatory precedent, while empirical beta estimates are time-sensitive, so we would be cautious</p>

	<p>about using these to derive a robust specific point estimate.</p> <p>There is an absence of information around the specifics of the Oxera approach, for example the level of actual gearing, given the relationship Oxera demonstrate between gearing and the DRP.</p> <p>The use of US company data limits comparability. There are differences in gearing, calculation of beta to a different relative index and an assumption on how equity returns differ between UK and the US (1% differential).</p> <p>Oxera’s analysis leads to a conclusion that assumptions for TMR and equity beta are lower than regulatory precedent. However, this leads us back to the same issues that we address in the TMR and equity beta generally, with the same underlying explanation as to why these are different from precedent.</p>
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Consultancy report 4:

Author	Prepared for	Report
Oxera	ENA	The estimation of beta and gearing

Arguments raised	Ofgem comment
Oxera argue that care should be taken when introducing new methodologies, referring to econometric approaches to assessing data.	In principle, we consider that our analysis should not be limited to approaches taken in other price controls, however we agree that new evidence must be justified and robustly applied. We believe that studies by Dr Robertson and Indepen go a significant distance to providing background to the econometric theory, options, approaches, and results. We do not agree that there has been a single econometric approach that has underpinned regulatory assessments of equity beta to date – that would be an oversimplification of the judgement that regulators have exercised based on the evidence available to them.
Oxera argue that, when estimating betas for RIIO-2, the sample should include European energy companies.	We remain unconvinced on this issue. The Oxera analysis shows that the National Grid asset beta is typically below the “Rest of Europe” energy networks. All else being equal, this suggests that including the European energy networks would put upwards pressure on equity beta estimates. However, Oxera did not

	<p>address the risk differences that may be at play, as referred to in the consultation. So Oxera’s suggestion could unduly bias the results, rather than improve accuracy.</p> <p>We note that Oxera exclude SSE from their analysis because SSE has “a high proportion of non-regulated activities”. We note that if we were to exclude SSE, replacing it with European networks as suggested, the implied betas are broadly similar. We therefore do not believe that including European utilities would materially alter the evidence, if SSE is simultaneously excluded.</p> <p>We also note the argument from NERA, based on its decomposition analysis, that US stocks have lower betas.</p>
<p>Oxera argue that the use of post-crisis data is more appropriate than pre-crisis data. In Oxera’s view, structural breaks have occurred due to market events and that recent information is more relevant than longer term evidence.</p>	<p>The Oxera argument fails to draw a strong link between the financial crisis and why network risk data should be ignored during this period. In any case, we do not see, based on Oxera’s two-year graphs, a clear structural break. Oxera’s argument would exclude periods where equity beta values are lower than other periods. Therefore, Oxera’s suggestion could unduly bias the results rather than improve accuracy.</p>
<p>Oxera argue that the arguments against the use of quarterly data are numerous.</p>	<p>We note Oxera’s arguments. However, limited weight is placed on quarterly data evidence.</p>
<p>Oxera argue that it is not appropriate to de-gear equity betas as a batch, by assuming an average gearing level.</p>	<p>We agree that it is good practice to de-gear individual companies to avoid any undue weighting effects or company-specific financial risks affecting the asset beta estimations. Where individual companies have significantly different gearing, this could avoid undue bias in the results.</p>
<p>Oxera argue that it is not appropriate to adjust gearing for an observed EV:RAV ratio because: it is not compatible with CAPM assumptions; or for linking asset and equity betas.</p>	<p>We continue to believe it is appropriate to estimate financial risk when deriving price control assumptions (notional equity betas).</p> <p>Oxera did not develop in detail why the compatibility issue occurs or why the link is less relevant between asset and equity betas. In our view, the link is</p>

	<p>strengthened if consistency between the de-gearing and re-gearing steps is improved.</p> <p>We address the gearing adjustment at paragraph 3.143.</p>
<p>Oxera argue, referring to the methodology of Professor Schaefer, that debt betas can assumed to be 0.05</p>	<p>We do not find the Oxera analysis persuasive because the Schaefer methodology may be an isolated alternative to the precedent methods for estimating debt beta, both academically and in practice. See advice from NERA to Ofcom dated October 2018.¹⁰⁴</p>

Consultancy report 5:

Author	Prepared for	Report
Oxera	NG	Assessment of political and regulatory risk

Arguments raised	Ofgem comment
<p>Oxera argue that stock-market data indicates that investors are pricing increased political and regulatory risk into the valuation of regulated utilities and NG in particular.</p> <p>Oxera conclude that, in its view, a practical way to reflect its findings would be to select a beta point estimate towards the top of the plausible equity beta range derived by the CAPM. Oxera argued that this would reduce the risk of such factors creating an underinvestment problem.</p>	<p>Oxera may have identified some relevant issues. The issue however is whether there is a risk of double counting, if we were to assume that political and regulatory risk were not already included, to a similar extent in previous outturn data. In our view, it is helpful to consider beta over a range of different states of the market. Over a longer time-frame it is not clear whether Oxera’s arguments hold, or that we could imply that regulated utilities are less defensive or higher risk than they have been hitherto.</p>

Consultancy report 6:

Author	Prepared for	Report
NERA	ENA	Cost of Equity Indexation using RFR

¹⁰⁴ https://www.ofcom.org.uk/data/assets/pdf_file/0018/124740/nera-wacc-report.pdf#page=47

Arguments raised	Ofgem comment
<p>NERA argue that 20-year nominal gilts should be deflated (using forecasts of CPI/H) instead of increasing real gilts for the expected RPI – CPI/H differential.</p>	<p>In our view, nominal gilts may not provide the best estimation of risk-free without adjustment for the inflation-risk-premium. NERA’s analysis appeared to increase the cost of equity without justifying accuracy improvements or customer benefits.</p> <p>NERA’s argued that the 20-year horizon may not be the best objective measure of risk-free but also argued that a 20-year horizon is acceptable to investors. There seemed to be an unfinished trade-off here that, using NERA’s logic, justified further exploration.</p> <p>Such exploration should address the ‘price of tomatoes’ argument. Without doing so there seems to be a material risk of cherry-picking the data to get higher numbers.</p>
<p>NERA argue that an inflation forecast error should be trued-up.</p>	<p>We do not agree that a true-up is appropriate. The cost of equity is not observable and therefore, in our view, there can be no reliable concept of truth. Equity indexation improves our ability to set allowances for up-to-date risk-free expectations rather than attempt to confirm ex-post, what investors expected (which may not be possible).</p> <p>To adjust real returns for outturn measures of inflation would seem to imply that network investors would be exposed to inflation risk, which we do not propose, and which would alter the risk-return relationship rather than delivery accuracy benefits, as implied.</p>
<p>NERA refer to OBR’s CPI forecast and the 5-year average value.</p>	<p>We note that the proposed methodology is to take the longest horizon forecast from OBR (the 5th year) not an average of the 5 years. This reflects our theory that the cost of capital is an expectation and our proposal to estimate a long-horizon cost of equity.</p>
<p>NERA argue that equity indexation could negatively affect ratios.</p>	<p>It was not clear from NERA’s analysis if debt costs and allowances were also impacted by changing risk-free rates. We agree, however, that equity indexation should form part of financeability stress</p>

	<p>tests. NERA’s suggestion did not give us cause for concern that the overall policy trade-off would be materially altered by such analysis.</p> <p>Relative to the counterfactual of setting a fixed risk-free rate that could be too low, equity indexation protects against this, such that allowances rise with market rates.</p>
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Consultancy report 7:

Author	Prepared for	Report
NERA	ENA	Review of UKRN Report Recommendations on TMR

Arguments raised	Ofgem comment								
<p>NERA argue that a real TMR deflated by RPI cannot be used in a CPI framework without adjustment.</p> <p>NERA argue that “RPI data should be used to analyse historical real TMR as the Millennium dataset CPI is unreliable.”</p> <p>NERA argue that a real TMR deflated by RPI cannot be applied in a CPI context without adjustment.</p>	<p>NERA’s argument assumes that RPI and CPI are, in their respective approaches to measuring inflation, consistent over time. NERA also imply that Dimson Marsh Staunton use RPI consistently (for over 100 years). However, the changes made to inflation measurement in 2010, represent, in our view, a step change.</p> <p>In our view, the unbiased approach is to find the best measure/s of inflation, both ex-post and ex-ante, for the purposes of accurately estimating the Total Market Return.</p> <p>NERA’s argument seems to contradict Frontier’s argument in terms of the approach taken by Dimson Marsh Staunton.</p> <p>We also note that Dimson Marsh Staunton have changed how they measure outturn inflation, using different sources in 2015, 2018 and 2019.</p> <table border="1"> <thead> <tr> <th>Period</th> <th>GIRY (before 2016)</th> </tr> </thead> <tbody> <tr> <td>1900 - 1961</td> <td>The index of retail prices</td> </tr> <tr> <td>1962 onwards</td> <td>RPI</td> </tr> </tbody> </table> <p>Source: Frontier, Interpretation of inflation expectations in the context of real TMR, p4.</p> <table border="1"> <thead> <tr> <th>Period</th> <th>GIRY 2018</th> </tr> </thead> <tbody> </tbody> </table>	Period	GIRY (before 2016)	1900 - 1961	The index of retail prices	1962 onwards	RPI	Period	GIRY 2018
Period	GIRY (before 2016)								
1900 - 1961	The index of retail prices								
1962 onwards	RPI								
Period	GIRY 2018								

	<table border="1"> <tr> <td>1900 – 1962</td> <td>The index of retail prices</td> </tr> <tr> <td>1962 – 1988</td> <td>RPI</td> </tr> <tr> <td>1988 onwards</td> <td>CPI</td> </tr> </table> <p>Source: Credit Suisse, Global Investment Returns Yearbook 2018, p210.</p> <table border="1"> <thead> <tr> <th>Period</th> <th>GIRY 2019</th> </tr> </thead> <tbody> <tr> <td>1900 – 1949</td> <td>RPI</td> </tr> <tr> <td>1949 – 1988</td> <td>O’Neill and Ralph</td> </tr> <tr> <td>1988 onwards</td> <td>CPI</td> </tr> </tbody> </table> <p>Source: Credit Suisse, Global Investment Returns Yearbook 2019, p212.</p> <p>We note that in a separate report (see consultancy report 11 below), NERA appear to recognise that RPI is not a consistent method over time.</p>	1900 – 1962	The index of retail prices	1962 – 1988	RPI	1988 onwards	CPI	Period	GIRY 2019	1900 – 1949	RPI	1949 – 1988	O’Neill and Ralph	1988 onwards	CPI
1900 – 1962	The index of retail prices														
1962 – 1988	RPI														
1988 onwards	CPI														
Period	GIRY 2019														
1900 – 1949	RPI														
1949 – 1988	O’Neill and Ralph														
1988 onwards	CPI														
<p>NERA argue that the UKRN Study “lower bound (6%) reflects a 1% downward adjustment to the simple arithmetic mean of realised returns due to return predictability at long horizons.”</p> <p>NERA argue that the UKRN Study ignores established approaches to derive unbiased estimators of TMR for long investment horizons.</p> <p>NERA argue that the UKRN Study’s adjustment for return predictability is unfounded and not compelling and thus by extension the uplift of 1% from geometric to arithmetic is not well founded.</p> <p>NERA refer to Blume (1974) and Jacquier, Kane, Marcus (2005) - approaches to estimating equity market returns. NERA argue that the evidence supports return holding periods of 1 to 5 years. NERA argue that the evidence supports a historical real TMR (RPI-deflated) of 6.8% to 7.1% and that the implication is a downward adjustment to the simple one</p>	<p>NERA may have misinterpreted the UKRN Study. The approach taken is to increase geometric returns not decrease the arithmetic returns.</p> <p>NERA appear to refer exclusively to approaches that adjust arithmetic returns. However, adjusting geometric returns is established practice and arguably more contemporary.</p> <p>See, for example, the Barclays Equity Gilt Study 2017 p154 and p155, Smithers & Co Ltd 2003 (A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.)</p>														

period arithmetic average should be in the order of 0.3%.	
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Consultancy report 8:

Author	Prepared for	Report
NERA	ENA	Further evidence on the TMR

Arguments raised	Ofgem comment
<p>NERA argue that recent market evidence shows constant TMR.</p> <p>NERA argue that, excluding Global Financial Crisis and Greek Euro crisis, the Bank of England DGM is stable over time. NERA also refer to PwC analysis and survey evidence.</p>	<p>NERA’s own analysis shows quite a material decline in UK TMR on a 30-year moving average basis, - the average is greater than 10% around 2005 and around 8% by 2015 (estimation based on visual interpretation of the NERA axis).</p> <p>It is not clear to us why certain historical periods, such as the Global Financial Crisis should be excluded.</p> <p>Contrary to NERA’s argument, the analysis by NERA’s shows, for both the Bank of England and for PwC, quite material changes in the respective estimates of TMR.</p> <p>NERA’s survey evidence appears to be relatively short term in nature, at only 5 years. We also note NERA’s own argument regarding survey evidence being potentially unreliable.</p>
<p>NERA argue that CEPA’s DGM TMR is implausibly low due to dividend growth assumption. NERA argue there are two issues: 70% of earnings come from outside the UK, and these countries have higher GDP forecasts; and short-term UK GDP forecast growth rates are somewhat depressed.</p> <p>NERA present updated evidence on why analyst forecasts are not biased.</p>	<p>NERA refer to the use of UK GDP as a proxy for dividends, and whether this is a fair. UK GDP may in fact over-estimate dividend expectations, based on the observed outturn dividend yields during the 20th century.</p> <p>NERA did not assess the extent to which UK dividends could grow at larger than UK GDP.</p> <p>NERA’s evidence on analyst forecast bias is not conclusive and the suggested solution, to use substantially higher forecasts (than UK GDP) seems inappropriate, particularly in light of outturn dividend growth being lower than UK GDP.</p>

