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# Cost of Capital – Annual Update Report

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Information Paper

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## About this document

The purpose of this information paper is to refresh the previous report and provide an update on the decisions taken by regulators over the last year. The paper also emphasises the similarities and consistencies between regulatory decisions and explains the main differences that arise.

Participating regulators have signed up to the [UKRN guidance for regulators on the methodology for setting the cost of capital](#).<sup>1</sup> We have identified a number of ways we intend to [continue to collaborate](#) in the future.

Regulators have committed to producing and publishing an annual update report on the cost of capital decisions, which will be produced in line with the format of this report. This paper provides a summary of the most recent decisions and analysis by each regulator.

This paper is not intended to put forward policy statements on behalf of any of the contributing regulators and if there appears to be a conflict between the material contained herein and an individual regulator's relevant price control papers then the individual regulator's own papers take precedence.

If you have any comments on this paper, please submit these to us through the [Contact Us](#) page on the UKRN website.

## About the UK Regulators Network

UKRN is a network formed by 13 of the UK's sectoral regulators:

- Civil Aviation Authority (CAA)
- Financial Conduct Authority (FCA)
- Financial Reporting Council (FRC)
- Payment Systems Regulator (PSR)
- Office of Communications (Ofcom)
- Office of Gas and Electricity Markets (Ofgem)
- Water Services Regulation Authority (Ofwat)
- Office of Rail and Road (ORR)
- Single Source Regulations Office (SSRO)
- Northern Ireland Authority for Utility Regulation (Utility Regulator)
- The Pensions Regulator (TPR)
- Regulator of Social Housing (RSH)
- Information Commissioner's Office (ICO)

The Competition and Markets Authority participates as an observer.

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<sup>1</sup> Ofwat, Ofgem, Ofcom, ORR, and UREGNI currently commit to having regard to the recommendations in this guidance for future price control determinations.



## Contributors to this paper

Contributions to this paper have been made by:

- Civil Aviation Authority (CAA)
- Office of Communications (Ofcom)
- Office of Gas and Electricity Markets (Ofgem)
- Water Services Regulation Authority (Ofwat)
- Office of Rail and Road (ORR)
- Northern Ireland Authority of Utility Regulation (Utility Regulator)

Unless explicitly mentioned any reference in this report to “the regulators” “we” or “us” relates to the six contributors listed above.

## Previous versions of this paper

Previous versions of this paper can be found here:

[July 2022](#)

[December 2020](#)

[September 2019](#)

[June 2018](#)

[May 2017](#)

[March 2016](#)

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## I. Foreword by Chris Hemsley, UKRN CEO

- I.0 Welcome to the 2023 annual UK Regulators' Network (UKRN) Cost of Capital report.
- I.1 This report is the product of the UKRN's Cost of Capital Network, which brings together specialists from across UKRN members to share expertise and best practice, and to develop opportunities for a shared approach. The report is just one example of that collaboration, and I was delighted that earlier this year we published UKRN guidance for regulators on the methodology for setting the cost of capital. This helps move towards greater alignment on the approach to cost of capital across our members.
- I.2 While effective competition is the best mechanism for protecting consumers, price controls are essential in those areas of regulated markets where companies retain significant and enduring market power. Economic regulators use price controls to protect consumers from excessive prices and to incentivise companies to invest, innovate, deliver cost efficiencies, and provide a decent quality of service. In effect, regulators are trying to recreate incentives which are prevalent in competitive markets, to improve outcomes.
- I.3 This has never been more important than in the context of the cost of living crisis. The crisis, caused by a number of factors including the COVID-19 pandemic, the war in Ukraine and rising energy prices, has resulted in significant and ongoing impact which continues to affect consumers and businesses across all sectors that we regulate. As we continue to navigate through this period, we will continue to play our part in finding new and innovative ways to protect those that rely on the businesses we regulate.
- I.4 A number of regulated sectors are planning for a step-change in investment to respond to multiple future challenges. This has increased the importance of a transparent and predictable investment proposition offered by the UK regulated sectors. I expect the UKRN will continue to play a pivotal role in producing materials that help investors understand and compare the regimes in place across different sectors. And it is very much in this spirit that our Annual Cost of Capital Report seeks to update on recent regulatory cost of capital developments, set in their proper context.
- I.5 There were a number of regulatory events since our previous publication: Ofgem published its final determinations for the RII0-ED2 price control for electricity distribution companies. The Utility Regulator for Northern Ireland (UREGNI) made final license modifications as part of GD23 for gas distribution companies. For the first time the Utility Regulator also includes information on decisions related to its electricity and gas TSOs. Finally, the Civil Aviation Authority (CAA) published its final decision for Heathrow as part of H7. The UREGNI's GD23 also marks a further milestone by UK regulators in the process of ceasing to use the RPI as an inflation measure; with growing alignment around the use of CPI(H).
- I.6 Looking ahead, we expect that the investment planning associated with climate change adaptation and the UK's Net Zero targets will prompt the roll-out of innovative new investment models to achieve these objectives. Alongside this, we continue to provide a robust regulatory framework, recognising the changing external environment and evolving views around the role and remit of regulation. The UKRN will continue to support this process, developing and testing new approaches and acting as a source of constructive challenge.
- I.7 I am grateful to the UKRN Cost of Capital Working Group for the hard work that went into this report and for their continued collaboration to drive high quality analysis on cost of capital issues.