	<p>Further, NERA’s arguments would be more persuasive if NERA provided evidence for a link between realised UK dividends and the IMF World GDP forecast. Further NERA did not justify why World GDP is favourable to Advanced Economies GDP.</p> <p>In addition, there seems to be a cherry-picking risk if we combine evidence on outturn TMR and ignore outturn dividend yields over the same period. Total returns to investors mean that there is an inverse relationship between company value and company yield. As values increase, yields decrease and vice versa.</p>
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Consultancy report 9:

Author	Prepared for	Report
NERA	NG	Review of Indepen report recommendations on beta estimation

Arguments raised	Ofgem comment
NERA argue that there is strong support for decomposing NG’s beta and that by ignoring this evidence Indepen understates NG’s beta.	<p>We do not see a strong precedent in UK utility regulation for decomposing NG’s beta. In any case, it is unclear that equity beta estimates for RIIO-2 are biased downwards as a result of this. We note, for example, that our approach to date to include SSE, contrary to the analysis by Oxera and advice by NERA (see consultancy report 11 below), provides a balanced approach to the best available data.</p> <p>We note that in a separate report for Scottish Power Transmission Ltd, (see consultancy report 11 below) NERA argue that SSE has a larger proportion of generation and non-regulated utilities that explain its higher systematic risk, noting that in Financial year end March 2018, SSE derived only 4% of its total revenues from regulated network activities.</p>
NERA argue that Ofgem fails to apply Indepen’s approach regarding gearing, underestimating the asset beta by around 0.02 to 0.03.	We address this gearing issue within the cost of equity chapter. In our view, the important estimation is the notional equity beta rather than the asset beta because the equity beta is used in CAPM whereas the asset beta is not.
NERA argue that Indepen’s assumed debt beta of 0.1 to 0.15 is out of line with academic evidence and UK regulators’ decisions on debt beta.	We address the debt beta estimation within the cost of equity chapter. In our view, the range presented in December is a reasonable interpretation of the available evidence.

	<p>We also note NERA’s advice to Ofcom that debt betas of 0.1 are supported by academic evidence and regulatory precedent.¹⁰⁵ NERA refer to research by:</p> <ul style="list-style-type: none"> • Fama & French (2002) estimating a debt beta of 0.22 for BBB rated debt, 0.21 for A rated debt and 0.20 for AA rated debt. • Brealey & Myers (2013) referring to debt betas from zero to 0.20.
<p>NERA argue asset betas could be as high as 0.45 based on ‘decomposition and other evidence’.</p>	<p>Prior to making an asset beta adjustment, but after ‘correcting for debt beta and leverage’ issues, NERA’s analysis shows a range for the cost of equity of approximately 4.23% to 5.66% (CPIH, adding 1% for simplicity).</p> <p>NERA’s analysis then takes a significant upward jump of approximately 2% based on ‘decomposition and other evidence’. However, this jump is not well supported, given the materiality.</p> <p>For example, NERA’s analysis decomposes only NG, excluding a decomposition for SSE, which could, had it been included, have helped to control for non UK regulated activities.</p>

Consultancy report 10:

Author	Prepared for	Report
NERA	NG	Review of Ofgem’s Commissioned Reports on Beta for Determining the Cost of Equity at RIIO-2

Arguments raised	Ofgem comment
<p>NERA argue that there are contradictory approaches between Ofgem’s advisors.</p>	<p>The reports are, in our view, a positive contribution for estimating risk. Advisors do not need to take precisely the same approach when conducting respective studies. We find the independent approaches productive and complementary. Taken together, this helps us draw upon a range of evidence before deciding on the most suitable approach.</p>
<p>NERA argue that if GARCH and OLS are both correctly applied, the beta estimates from both approaches are very similar, for a set of UK and European networks at least.</p>	<p>We broadly agree with NERA although we would point out one very important caveat, in light of NERA’s other preferences. Over short periods, such as 2 to 5 years, the approaches can give very different answers. This is an important caveat because NERA advise the use of estimates based on both two-year and five-year estimation windows for estimating equity beta.</p>

¹⁰⁵ https://www.ofcom.org.uk/data/assets/pdf_file/0018/124740/nera-wacc-report.pdf#page=49

Consultancy report 11:

Author	Prepared for	Report
NERA	SPEN	Cost of Equity for SPT in RIIO-T2

Arguments raised	Ofgem comment
<p>NERA argue that, due to methodological changes by the ONS in 2010 “which led to an estimated structural increase in the measure of RPI inflation (“the formula effect”) and an increase in the RPI-CPI wedge of around 30 bps”, the TMR estimation should take this change into account.</p>	<p>We agree with NERA that there has been a structural change in RPI and that TMR estimations should be mindful of this.</p> <p>In any case, our interpretation of the outturn data includes a range of approaches to ex-post inflation.</p> <p>NERA focus on arithmetic averages and attempt to make corrections for issues in RPI. This seems unduly narrow on two grounds.</p> <p>First, a geometric approach is established precedent.</p> <p>Second, see, for example, Derry Pickford’s Appendix D from the UKRN Study¹⁰⁶ with regards to price indices and estimating real returns. If primary weight is placed upon the Pickford approach, it is not necessary to create exposure to, or make adjustments for, the unreliability of RPI.</p>
<p>NERA argue that the average two-year asset beta of networks stands at 0.34, or 0.32 if SSE is excluded. NERA argue that SSE is predominantly a non-network business and its beta shows volatility over recent periods because of the effect of Brexit whereas the pre networks’ businesses are less affected.</p>	<p>We note NERA’s arguments on asset beta and SSE. NERA’s analysis does indicate that SSE’s asset beta is materially higher than the other four UK listed energy network stocks, NG, UU, SVT and PNN.</p>
<p>NERA argue that Scottish Power Transmission Ltd face greater risks and that UK regulators have set asset beta allowances in the range of 0.3 for water, 0.44 for aviation and that in RIIO-1 Ofgem allowed asset betas of 0.34 and 0.38 for NGGT and NGET and higher asset betas of 0.43 for SPT and SHETL.</p> <p>NERA argue that it derived the asset beta associated with NG plc’s UK businesses by estimating the betas</p>	<p>We note NERA’s arguments on regulatory precedent although it is not clear whether NERA believe that the quantum and relatively, continue to remain appropriate for RIIO-2.</p> <p>NERA’s beta de-composition is selective, because it excludes SSE, and subjective, because it makes a number of relative-risk assumptions which in our view lack sufficient support (or ignores relative risk issues entirely), including on international relative riskiness.</p> <p>NERA’s own evidence on European stocks shows some stocks had asset betas of 0.8 while others have had recent asset betas of approximately 0.2. Therefore, in our view, there seems to be quite a large degree of interpretation required when considering European evidence.</p>

¹⁰⁶ <https://www.ukrn.org.uk/wp-content/uploads/2018/11/2018-CoE-Study.pdf#page=109>

<p>associated with comparator US networks. NERA argue that its derivation implies US asset betas average 0.2 and that by extension NG plc’s implied UK 2-year beta is 0.55 to 0.57.</p> <p>NERA argue that asset betas of around 0.4 are supported by European empirical evidence.</p>	<p>Contrary to NERA’s suggestion, it does not seem safe to simply average European asset betas for the purposes of estimating the riskiness of RIIO-2. To do so, while ignoring international risk, political risk and tax differences, would in all likelihood unduly bias the estimation process.</p>
<p>NERA argued that TOs face greater risks than other energy networks, due to: complexity of the investment programme, competition risks, and uncertainty over the future role of TOs due to embedded generation.</p>	<p>NERA’s arguments do not seem well supported from a relative-risk or CAPM point of view. The approach by NERA is simplistic and it is difficult therefore to put material weight on these arguments.</p>

Consultancy Report 12:

Author	Prepared for	Report
KPMG	Cadent	Cost of Equity and the RIIO-2 Consultation

Arguments raised	Ofgem comment
<p>KPMG argue that there are a number of issues with the values that we used for the TMR from asset managers and financial organisations.</p> <p>KPMG also argue that there are differences between OFTOs and regulated onshore networks which render them not comparable.</p> <p>KPMG argue that infrastructure fund data indicates a wider range, of 7% to 12% nominal and that there are a number of interpretation issues, primarily differences in risk profile.</p> <p>KPMG argue that INPP and 3i compare relatively better than others due to current investments in Cadent and brownfield infrastructure, respectively.</p>	<p>We have addressed the majority of KPMG’s relevant points within the cost of equity chapter.</p> <p>We note KPMG’s arguments on relative risk between funds. Funds may not be perfect comparators for the purpose of our analysis and it would be beneficial to take into account underlying characteristics, such as investments, countries of operation, NAV premium and inflation linkage. However, to support its views, KPMG did not provide persuasive evidence to show, for funds with discount rates up to 12%, that these funds were more reliable proxies for RIIO-2 than the funds we had identified.</p>

	<p>KPMG argue one fund, 3i, which has a higher discount rate than most other funds, compares relatively better (with RIIO-2) than other funds due to its investment in brownfield infrastructure. However, we note that Oxera disagree with KPMG’s view (see Consultancy Report 2 above), because 3i are exposed to demand/revenue risk and are therefore likely to be a higher risk than RIIO-2.¹⁰⁷</p>
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Consultancy report 13:

Author	Prepared for	Report
KPMG	Cadent	Risk return balance under RIIO-GD2

Arguments raised	Ofgem comment
<p>KPMG argue that, there are eight RIIO-2 mechanisms that could decrease risk and nine that could increase risk.</p> <p>KPMG argue that there are three RIIO-2 mechanisms that could increase returns (reduction in notional gearing, deflation of nominal cost of debt and Return Adjustment Mechanisms) but many more that negatively impact returns, while some could be symmetric.</p>	<p>We welcome KPMG’s contribution to assessing the risk-return balance for RIIO-2 in this way. We find KPMG’s analysis is a positive attempt to understand the RIIO-2 framework, and in places we agree with KPMG’s assessment. We will continue to assess KPMG’s assessment in advance of setting RIIO-2 determinations.</p>
<p>KPMG argue that, from a risk-return balance perspective, the proposed mechanisms collectively result in a shift that might be seen as going beyond what can be justified based on outcomes that would prevail in a competitive market equilibrium.</p>	<p>We note KPMG’s conclusion. We agree that a competitive market equilibrium is a useful proxy and we believe that Step 2 in our methodology attempts to bring such equilibria into effect.</p> <p>KPMG did not expand upon its analysis in a practical way for us to best reflect what KPMG referred to as competitive market equilibria. We would, however, welcome suggestions in this regard.</p> <p>We would add however that RIIO-2 is being set on its own merits, not in terms of the correct differential to RIIO-1.</p>

¹⁰⁷ See 3i Infrastructure plc (2018) ‘Annual report and accounts 2018’, 10 May, page 6. http://www.annualreports.com/HostedData/AnnualReports/PDF/LSE_3IN_2018.pdf

Consultancy report 14:

Author	Prepared for	Report
Frontier	ENA	Adjusting Baseline Returns

Arguments raised	Ofgem comment
<p>Frontier argue that Ofgem should, when setting an allowed return within the cost of capital range, consider the Dobbs (2011) model and regulatory precedent, and therefore aim up.</p>	<p>The argument to aim up within the cost of capital range rests upon a number of subjective assumptions.</p> <p>First, the range itself must be relatively accurate at both the high and low ends. Second, the cost of underinvestment and over-remuneration need to each be estimated accurately. Arguments to over-remunerate may be more applicable in sectors that are experiencing capacity shortages, such as those in aviation or other growth sectors. This may have been a factor in the Competition Commission deliberations regarding the airport decision in 2007, to which Frontier refer. Third, our proposal to cross-check CAPM against four other investor return benchmarks, may in fact better capture investors true expectations. To aim-up after considering these cross-checks may lead to a double-count. Finally, it would be remiss to ignore the risks of consistent and deliberate over-remuneration. Such risks, including political risk and increased legitimacy risk, could in fact out-weigh the benefit of aiming up, to which Frontier, and Dobbs, refer.</p>
<p>Frontier argue that the theoretical foundations of setting the allowed return in expectation of outperformance is deeply flawed. Frontier argue that the proposals arise from an impossible premise that the outcomes of a general equilibrium framework that assumes perfect competition and efficient capital markets can and should be found where the assumptions of perfect competition do not hold.</p> <p>Frontier argue that the approach is an attempt to improve allocative efficiency, setting prices in line with costs, at the cost of dynamic and productive efficiency.</p> <p>In Frontier’s view, it is impossible to simultaneously satisfy allocative, productive and dynamic efficiency and forcing allocative efficiency at the expense of</p>	<p>A ‘perfectly competitive market’ is difficult to define and would in any case be an unduly high bar against which to assess regulatory mechanisms.</p> <p>In our view, Frontier appear to see a binary choice between allocative and productive efficiency. This is unduly simplistic and we note that price controls, and economic regulation generally, typically combine these two desirable features – where costs are in line with allowances and where incentive properties (regarding productivity) still remain. Our recent work on network charging demonstrates examples of such trade-offs.</p>

<p>productive and dynamic efficiency is unambiguously detrimental to customers’ interests.</p>	<p>It may in fact be beneficial to sacrifice some productive efficiency in light of the benefits of allocative efficiency.</p> <p>However, we fear that Frontier’s depiction of incentives (and thus productive efficiency) does not distinguish between justified and unjustified returns. By extension, Frontier appear to assume that reductions in excess returns must be associated with reductions in incentives. However, investors can be just as incentivised with the correct level of remuneration. In fact, excess returns can lead to suboptimal properties – where even poor performers have high returns (and are therefore not incentivised to improve efficiency). Frontier do not address this distinction and therefore fail to demonstrate a sufficiently strong link between returns and incentives to call Ofgem’s analysis into question.</p>
<p>Frontier argue that price controls can be calibrated more symmetrically (than RIIO-1) and that outperformance varies significantly across sectors and over time and is not therefore a one-way bet.</p>	<p>We agree with Frontier that price controls can be calibrated symmetrically. However, Frontier’s argument focuses on what is possible rather than what is probable.</p> <p>Investors are likely to base their expectations for RIIO-2 on probabilities, and it is reasonable to assume that these probabilities are, at least in part, informed by previous scenarios.</p>
<p>Frontier argue that Ofgem makes no allowance for the fact that the scope for outperformance is likely to be quite different in the RIIO-2 period than the RIIO-1 period.</p>	<p>Frontier’s analysis shows RIIO-1 outperformance is forecast to be greater than 2% for the majority of (16 of 18) observations (some observations by company and some network area), with outperformance for SPEN and NGGT to be closer to 1%.</p> <p>The working assumption in the consultation assumed 0.5% for RIIO-2, which seemed suitably conservative in light of the available evidence.</p> <p>Given that price controls are a repeat exercise, it is not clear whether the differences between RIIO-1 and RIIO-2 are materially different between pre-RIIO and RIIO-1.</p>

<p>Frontier argue that Ofgem has not properly evaluated the wider consequences of this adjustment – which all, in Frontier’s view, point in the direction of harming customers. Frontier argue that these detriments include: erosion of investor confidence; weakened incentives; distortion of incentives; and loss of clarity.</p>	<p>Frontier assume that the proposals, necessarily and exclusively, have negative effects. It is not clear from Frontier’s arguments that this is the case.</p> <p>We agree with Frontier, however, that any potential for negative effects should be considered.</p> <p>We also agree that there may be an impact on investor confidence, in terms of earning excessive returns. However, an accurate reading of the Ofgem proposals is that investors can be confident of earning returns commensurate with risks, in line with the cost of capital. This return will, in expectation, be a combination of baseline allowances coupled with incentives.</p> <p>In our view, for incentive regulation to be an enduring concept, both investors and customers must have confidence that there is not a systematic bias.</p> <p>Frontier’s argument that there is a loss of clarity is not well founded or explained in detail - although we welcome further explanation in this regard.</p>
<p>Frontier state that information asymmetry and information problems in general are, and have always been, a feature of UK regulation to date. Frontier refer to research by Pollitt that provides, in Frontier’s view, evidence that customers have significantly benefitted from incentive based regulation.</p> <p>In Frontier’s view, Ofgem’s argument that information asymmetries will lead to positive expectations of company performance during RIIO-2 is an extremely weak justification for adjusting baseline returns.</p>	<p>We agree with Frontier that information asymmetry and information problems were a factor in previous price controls, and in our view, this is likely to also be the case for future price controls including RIIO-2.</p> <p>Although we still believe in the benefits of incentive regulation, in our view, the research by Pollitt is not as conclusive as Frontier claim. For example, Pollitt’s study states¹⁰⁸:</p> <p><i>“A major learning has been just how slow the measured TFP productivity growth for energy networks has been over the entire period (in general), but this is still better than the UK economy as a whole. A suspected reason for low measured productivity is that energy networks have needed to invest heavily to respond to government objectives for the addition of renewables</i></p>

¹⁰⁸ <https://www.ofgem.gov.uk/ofgem-publications/146010>

	<i>and the promotion of energy efficiency without seeing increased measured outputs.”</i>
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Consultancy report 15:

Author	Prepared for	Report
Frontier	ENA	Inflation in the context of Real TMR

Arguments raised	Ofgem comment
<p>Frontier argue that there is no definitive answer to the estimation of the real (outurn) TMR.</p> <p>Ofgem’s approach is unjustified given the importance of regulatory stability and predictability in setting allowed returns and the unreliable nature of the inflation evidence that is being relied upon.</p>	<p>We agree with Frontier that there is a range of available evidence and that this can be interpreted in various ways. In our view, we show this evidence in the consultation, demonstrating how different estimates of inflation result in marginally different indications of realised returns. We also show that returns on a US dollar (\$) basis, for both UK and World regions, were lower than the sterling returns on a UK basis.¹⁰⁹ This gives comfort that UK-specific inflation estimations, as referred to by Frontier, are not materially affecting the working assumption for RIIO-2.</p> <p>We disagree with Frontier that regulatory stability and predictability means that regulators should not consider the best available evidence at each price control review.</p>
<p>Frontier argue that Burns, a contributor to the UKRN Report, did not formally dissent from the recommendation (that the Total Market Return should be 6-7% on a CPIH basis) because, at the time the report was concluded, it was not made clear that this recommendation was on a CPI/H basis rather than an RPI basis. Frontier argue that MPW (the other three authors, Mason, Pickford, Wright) took the lead on the TMR.</p>	<p>Noted. We also note that Pickford has provided updated views on the Total Market Return (see Consultancy Report 17 below, from AON, for National Grid).</p> <p>We note that the issue to which Frontier refer may in fact be an issue with the meaning of ‘real returns’ rather than an issue with how these returns are related to a particular inflation index (which itself is not stable in its methodology).</p>
<p>Frontier argue that the Ofgem estimation of a real TMR can be illustrated using four sequential steps.</p>	<p>Frontier may have misunderstood the steps that Ofgem has followed to derive</p>

¹⁰⁹ See page 28 of the consultation: https://www.ofgem.gov.uk/system/files/docs/2018/12/riio-2_finance_annex.pdf#page=28

	<p>the real TMR. For example, in Step 1, Frontier imply that there is a reputable single source for the real TMR. However, this is not accurate (and seems contrary to Frontier’s other arguments). There may be separate sources for historical nominal returns and inflation, which are more appropriate to be combined rather than rely on a single source for both (such as the DMS data). We also note that DMS has frequently changed (multiple times in recent publications) how it has measured, outturn inflation for the 20th century.</p> <p>Step 2 is also not familiar to us. We have not, and the UKRN Study did not, convert an outturn geometric real return from one inflation base to another.</p> <p>Step 3 seems broadly agreeable (uplifting from geometric to arithmetic) but Step 4 is not familiar to us.</p> <p>Real returns are the best estimation of real returns, and can be interpreted relative to the best available measure of inflation. Frontier appear to assume that the best ex-ante measure of inflation is, currently, RPI. However, we disagree on this point. NERA also appear to disagree on this point, by making an adjustment for a structural change in RPI – see Consultancy Report 11.</p>
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Consultancy report 16:

Author	Prepared for	Report
First Economics	NG	Allowed v Expected Returns

Arguments raised	Ofgem comment
<p>First Economics disputes the argument made in the UKRN Study that information asymmetry makes it more likely than not that regulators will mistakenly set price caps too high, referring to this as a defeatist characterisation of the regulatory process.</p> <p>First Economics argues that it does not agree that regulators are not capable of setting price controls which give the average regulated company a ‘fair</p>	<p>First Economics appears to conflate probabilities with possibilities, by arguing that outperformance is not probable by reference to a ‘fair-bet’ being possible. In our view, these are different things. We agree with First Economics that a ‘fair bet’ is possible but we disagree that it logically follows, or that First Economics has provided evidence to support its view that,</p>

<p>bet’, such that, across sectors and across time, firms have a roughly equal chance of out- and under-performing.</p> <p>In First Economics’ view, the evidence it presents “tends to support” its position.</p>	<p>a ‘fair bet’ is probable. We also disagree with First Economics that there is a roughly equal chance of out- and under-performance across price controls; the data does not support this view, which does not take account of causes, such as systemic information asymmetry as detailed in the UKRN report.</p> <p>If investors base their expectations for RIIO-2 on the larger degrees of outperformance than underperformance historically, the evidence provided by First Economics tends to support our view – put simply, we see more green areas than red in the First Economics graphic, which suggests that outperformance is more likely than underperformance even on this data. In addition the red bars for “CAA, Heathrow” are heavily influenced by volume risk, to which the energy networks are not exposed, and therefore the predictive properties of these two price control examples is fairly limited. We note that First Economics may have misrepresented one of the bars (in pink colour) – Frontier argue that this price control resulted outperformance of 80bps, not underperformance as implied by First Economics.</p>
<p>First Economics argue that the proposed reduction from the cost of capital might more naturally be packaged as a ‘stretch efficiency target’ insofar as Ofgem is, in effect, signalling that it intends to go beyond the evidence assembled in its RIIO-2 cost assessment work.</p> <p>On this basis, First Economics argue that the proposal would be hard to defend and equivalent to 4-14% in terms of annual totex out-performance. First Economics argue that the adjustment would be difficult to defend on this basis.</p>	<p>We do not agree that it is more appropriate to package the policy as a ‘stretch efficiency target’.</p> <p>The cost of capital and the efficient baseline for costs (& incentives) are unknowns. To estimate a ‘stretch efficiency target’ First Economics has assumed point estimates. A safer and more applicable assumption, however, is that there is a range of reasonable estimates for each.</p> <p>Therefore, this sensitivity does not jeopardise the policy because efficient totex costs and the cost of equity cannot be known, as implied by First Economics, instead – these costs must be estimated and there will be reasonable degrees of uncertainty in both cases. In any case, arguably: 1) this ‘totex test’ is well within the historical bounds of variation between outturns and allowances, and 2) this</p>

	<p>variation is within the bounds of regulatory discretion around costs (totex and financing) generally.</p> <p>We note that the 4-14% range presented by First Economics is misleading. A 0.5% sensitivity for the return on equity is worth approximately 5% to all companies (depending on the incentive rate) – no company is close to 14%. The high-end of the First Economics range (14%) appears to be based on one licensee only (NGGT), but this licensee is part of a larger group, therefore when assessing the sensitivity on a company basis, the result is much closer to 5% of totex.</p>
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Consultancy report 17:

Author	Prepared for	Report
AON	NG	Is the UK an “averagely lucky country”?

Arguments raised	Ofgem comment
<p>AON argue, in a report prepared by Derry Pickford (one of the authors of the UKRN Study) that a best estimate of long-term international returns is 6.5% real.</p>	<p>We can interpret AON’s view as being relative to CPI/H, and on an arithmetic basis, given work by Derry Pickford for the UKRN Study (see Frontier argument above that Pickford was a supporting author to the TMR recommendation) and based on our discussions with AON to date.</p> <p>However, we note that the report does not explicitly state an inflation reference point and that AON may in fact be referring to a geometric return rather than an arithmetic return. We are happy to discuss these matters further to verify the AON view in light of related work on RIIO-2.</p>
<p>AON argue that, provided capital is internationally mobile and that markets are efficient, risk-adjusted equity returns, in common currency terms, should be similar across markets.</p> <p>AON also argue that global numeraire is usually taken as the USD, and that a good reason for looking at real USD returns is that there are huge uncertainties in the inflation data not only for the UK (referring to AON’s response to a NERA report) but for</p>	<p>AON’s arguments appear to support our interpretation of outturn TMR data.</p> <p>To date, and consistent with AON’s recommendations to National Grid, we too have considered international TMR measured on a US dollar (\$) basis, partly due to an expectation that capital markets should be internationally efficient and partly due to concerns with relying exclusively on outturn UK inflation measures.</p>

<p>other countries that have experienced hyper-inflation such as Germany, Australia and Japan. In AON’s view, it therefore follows that real USD returns are likely to be more reliable than local currency real returns.</p>	
<p>AON argue that the Dimson Marsh Staunton dataset may underestimate inflation.</p>	<p>We agree with AON that this may have been the case, and we noted that Dimson Marsh Staunton have, on a number of occasions, changed their estimate of UK inflation (see response above to NERA study on inflation).</p>
<p>AON argue that big shocks to capital returns are asymmetric and that big losses are more significant than big gains. As a result, AON argue that there may be a ‘disaster bias’ in the 20th century data, referring to capital destruction from wars or revolutions.</p> <p>AON suggested that an alternative approach would be to rely on non-war periods (1957 onwards) or to extend the data back in time to 1800. AON referred to a dataset from Jeremy Siegel which it used to do this.</p>	<p>AON may have a valid point with regards to big shocks. However, AON presume that big shocks are overly influential on the dataset – this point is not well evidenced. In addition, AON’s solutions are not particularly attractive. To select 1957 onwards, as suggested, would seem to be selective.</p> <p>Our approach is based on the principle that the best available data is from 1899 onwards. This is also in line with best regulatory practice to date.</p> <p>Neither AON or NG supported their arguments by supplying us with, or referring us to an obtainable source for, the data that they relied upon. It is therefore impossible to duly assess these arguments without verification or assessment of the data that they have used.</p> <p>In addition, and as shown by AON’s analysis, data for 1800 to 1900 is focussed on the US only and therefore may be unduly biased towards returns experienced in one (probably prosperous) region.</p> <p>In all likelihood, there are reliability issues for data relating to periods preceding 1900, which is why these periods appear not to be included within the Dimson Marsh Staunton dataset. However, we are happy to consider this more closely in light of new information arising.</p>

Consultancy report 18:

Author	Prepared for	Report
NERA	ENA	Cost of Debt at RIIO-2

Arguments raised	Ofgem comment
GD and T sectors expected to underperform the cost of debt index if the RIIO-1 mechanism (10yr trailing average of A/BBB 10yr+ non financials Iboxx indices) is used due to a mismatch between debt issuance profile and trailing average.	We have analysed the debt issuance profile of sector debt and do observe some mismatch between the embedded debt issuance profile and the start of a 10yr trailing average index for RIIO-2. Based on the analysis provided by NERA and Frontier Economics we have updated our working assumption for the cost of debt in this annex to better match current views on expected sector debt costs. However, the eventual calibration of the index will be decided at Final Determination, based on full scrutiny of the data available at that time on sector embedded debt and sector expected new issuance profile.
There is no 'halo effect' if tenor and/or rating is controlled for.	We have provided some updated analysis in 2.72 to 2.75 on the 'halo effect'. This updated analysis suggests that networks have been able to issue fixed rate bonds at lower credit spreads than the iBoxx indices used in the cost of debt mechanism. However, our analysis suggests this 'halo effect' is significantly smaller than previous Ofgem analysis suggested.
Ofgem should provide a specific allowance for transaction, liquidity and cost of carry costs since these costs cannot be argued to be covered by the offsetting impact of a 'halo effect'. NERA estimate these costs as 23-56bps.	Given the updated analysis provided by NERA and our own updated analysis on the halo effect, we believe it may be appropriate to provide an allowance for transaction and liquidity costs, subject to also considering the impact of floating rate and non-bond debt on sector performance versus the index. However, we believe NERA may be double counting by assuming network companies hold cash for both cost of carry and day to day cash flow operations, thereby overestimating the amount of cash generally held in regulated businesses. Providing an allowance based on NERA's analysis could risk overcompensating network companies for liquidity costs.

Consultancy report 19:

Author	Prepared for	Report
KPMG	ENA	Assessment of Ofgem Cashflow Floor Proposals

Arguments raised	Ofgem comment
Ofgem do not clearly identify a market failure that the cashflow floor is seeking to address. Introducing the mechanism could risk distorting the market and network company behaviours, potentially increasing actual or perceived risk and reducing the potential of natural market mechanisms to manage and price risk efficiently.	We set out in 4.94 the potential market failure that Ofgem was seeking to address in considering the cashflow floor. However, based on the combination of policies and working assumptions set out in this document, we do not currently consider there to be a market failure to address.

The floor could undermine the extent to which financeability tests are meaningful, binding and robust as a cross-check on the calibration of the RIIO-2 package. The non-permanent short-term liquidity provided by the cashflow floor may not aid financeability or support ratings and may have a negative impact on the attractiveness of the sector for equity investors.	The rating agency feedback that a cashflow floor based on liquidity would probably not support ratings has been taken into account in deciding to suspend work on the cashflow floor.
The floor could negatively impact the incentives on management and capital providers to undertake efficient financial restructuring as well as negatively affect corporate governance.	This issue would need to be carefully considered if work and/or consultation on a cashflow floor is reinstated.
The floor could impact existing stakeholder claims, which are complex in nature, and either adds complexity or risks mis-calibration if kept simple.	This issue would need to be carefully considered if work and/or consultation on a cashflow floor is reinstated.
The mechanistic nature of the floor risks manipulation.	This issue would need to be carefully considered if work and/or consultation on a cashflow floor is reinstated.
A hard revenue floor on a non-repayable basis could improve financeability but was ruled out by Ofgem due to its distortive effect on incentives and removal of company responsibility for mitigation action. A reopener would be a more appropriate mechanism to deal with catastrophic risks.	We believe that the ability to reopen the price control or for networks to apply for disapplication of the price control provides an appropriate mechanism to deal with catastrophic risks.

Consultancy report 20:

Author	Prepared for	Report
Frontier Economics	NGN	Cost of debt at RIIO GD2

Arguments raised	Ofgem comment
Frontier Economics argue that the existing GD1 mechanism based on a 10yr trailing average would likely under compensate the GD sector on average (excluding Cadent) because it does not contain the pre-crisis higher interest rate environment during which some GDN legacy debt was raised. Of the roller options explored an 11-15yr trombone provides the best match to expected sector debt costs in a central interest rate case.	We have incorporated the suggestion of a 11-15yr trombone into our current working assumptions for cost of debt in the interests of reflecting a reasonable current estimate of sector average debt costs for business plans. However, the specific calibration of the index will be determined at Final Determination based on full scrutiny of information available at that time on sector embedded debt books and expected new issuance requirements over RIIO-2.
Frontier Economics run a sensitivity based on an assumption that networks raise new debt at the level of the BBB index and argue that if this were	We will consider this following full financeability review after business plan submission. Our initial analysis included in the section titled "Notional company credit

the case, a A/BBB combined 11-15yr trombone would underfund the sector average by 20bps.	metrics” would not necessarily suggest a downward movement in the notional company rating compared to RIIO-1 so we do not currently consider it appropriate to assume network companies will issue at BBB levels.
Frontier Economics argue that if Cadent’s current debt book is taken into the sector average without adjustment this would under estimate the true cost of debt of the sector by a large margin and the entire sector would be under funded, implying a potential failure of Ofgem’s financing duties.	We have some sympathy with this position and currently believe that it is likely to be appropriate for Cadent’s debt costs to either be a) adjusted for the bond refinancing costs relating to market yield movements or b) excluded for the purpose of determining sector average debt costs.

Consultancy report 21:

Author	Prepared for	Report
Oxera	NGN	Review of NGN financial analysis for RIIO-GD2

Arguments raised	Ofgem comment
<p>Oxera set out the forecasted financial metrics from NGN’s model against some indicative ranges for investment grade metrics from the credit rating agencies. They argue that the resulting metrics for the notional company with a 4% dividend yield fall below the guidance levels for an investment grade rating. They also consider a 2.4% dividend yield scenario and note the improvement in some ratios but argue that PMICR and FFO/net debt remain below Moody’s investment grade guidance threshold range at 1.34x and 9.8% respectively.</p> <p>Oxera states that its review of NGN’s model confirms NGN’s conclusion that the notional company’s financial metrics are under pressure in RIIO-GD2.</p>	<p>We believe the 2.4% dividend yield case is a more appropriate case because, as Oxera notes, it is common for dividend yields to be lower than the allowed return because part of the equity return will be in the form of growth in the value of the equity stake.</p> <p>We believe the NGN/Oxera analysis should have included a 4.5% expected equity return as the base case (rather than 4%) if based on the December working assumptions.</p> <p>As identified in the section titled “Notional company credit metrics” in this annex we do not believe the notional GDN has worse credit metrics than in RIIO-1.</p>
<p>Oxera/NGN argue that breaching certain financial metric thresholds could result in a breach of bank covenants (they reference a bank covenant with an AICR floor of 1.3x)</p>	<p>Noted. It is useful for Ofgem to understand the financial covenants included in networks’ debt instruments. In common with the process for RIIO-1 we would seek to cover this point by asking networks for business plan data template commentary that will include a request for detail on financial covenants and the volume of debt that include any such covenants.</p>
<p>Oxera state that changes to capitalisation rate or depreciation profile may not materially affect financial metrics and provide the example that Fitch has indicated it does not view alternative capitalisation or depreciation</p>	<p>We believe these measures can be used to improve cash flow and some metrics but we recognise that they may not impact Moody’s AICR or Fitch’s PMICR if viewed as ‘excess fast money’. We note that four companies in the</p>

<p>rates as helping PMICRs. Oxera also state that NGN’s view is that the only practical tools to alleviate pressure on financial metrics would be equity injection or dividend restraint. They argue that both would lead to increased cost of equity (discussed below).</p>	<p>water sector have used PAYG or RCV run off¹¹⁰ to address notional financeability in their PR19 business plans. We agree that equity injection or dividend restraint can be used to alleviate pressure on financial metrics but do not agree they are the only practical tools, as noted above other levers can be used in certain circumstances.</p>
<p>Oxera argue that if dividends are forgone or significantly reduced the cost of equity would be expected to increase because increasing the duration of cashflows would be expected to increase investors required returns due to the term premium effect. They also argue that the time inconsistency effect when combined with asset stranding risk could increase the cost of equity.</p>	<p>There are two competing theories to Oxera’s argument. First, high dividends may decrease value because dividends can be subject to higher tax rates than capital gains. Second, the quantum of dividends paid may not increase or decrease equity value because the underlying asset, and therefore its value, does not vary with dividends. Therefore, we were not persuaded by Oxera’s argument as it did not sufficiently address these other theories.</p>

¹¹⁰ PAYG or "Pay as you go" in water sector terminology is equivalent to "capitalisation rates" terminology used by Ofgem and "RCV run off" in water sector terminology is equivalent to "regulatory/RAV depreciation rates" used by Ofgem.

Appendix 3 – Additional detail on infrastructure fund discount rates

Table 24: Infrastructure funds used for discount rates – additional evidence

Fund	UK focus	Contract type	Project type	Average life
BBGI	34%	<ul style="list-style-type: none"> 100% availability-based PPP revenue stream 	100% operational	21.3 years
John Laing	72.3%	<ul style="list-style-type: none"> <10% non-PPP/PFI assets 91.5% availability-based with government backed cash flows 	85.9% operational	19.1 years
HICL	79%	<ul style="list-style-type: none"> 70% PPP 22% demand-based assets 8% regulated assets 	99% operational ¹¹¹	30 years
GCP	primarily	<ul style="list-style-type: none"> 22% PFIs, renewables focus Core portfolio (75%) must have no operational risk, pre-determined, long-term, government backed revenues and benefits from availability-based revenue contracts benefits from renewables obligation scheme, feed-in tariffs 	Construction exposure limited to 25% of total assets	15 years
INPP	71%	<ul style="list-style-type: none"> 46% PPP/PFI 40% regulated investments 	89% operational	35 years
3i	51%	<ul style="list-style-type: none"> Mainly brownfield economic infrastructure¹¹² Transport & utilities make up almost 60% of portfolio 	92% operational	

Source: CEPA analysis of relevant publications

Gearing

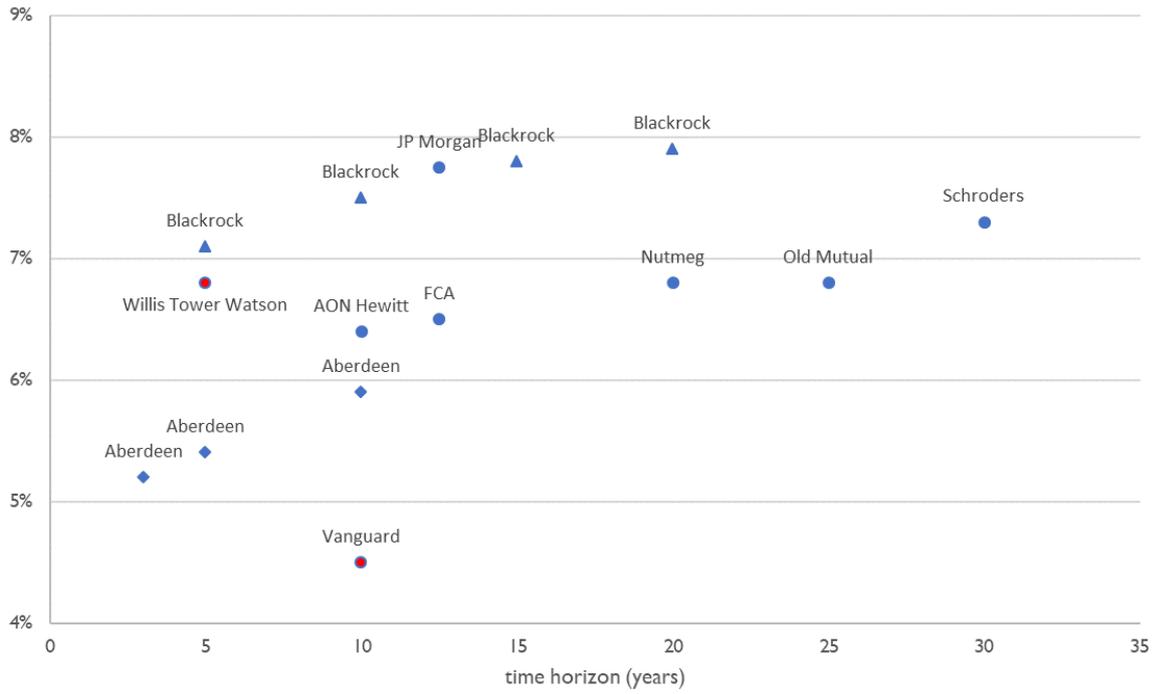
We have also looked at gearing levels for infrastructure funds. We have sought to use comparable measures of gearing, but information is not available on a consistent basis. We have found gearing ratios from 0% (3i Infrastructure) to c.15% (JLIF, GCP).

¹¹¹ KPMG suggests that they have more construction risk than BBGI and JFI, yet with 99% of projects being operational, this point appears less relevant.

¹¹² KPMG (2019): Cost of Equity and the RIIO-2 Consultation.

Appendix 4 – Investment management forecasts of TMR

Figure 23: Investment management forecasts of nominal TMR for different horizons



Source: CEPA analysis of relevant publications

Appendix 5 – Supplementary evidence on betas for listed companies

Introduction

This appendix provides supplementary evidence on beta, organised by raw equity betas, gearing, asset betas and re-gearing notional equity betas.

Raw equity betas

The starting point for our analysis is the empirical data on raw equity beta. There are different methodological choices when estimating raw equity betas. In this appendix, we do not seek to include all possible specifications.

The first methodological choice is the statistical approach applied. We have previously commissioned analysis from Robertson and Indepen on whether there are alternative statistical techniques, such as GARCH, that would improve on the traditional OLS approach. We remain open to alternative approaches, however evidence in this annex is based on OLS calculations which we deem sufficient at this stage given our focus on long-run values.

The second methodological choice is the frequency of data. We present evidence in this appendix using only high frequency daily data. The Robertson report, and stakeholder responses to the December Finance Annex, discussed relative merits of low frequency and high frequency data.

The third methodological choice is the reference index. We use the FTSE All Share Index for our UK comparators. This is a well-accepted and broad index, which is consistent with our approach to estimating the cost of equity.

The fourth methodological choice is the estimation window. As discussed in our equity beta work to date, and as identified by stakeholders, OLS is not designed to capture time variation. The estimation window is a set period of time of a certain length (eg a 5-year period). We present evidence for a range of estimation windows – between 3-year and 10-year windows. All periods end on 30th September 2018. In the tables that follow, we supplement the various estimation windows by taking an average over a different averaging periods. This is useful because the five-year period ending 30th September 2018 can imply quite different values compared to the 5-year period ending 30th September 2017. The averaging period therefore provides an indication of the average results for each given estimation window. Although this is a simplification, and we are mindful how taking such averages could affect the underlying econometric principles (eg OLS is not designed to be used in this way) – we find that it helps to isolate some of the noise in the underlying estimates, providing a signal for the underlying values.

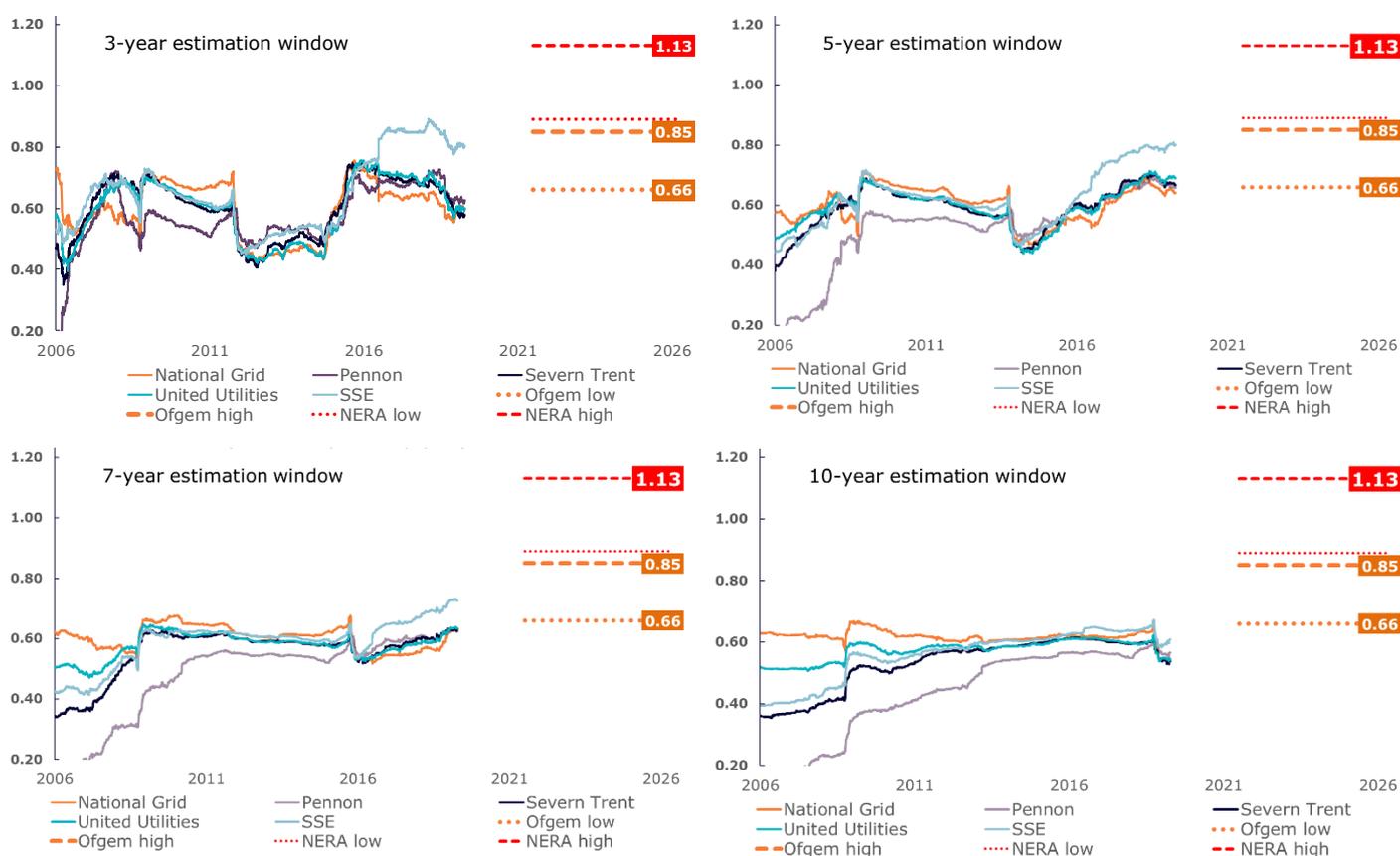
Our evidence looks at five listed comparators - National Grid, Severn Trent, United Utilities, Pennon and SSE. Comparators should ideally be 'pure play' in that they reflect the activities undertaken by the firms of relevance for our notional equity beta. We note that National Grid has significant US assets and SSE has a distinct business mix.

For National Grid we have considered whether the US assets lead to a bias in results. NERA has argued that National Grid's US assets are significantly less risky than their assets in the UK and therefore an upward adjustment is required when interpreting beta evidence. We disagree with this and consider that National Grid's asset beta can be used without adjustment to inform our range, and inform this sensitivity analysis.

For SSE, a decomposition of activities has not been provided by network companies or their advisers, however we note that Oxera and NERA suggest that SSE may be higher risk than other networks. In addition, CEPA (2018) recommended that SSE should be excluded as a comparator due to the low proportion of regulated activities. To illustrate the sensitivity of this, we present results for individual companies and where averages are used, we show the results including and excluding SSE, to illustrate the sensitivity of its inclusion.

The charts below show historical rolling raw equity beta estimates for our comparators using the different estimation windows. We can see that longer estimation windows focus the underlying data and flatten the lines. We can see that our working assumption fits the data better than NERA’s proposal – although as explained Chapter 3, part of the difference between the data and the horizontal lines, is that the price control is set on a different level of gearing.

Figure 24: Raw equity betas, using a range of estimation windows, relative to NERA arguments and our working assumption for the price control



Source: Ofgem analysis of Bloomberg share price movements

Looking at these graphs, we can see:

- that larger estimation windows focus the underlying data and flatten the lines.
- that the shorter estimation windows display greater volatility.
- that our working assumption fits the data better than NERA’s proposal.

However as explained Chapter 3, part of the difference between the data and the horizontal lines, is that the price control is set on a different level of gearing. In an attempt to compare like with like, we need to estimate the impact of gearing. We do this in the following sections.

The results of different estimation windows and different averaging periods are shown below at Table 25.

Table 25: Raw equity betas, sensitivity analysis

Estimation window	Averaging period	SSE	NG	PNN	SVT	UU	Average	Average (exc SSE)
3-year	Spot	0.82	0.58	0.65	0.64	0.62	0.66	0.62
3-year	3-year	0.83	0.65	0.68	0.70	0.71	0.71	0.69
3-year	5-year	0.72	0.61	0.63	0.64	0.64	0.65	0.63
3-year	10-year	0.65	0.60	0.58	0.61	0.60	0.61	0.60
5-year	Spot	0.78	0.65	0.68	0.69	0.69	0.70	0.68
5-year	3-year	0.73	0.61	0.63	0.64	0.64	0.65	0.63
5-year	5-year	0.65	0.57	0.59	0.59	0.58	0.60	0.58
5-year	10-year	0.64	0.61	0.57	0.60	0.60	0.60	0.59
10-year	Spot	0.67	0.65	0.61	0.62	0.62	0.63	0.62
10-year	3-year	0.64	0.62	0.57	0.60	0.61	0.61	0.60
10-year	5-year	0.63	0.62	0.56	0.60	0.60	0.60	0.59
10-year	10-year	0.60	0.62	0.49	0.57	0.59	0.57	0.57

Source: Ofgem analysis of Bloomberg share price movements

Gearing

The equity beta captures the risk to equity investors at a given level of gearing. Corporate finance theory notes that equity risk increases with gearing. We refer to the risk contingent on the level of gearing as 'financial risk'. The gearing of comparator companies may not be the same as the notional gearing estimate used in a price control determination. The approach traditionally taken to account for this is to de-gear to derive an asset beta. The asset beta captures the underlying 'asset risk'. The next step is to re-gear from the asset beta to the notional equity beta, using an assessment of financial risk and gearing for our notional entity.

There are different measures of gearing that can be used to reflect financial risk. We look to use the gearing estimates that investors would consider in assessing financial risk and we consider that outturn gearing is the best available approach. We discuss two characteristics within gearing estimates below, namely:

- the choice of gross or net debt
- use of book value or market value
- the appropriate time horizon to consider gearing over

Gross versus net debt

Our approach for the December Finance Annex utilised net debt gearing. Net debt gearing subtracts cash and cash equivalents from gross debt. Our default approach within this appendix continues to rely on net debt gearing, however we present gross debt, ie without cash netted off, as a sensitivity.

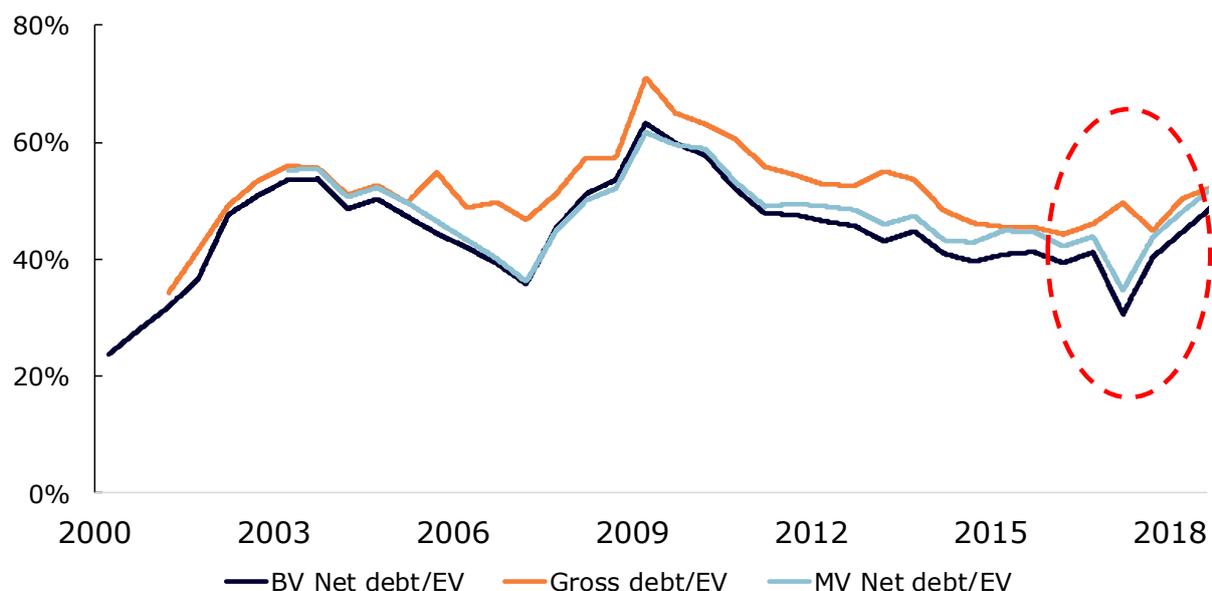
NERA (2018) in their work for Ofcom use gross debt for estimating equity and asset beta.¹¹³ Previous reports from NERA to Ofcom discuss that net debt is appropriate if the cash holdings could be used to pay off existing debt. However, where this cash is required to finance ongoing activities, gross debt is more appropriate.

¹¹³ NERA (2018) Cost of Capital: Beta and gearing for the 2019 BCMR, October 2018.

We calculate both net debt gearing and gross debt gearing with the Enterprise Value (EV) as the denominator. The EV represents the value of a firm to a buyer and is itself calculated using net debt, ie cash offsets debt.

There could be occasions where using a proxy of outturn gearing levels are not representative of the gearing levels that an investor would consider in assessing financial risk. An example of this is the observed levels of gearing for National Grid during the sale of the gas distribution networks. With a high level of cash from the sale, the net debt gearing figure fell sharply, but the effect was transitory.

Figure 25: Differences in National Grid gearing measures



Source: Bloomberg

We note that EV is updated each day. Net debt and gross debt are not updated daily and are updated semi-annually. Bloomberg uses the last reported value when providing data on these two measures.¹¹⁴ Using last reported values is consistent with the calculation of EV, although we would ideally have more frequent data to use for estimating debt.

Book value or market value of debt

Regulators have typically used the book value of debt in estimating gearing and the notional equity beta. This reflects the balance sheet value of debt owed.

However, the market value of debt captures the price an investor would be willing to purchase debt at. When the interest rate falls, the price of fixed-rate debt will increase. In a declining interest rate environment, the market value of debt will typically be higher than the book value of that debt. Theoretically, and as argued by Citizens Advice, the market value of debt is a better basis upon which to estimate risk. We therefore present the impact of this below as part of the sensitivity tables.

The fair value of debt, used as a proxy for the market value of debt, is available within annual accounts. We have used the difference between the fair value of gross debt and the book value of gross debt to reflect the 'Market Value Adjustment' (MVA) see Appendix 8. For calculation purposes, this premium is added to net debt.

¹¹⁴ If debt figures are produced on 31 March 2018 and 30 September 2018, the daily series from 31 March 2018 to 29 September 2018 will show the debt figure reported on 31 March 2018.

Appropriate time horizon to estimate gearing

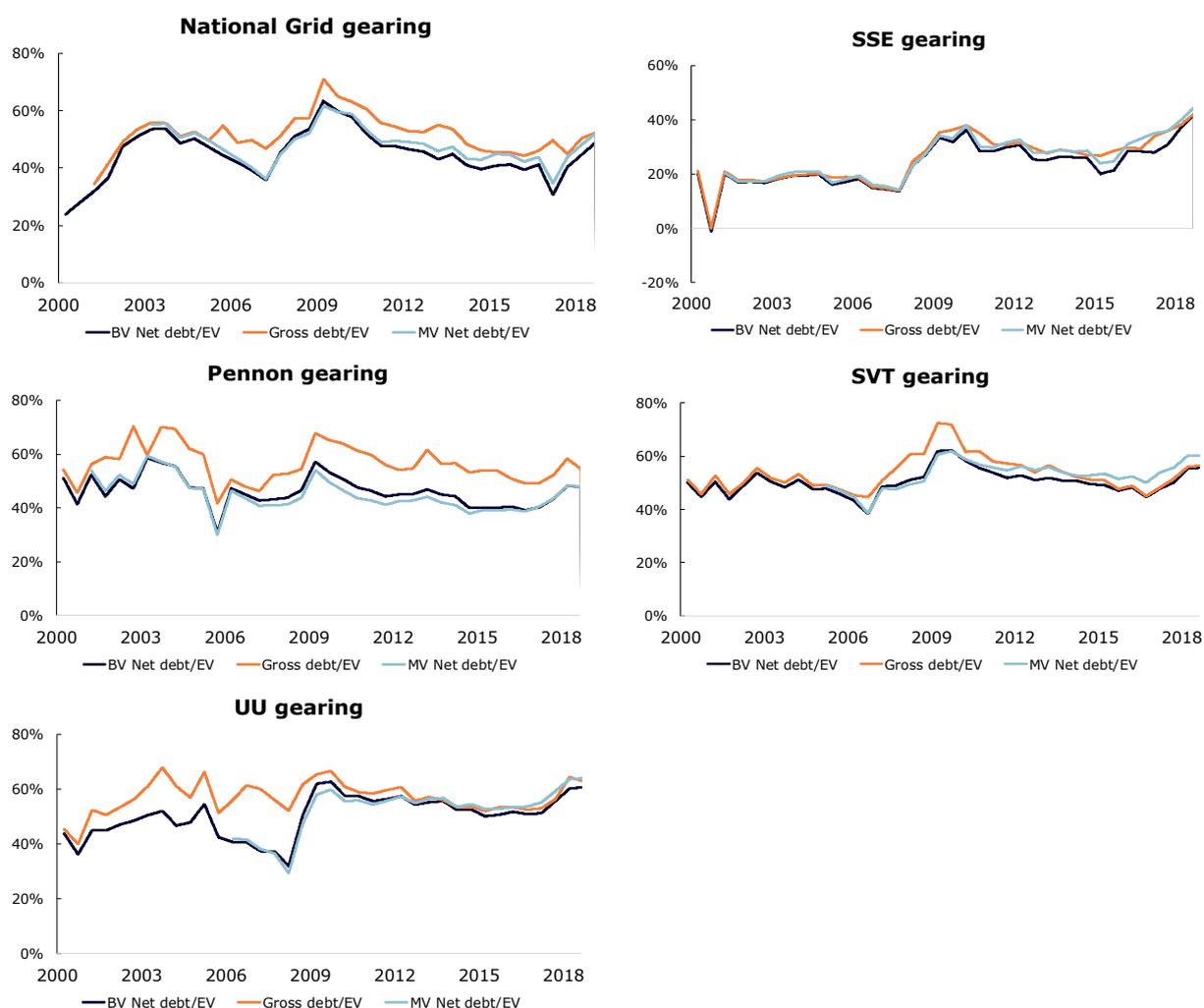
To separate financial risk from underlying asset risk, we require a judgement on the gearing inferred by equity investors. There are two approaches that are typically used for assessing the appropriate time horizon for gearing:

- using an average of gearing over the same estimation window as used in calculating the equity beta
- using the prevailing gearing estimate at the last day of the estimation window used in calculating the equity beta

In this appendix we calculate the average gearing over the same estimation window that measure betas. For example, when we measure raw equity beta over a two-year period, we also use the same two-year period to estimate gearing, to allow us to derive an asset beta for that two-year period. We consider that this is most representative of assumed gearing, although the alternative approach is plausible.

Data availability can become an issue when we attempt to measure gearing over longer periods, particularly when using different gearing variants. For gearing, our longer-term estimates will begin from when the earliest point data is available. This will mean that in some cases, the time horizon used for gearing will not cover the full estimation window used in estimating the equity beta. We show gearing variants below in Figure 26.

Figure 26: Gearing variants over time



Source: Bloomberg and companies' financial accounts

We can see from the gearing information presented in Figure 26:

- Market Value Net Debt gearing (MVND) is usually higher than Book Value Net Debt gearing (BVND), except for Pennon between 2005 and 2017. This reflects the impact of Pennon’s debt holdings
- Gross Debt gearing (GD) can be lower than MVND, particularly when a company has a low amount of cash holdings
- GD gearing can be markedly higher than MVND and BVND when a company has particularly large amounts of cash holdings, with the clear example of this being National Grid in 2017

In the following sections we refer to a “Market Value Factor (MVF) sensitivity” to switch between MVND and BVND.

Asset beta

Recap of key concepts and calculation variants

The de-gearing process converts raw equity betas into assets betas. Raw equity betas reflect a combination of undiversifiable asset risk and financial risk introduced by use of debt. Raw equity betas for companies with different capital structures therefore are not perfectly comparable because financial risk concentrates the risk that equity investors face. The equity beta measures the risk for equity investors, while the concept of the debt beta represents risk for debt investors. The assumed debt beta affects the derived asset beta. However, for this appendix we assume a debt beta of 0.1 for all graphs and tables. The formula for de-gearing is presented below.

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

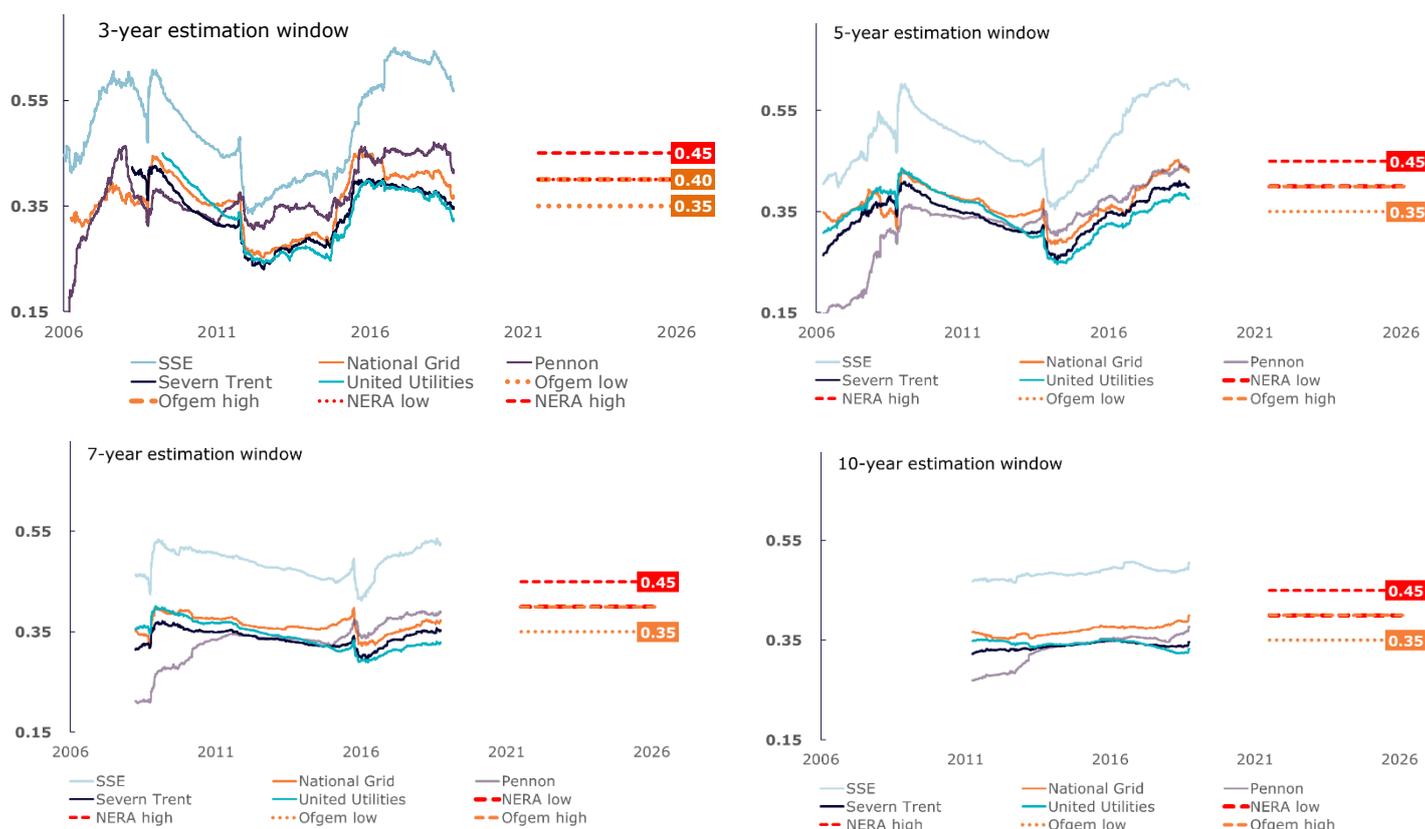
where g = gearing, β_a = asset beta, β_d = debt beta and β_e = equity beta.

In the December Finance Annex, we proposed to de-gear our comparator raw equity beta range by a measure of "adjusted gearing", rather than the observed level of gearing for our comparators. Indepen’s report noted an inconsistency between de-gearing using EV as the denominator in the gearing term and re-gearing using RAV as the denominator. We refer to this as an EV:RAV sensitivity.

Evidence

The charts below (Figure 27) present asset betas on a BVND basis while assuming an EV:RAV of 1:1, and a debt beta of 0.1.

Figure 27: Asset betas, using a range of estimation windows, relative to NERA arguments and our working assumption for the price control



Source: Ofgem analysis

We can see that:

- larger estimation windows focus the underlying data and flatten the lines
- the working assumption range fits the data better than NERA’s proposal
- SSE is more clearly an outlier and for longer periods than we observe in Figure 24. This is potentially due to SSE’s distinct business mix and/or distinctly different gearing.
- the 3-year rolling window approach is still notably more volatile than the others
- lower betas were measured during 2011-14, although this is only clearly noticeable in the 3-year estimation window. We treat this period as an important part of the evidence base. NERA considers this period a time of 'flight to quality' with NG beta as a 'defensive stock' showing lower relative volatility at a time of high market volatility. However, we consider this an important characteristic of regulated utility stocks, and one that should be factored into our judgement on beta.

Table 26 below shows asset beta estimates for a range of calculation variants. We show different estimation windows and different averaging periods of those rolling windows. We also show the sensitivity for two other assumptions: 1) the Market Value Factor (MVF)¹¹⁵ for debt (effectively using MVND instead of BVND), and 2) the EV:RAV ratio adjustment, showing either 1.1 or 1.0. We highlight in the table where the asset betas are greater than our working assumption of 0.40 (red fill) and lower than our working assumption 0.35 (green fill). A clear box indicates that the value is greater than 0.35 and less than 0.40.

¹¹⁵ See Table 31 for further detail on the Market Value Factor.

Given the SEE analysis above, we show simple averages: 1) for all 5 companies; 2) excluding SSE.

Table 26: Asset betas, sensitivity analysis, assuming a debt beta of 0.1

Estimation window	Averaging period	MVF	EV:RAV	SSE	NG	PNN	SVT	UU	Average	Average (exc SSE)
3-year	Spot	1.0	1 : 1	0.60	0.38	0.41	0.37	0.34	0.42	0.37
3-year	3-year	1.0	1 : 1	0.64	0.43	0.44	0.40	0.39	0.46	0.41
3-year	5-year	1.0	1 : 1	0.56	0.39	0.40	0.37	0.35	0.42	0.38
3-year	10-year	1.0	1 : 1	0.51	0.36	0.37	0.34	0.34	0.38	0.35
5-year	Spot	1.0	1 : 1	0.59	0.42	0.43	0.40	0.37	0.44	0.41
5-year	3-year	1.0	1 : 1	0.56	0.39	0.41	0.37	0.35	0.42	0.38
5-year	5-year	1.0	1 : 1	0.50	0.36	0.38	0.34	0.32	0.38	0.35
5-year	10-year	1.0	1 : 1	0.50	0.36	0.36	0.34	0.34	0.38	0.35
10-year	Spot	1.0	1 : 1	0.50	0.39	0.38	0.34	0.33	0.39	0.36
10-year	3-year	1.0	1 : 1	0.49	0.37	0.36	0.34	0.34	0.38	0.35
10-year	5-year	1.0	1 : 1	0.49	0.37	0.35	0.34	0.34	0.38	0.35
10-year	10-year	1.0	1 : 1	0.48	0.36	0.32	0.33	0.34	0.37	0.34
3-year	Spot	1.07	1.1 : 1	0.54	0.34	0.39	0.31	0.29	0.37	0.33
3-year	3-year	1.06	1.1 : 1	0.59	0.38	0.43	0.35	0.34	0.42	0.37
3-year	5-year	1.05	1.1 : 1	0.52	0.36	0.39	0.32	0.31	0.38	0.35
3-year	10-year	1.02	1.1 : 1	0.48	0.33	0.36	0.31	0.31	0.36	0.32
5-year	Spot	1.06	1.1 : 1	0.54	0.38	0.41	0.34	0.33	0.40	0.36
5-year	3-year	1.05	1.1 : 1	0.53	0.35	0.39	0.32	0.31	0.38	0.35
5-year	5-year	1.04	1.1 : 1	0.47	0.33	0.37	0.30	0.29	0.35	0.32
5-year	10-year	1.02	1.1 : 1	0.47	0.33	0.35	0.30	0.30	0.35	0.32
10-year	Spot	1.03	1.1 : 1	0.47	0.35	0.37	0.30	0.30	0.36	0.33
10-year	3-year	1.02	1.1 : 1	0.47	0.34	0.35	0.30	0.31	0.35	0.32
10-year	5-year	1.02	1.1 : 1	0.46	0.34	0.34	0.30	0.31	0.35	0.32
10-year	10-year	1.02	1.1 : 1	0.46	0.34	0.32	0.30	0.31	0.35	0.32

Source: Ofgem analysis

We see that as the estimation window gets larger, values fall within or below our working assumption for asset betas, aside from SSE which is a clear outlier.

Notional equity beta

Recap of key concepts and calculation variants

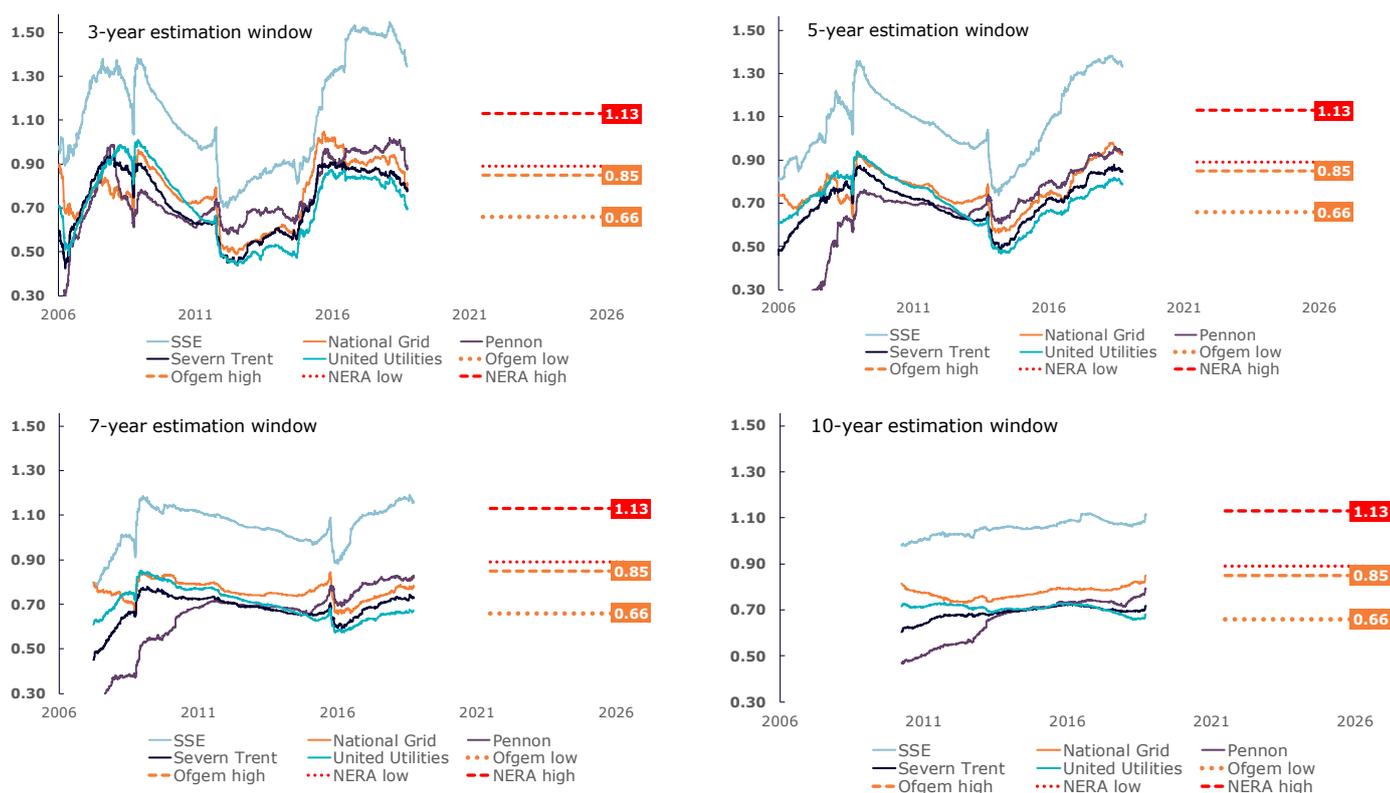
Re-gearing will provide a notional equity beta from an asset beta. The asset beta reflects underlying asset risk excluding financial risk. Notional equity betas take into account the financing risk implied by the notional gearing assumption.

The mechanics work as an unwinding of the formula presented in the asset beta section.

Evidence

The remainder of the section presents evidence for a range of calculation options. In all cases betas are re-gearred to 60% notional gearing. We show, similar to previous sections, a range of estimation windows.

Figure 28: Notional equity betas, using a range of estimation windows, relative to NERA arguments and our working assumption for the price control



Source: Ofgem analysis

We can see that:

- Compared to Figure 24, notional equity betas are higher than the raw equity betas
- SSE remains an outlier
- The working assumption range 0.66 to 0.85 fits the data well, particularly when using larger estimation windows, and in all cases better than the NERA proposals
- Using smaller estimation windows, for example of 3-years and 5-years, implies that our range is too narrow, at times not low enough and at times too high

We now conduct sensitivity analysis on notional equity beta estimates. We show the impact of including 1) a Market Value Factor and, 2) an EV:RAV ratio of 1.1:1. In all cases we assume a debt beta of 0.1. We highlight in the table where the notional equity betas are greater than our working assumption of 0.85 (red fill) and lower than our working assumption 0.66 (green fill). A clear box indicates that the value is greater than 0.66 and less than 0.85. Given the SSE analysis above, we show simple averages: 1) for all 5 companies; 2) excluding SSE.

Table 27: Notional equity betas at 60% gearing, sensitivity analysis (debt beta=0.1)

Estimation window	Averaging period	MVF	EV:RAV	SSE	NG	PNN	SVT	UU	Average	Average (exc SSE)
3-year	Spot	1.0	1 : 1	1.34	0.79	0.88	0.77	0.69	0.90	0.78
3-year	3-year	1.0	1 : 1	1.44	0.91	0.95	0.86	0.82	1.00	0.89
3-year	5-year	1.0	1 : 1	1.24	0.84	0.86	0.78	0.73	0.89	0.80
3-year	10-year	1.0	1 : 1	1.12	0.76	0.77	0.71	0.70	0.81	0.73
5-year	Spot	1.0	1 : 1	1.33	0.90	0.93	0.84	0.79	0.96	0.87
5-year	3-year	1.0	1 : 1	1.26	0.83	0.86	0.78	0.73	0.89	0.80
5-year	5-year	1.0	1 : 1	1.10	0.75	0.79	0.70	0.65	0.80	0.72
5-year	10-year	1.0	1 : 1	1.09	0.76	0.74	0.70	0.70	0.80	0.73
10-year	Spot	1.0	1 : 1	1.11	0.83	0.79	0.71	0.68	0.83	0.75
10-year	3-year	1.0	1 : 1	1.08	0.78	0.74	0.70	0.69	0.80	0.73
10-year	5-year	1.0	1 : 1	1.07	0.78	0.72	0.70	0.70	0.79	0.72
10-year	10-year	1.0	1 : 1	1.05	0.76	0.65	0.68	0.70	0.77	0.70
3-year	Spot	1.07	1.1 : 1	1.20	0.70	0.83	0.63	0.58	0.79	0.68
3-year	3-year	1.06	1.1 : 1	1.32	0.81	0.91	0.72	0.71	0.89	0.79
3-year	5-year	1.05	1.1 : 1	1.15	0.74	0.83	0.66	0.63	0.80	0.71
3-year	10-year	1.02	1.1 : 1	1.04	0.68	0.74	0.61	0.61	0.74	0.66
5-year	Spot	1.06	1.1 : 1	1.21	0.80	0.89	0.69	0.67	0.85	0.76
5-year	3-year	1.05	1.1 : 1	1.16	0.74	0.83	0.65	0.63	0.80	0.71
5-year	5-year	1.04	1.1 : 1	1.02	0.67	0.77	0.59	0.57	0.72	0.65
5-year	10-year	1.02	1.1 : 1	1.03	0.68	0.72	0.59	0.59	0.72	0.65
10-year	Spot	1.03	1.1 : 1	1.03	0.74	0.77	0.60	0.60	0.74	0.67
10-year	3-year	1.02	1.1 : 1	1.01	0.70	0.72	0.61	0.62	0.73	0.66
10-year	5-year	1.02	1.1 : 1	1.01	0.69	0.70	0.61	0.62	0.73	0.66
10-year	10-year	1.02	1.1 : 1	1.00	0.69	0.65	0.61	0.62	0.71	0.64

Source: Ofgem analysis

We can see that:

- Notional equity betas are only greater than 0.85, (the top end of our range) in isolated circumstances, either due to the inclusion of SSE and/or for small estimation windows
- Severn Trent (SVT) and United Utilities (UU) typically display lower results than the other companies, and frequently fall below the bottom end of our range (0.66)
- Shorter estimation windows tend to give larger differences between averaging periods, than larger estimation windows
- Excluding SSE most average equity betas are less than the implied midpoint (0.75) of our 0.66 to 0.85 range
- The vast majority of notional equity betas fall within our current 0.66 to 0.85 range

Appendix 6 – Supplementary evidence on OFTO asset betas

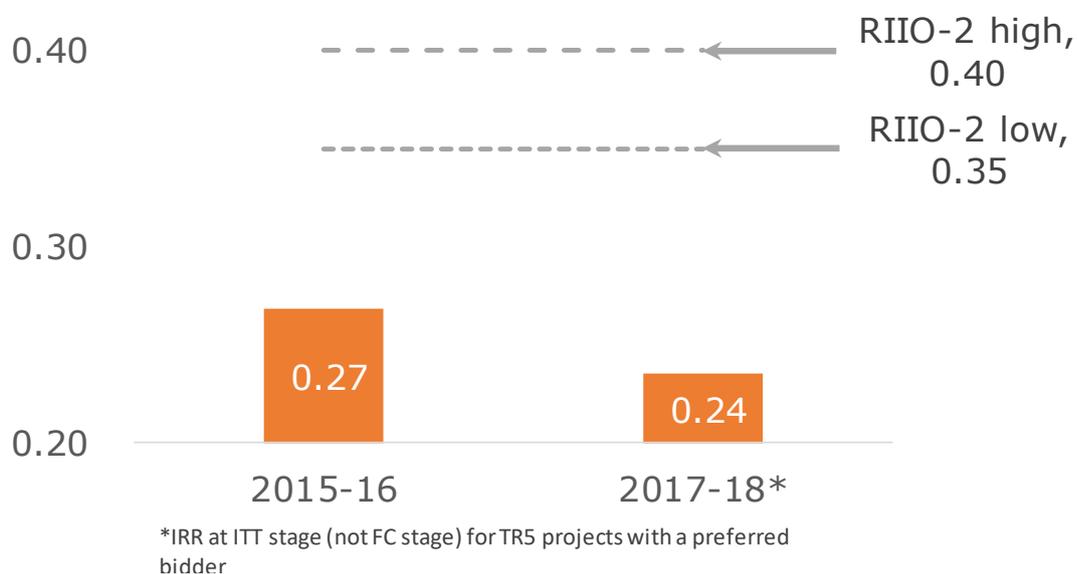
This appendix provides supplementary evidence on OFTO asset betas. In the Sector Specific Consultation, as part of our cross-checks on the CAPM-implied cost of equity, we presented IRR data for OFTO projects.¹¹⁶ In response, network companies argued:

- OFTO projects are typically higher geared than network companies
- OFTO projects are lower risk than network companies

In an attempt to avoid financial risk unduly influencing the OFTO cross-check, we use the OFTO bid data to analyse the implied asset risk. To do this, we use CAPM assumptions for Total Market Return (6.5%), the risk-free rate (-0.96%) and debt beta (0.15) consistent with our estimations as per chapter 3, increasing the TMR and risk-free to nominal using the Fisher equation and an inflation assumption of 2%. Using the equity Internal Rate of Return (IRR) from OFTO bids, treating this as a cost of equity, we then use the CAPM formula to derive a levered equity beta. Using this derived equity beta, with the gearing values from financial close of the OFTO projects, alongside a debt beta assumption of 0.15, we can derive an asset beta for each OFTO project. In doing so, we estimate the underlying asset risk for OFTO projects, allowing us to compare to the asset risk that we are assuming for RIIO-2.

We present the results below, using a simple average of the asset betas for four projects in the 2015-16 period and a simple average of three projects in the 2017-18. These results are compared with the RIIO-2 assumptions (as per Table 8) for asset beta.

Figure 29: Derived asset betas for OFTO projects compared with RIIO-2 assumptions



Source: Ofgem analysis

This analysis supports the view that OFTO projects carry lower asset risk than network companies. It also supports our position that the asset beta we assume for RIIO-2 is not evidently low, compared to market data for OFTO infrastructure projects.

¹¹⁶ See page 46, Figure 14 of the finance annex: https://www.ofgem.gov.uk/system/files/docs/2018/12/riio-2_finance_annex.pdf#page=46

Appendix 7 – Gearing measurements

Table 28: Market Value Adjustment (MVA), £m company accounts & Appendix 8

	NG	SSE	PNN	SVT	UU
	MVA	MVA	MVA	MVA	MVA
Sep '08	-1,179	75	-196	-212	-572
Mar '09	-1,563	179	-222	-199	-815
Sep '09	-246	309	-259	-54	-600
Mar '10	1,072	439	-296	91	-384
Sep '10	1,028	397	-278	210	-317
Mar '11	984	354	-261	328	-248
Sep '11	1,588	480	-231	469	-136
Mar '12	2,192	604	-200	611	-25
Sep '12	2,445	725	-204	693	136
Mar '13	2,697	845	-208	773	296
Sep '13	2,439	742	-242	563	282
Mar '14	2,181	639	-275	352	267
Sep '14	3,187	893	-174	626	486
Mar '15	4,193	1,147	-74	899	705
Sep '15	3,656	1,035	-93	885	594
Mar '16	3,119	922	-113	870	483
Sep '16	3,360	1,771	-43	1,157	851
Mar '17	3,601	2,620	28	1,444	1,218
Sep '17	3,570	1,850	15	1,315	1,179
Mar '18	3,539	1,080	2	1,184	1,140
Sep '18	3,539	1,080	2	1,184	1,140

Table 29: Net Debt / Enterprise Value, period averages (G1)

	NG	SSE	PNN	SVT	UU	
	ND / EV	Average				
	G1	G1	G1	G1	G1	G1
17.5 -year	45.81%	24.32%	46.30%	50.48%	50.83%	43.6%
10-year	46.21%	29.07%	45.38%	52.37%	55.33%	45.7%
5-year	41.17%	28.56%	42.67%	49.91%	53.86%	43.2%
3-year	41%	31%	43%	50%	54%	43.8%

Table 30: Net Debt + Market Value Adjustment gearing, period averages (G2)

	NG	SSE	PNN	SVT	UU	Average
	(ND + MVA) / (EV + MVA)					
	G2	G2	G2	G2	G2	G2
10-year	48%	32%	43%	55%	56%	46.95%
5-year	44%	32%	42%	54%	56%	45.75%
3-year	44%	35%	43%	55%	58%	46.80%

Table 31: Market Value Factor (MVF), G2/G1

	NG G2/G1	SSE G2/G1	PNN G2/G1	SVT G2/G1	UU G2/G1	Average G2/G1
MVF 10-year	1.047	1.091	0.955	1.056	1.012	1.03
MVF 5-year	1.078	1.125	0.976	1.086	1.047	1.06
MVF 3-year	1.081	1.131	0.993	1.100	1.055	1.07

Appendix 8 – Market Value Adjustment (MVA)

Introduction

The MVA is the difference between the book value of debt and the market value of debt. In this appendix we use the difference between Fair Value and Book Value as a proxy for the difference between Market Value and Book Value. Our approach therefore relies upon the available information and the approach taken within the accounting statements.

Entity	Period ending	Book value of debt	Market value of debt - 'fair value'	Difference between FV and BV	Source
NG		<i>from the annual report - 'Borrowings', ie: bank overdraft, bank loans, other loans, and finance leases</i>	<i>from the annual report - same categories as book value of debt</i>		https://investors.nationalgrid.com/news-and-reports/reports/
	30/09/2018			3,539	<i>We use March values as a proxy.</i>
	31/03/2018	26,625	30,164	3,539	p.140, Total Borrowings; p.141, mentioned in text.
	30/09/2017	27,632	31,202	3,570	<i>Half year values are an average of year end values</i>
	31/03/2017	28,638	32,239	3,601	<i>all data included in the following year's report</i>
	30/09/2016	28,491	31,851	3,360	
	31/03/2016	28,344	31,463	3,119	p.130; p.131.
	30/09/2015	27,127	30,783	3,656	
	31/03/2015	25,910	30,103	4,193	<i>all data included in the following year's report</i>
	30/09/2014	25,930	29,117	3,187	
	31/03/2014	25,950	28,131	2,181	p.119; p.120
	30/09/2013	27,023	29,462	2,439	
	31/03/2013	28,095	30,792	2,697	<i>all data included in the following year's report</i>
	30/09/2012	25,560	28,005	2,445	
	31/03/2012	23,025	25,217	2,192	p.142; p.142.
	30/09/2011	23,112	24,700	1,588	
	31/03/2011	23,198	24,182	984	<i>all data included in the following year's report</i>
	30/09/2010	24,161	25,189	1,028	
	31/03/2010	25,124	26,196	1,072	p.145; p.145.
	30/09/2009	25,959	25,713	-246	
31/03/2009	26,793	25,230	-1,563	<i>all data included in the following year's report</i>	
30/09/2008	23,898	22,719	-1,179		
SSE		<i>incl. hybrids (first issued in fy ending 2011)</i>	<i>incl. hybrids (first issued in fy ending 2011)</i>		https://sse.com/investors/reportsandresults/
	30/09/2018			1,080	<i>We use March values as a proxy.</i>
	31/03/2018	9,780	10,860	1,080	p.188; p.189
	30/09/2017	9,323	11,173	1,850	
	31/03/2017	8,865	11,485	2,620	<i>all data included in the following year's report</i>
30/09/2016	9,122	10,893	1,771		

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	31/03/2016	9,379	10,301	923	p.160; p.160-2
	30/09/2015	9,425	10,460	1,035	
	31/03/2015	9,472	10,619	1,147	<i>all data included in the following year's report</i>
	30/09/2014	8,977	9,870	893	
	31/03/2014	8,482	9,121	639	p.134; p.134-6
	30/09/2013	8,377	9,119	742	
	31/03/2013	8,272	9,117	845	<i>all data included in the following year's report</i>
	30/09/2012	7,839	8,564	725	
	31/03/2012	7,407	8,011	604	p.136; p.136-8
	30/09/2011	7,087	7,567	479	
	31/03/2011	6,768	7,122	354	<i>all data included in the following year's report</i>
	30/09/2010	6,407	6,804	397	
	31/03/2010	6,047	6,486	439	p.119; p.119-21
	30/09/2009	5,722	6,031	309	
	31/03/2009	5,396	5,575	179	<i>all data included in the following year's report</i>
	30/09/2008	4,658	4,733	75	
SVT					https://www.severntrent.com/investors/annual-reports/annual-reports-overview/
	30/09/2018			1,184	<i>We use March values as a proxy.</i>
	31/03/2018	5,568	6,752	1,184	p.167, Borrowings; p.177, Fair value + Bank overdraft from p.167
	30/09/2017	5,423	6,738	1,314	
	31/03/2017	5,279	6,723	1,444	<i>all data included in the following year's report</i>
	30/09/2016	5,093	6,250	1,157	
	31/03/2016	4,907	5,777	871	p.140; p.149 + p.171
	30/09/2015	4,917	5,802	885	
	31/03/2015	4,927	5,826	899	<i>all data included in the following year's report</i>
	30/09/2014	4,774	5,400	626	
	31/03/2014	4,622	4,974	352	p.115; p.115 + p.126
	30/09/2013	4,712	5,275	563	
	31/03/2013	4,802	5,575	774	<i>all data included in the following year's report</i>
	30/09/2012	4,600	5,293	693	
	31/03/2012	4,399	5,010	611	p.110; p.111 + 108
	30/09/2011	4,372	4,841	469	
	31/03/2011	4,344	4,672	327	<i>all data included in the following year's report</i>
	30/09/2010	4,260	4,470	209	
	31/03/2010	4,177	4,268	91	p.86; p.87 + p.66
	30/09/2009	4,311	4,257	-54	
	31/03/2009	4,445	4,246	-199	<i>all data included in the following year's report</i>
	30/09/2008	4,266	4,055	-212	
UU					https://www.unitedutilities.com/corporate/investors/Reports-and-presentations/annual-reports/

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	30/09/2018			1,140	<i>We use March values as a proxy.</i>
	31/03/2018	7,912	9,052	1,140	p.159; p.159
	30/09/2017	7,648	8,827	1,179	
	31/03/2017	7,385	8,603	1,218	<i>all data included in the following year's report</i>
	30/09/2016	7,181	8,032	851	
	31/03/2016	6,978	7,461	483	p.141; p.141
	30/09/2015	6,812	7,406	594	
	31/03/2015	6,645	7,350	705	<i>all data included in the following year's report</i>
	30/09/2014	6,357	6,843	486	
	31/03/2014	6,069	6,336	267	p.135; p.135
	30/09/2013	6,121	6,403	282	
	31/03/2013	6,174	6,470	297	<i>all data included in the following year's report</i>
	30/09/2012	6,014	6,150	136	
	31/03/2012	5,855	5,830	-25	p.97; p.97
	30/09/2011	5,584	5,448	-137	
	31/03/2011	5,313	5,065	-248	<i>all data included in the following year's report</i>
	30/09/2010	5,395	5,078	-316	
	31/03/2010	5,476	5,092	-385	p.89; p.89
	30/09/2009	5,578	4,978	-600	
	31/03/2009	5,680	4,865	-815	<i>all data included in the following year's report</i>
	30/09/2008	5,174	4,602	-572	
PNN		<i>incl. hybrids (issued in fy ending 2013)</i>	<i>incl. hybrids (issued in fy ending 2013)</i>		https://www.pennon-group.co.uk/investor-information/financial-reports-and-presentations
	30/09/2018			3	<i>We use March values as a proxy.</i>
	31/03/2018	3,684	3,686	3	p.148 + p.160; p.148 + p.160
	30/09/2017	3,621	3,636	16	
	31/03/2017	3,558	3,586	28	<i>all data included in the following year's report</i>
	30/09/2016	3,485	3,442	-42	
	31/03/2016	3,411	3,298	-113	p.151 + p.164; p.151 + p.164
	30/09/2015	3,337	3,244	-93	
	31/03/2015	3,263	3,189	-74	<i>all data included in the following year's report</i>
	30/09/2014	3,182	3,008	-175	
	31/03/2014	3,102	2,827	-275	p.137 + p.152; p.137-8 + p.152
	30/09/2013	3,020	2,778	-242	
	31/03/2013	2,938	2,730	-208	<i>all data included in the following year's report</i>
	30/09/2012	2,734	2,530	-204	
	31/03/2012	2,530	2,330	-200	p.93; p.93

	30/09/2011	2,510	2,279	-231	
	31/03/2011	2,489	2,228	-261	<i>all data included in the following year's report</i>
	30/09/2010	2,439	2,161	-279	
	31/03/2010	2,389	2,093	-296	p.88; p.88
	30/09/2009	2,317	2,058	-259	
	31/03/2009	2,245	2,024	-222	<i>all data included in the following year's report</i>
	30/09/2008	2,183	1,988	-196	

Source: CEPA analysis of company accounts