## 2. Background

### Price controls and setting allowed returns

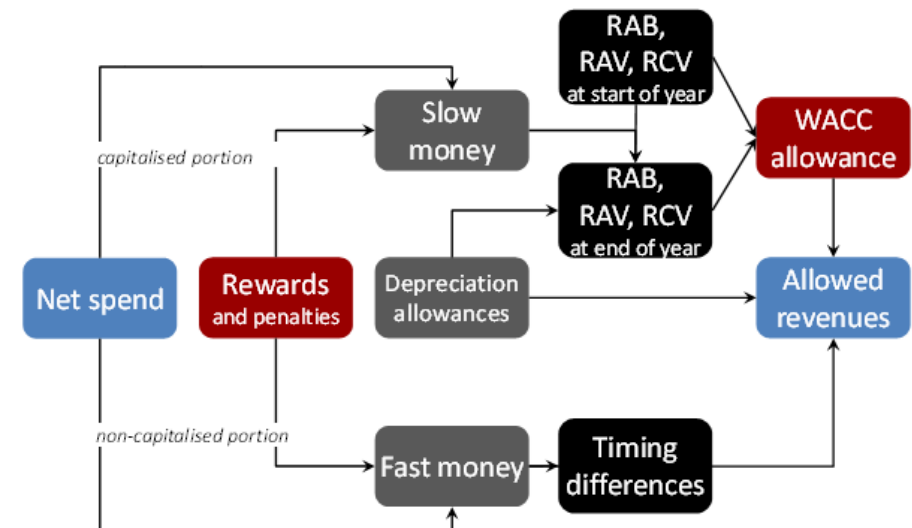
- 2.0 As a key tool in economic regulation many members of the UKRN establish limits on the prices regulated companies may charge to ensure that customers' bills in respect of services provided are set at a level that provides value for money and, as appropriate, meet required standards. Through economic regulation and specifically price controls, the interests of customers can be protected from the consequences of insufficiently developed competition.
- 2.1 In addition to their statutory duties to customers, some regulators are also required to secure that companies can finance their functions by setting an appropriate rate of return on regulated assets. This is essential to facilitate continuing investment in UK infrastructure, supporting the well-being of both individual customers and the wider UK economy.
- 2.2 The allowed return on capital will vary across sectors and between price controls to reflect differences such as: varying sector-specific risk, variations in risk assigned to investors by different regulatory frameworks, and market conditions at the time of setting the allowance. Regulators' statutory duties also vary. In some regulated sectors, safety or other public service objectives may be of more critical importance and the associated duties may impact how regulators fulfil their duties as well as influencing the level of allowed returns.
- 2.3 Setting the level of the allowed return on capital is a matter of judgement for individual regulators, taking all evidence in the round. Each participating regulator has committed to contribute to the production of this annual update report to compare decisions. Further, the Cost of Capital Working Group is available to support one

another when individual regulators make determinations, and most regulators with a regulated asset base model have signed up to the [UKRN guidance for regulators on the methodology for setting the cost of capital](#), which is intended to secure greater consistency between regulators in the approach taken to setting the allowed return.<sup>2</sup>

- 2.4 This paper provides a summary of recent allowed return on capital decisions. It covers only the principal price control determinations, and not all decisions made by regulators.

### Estimating the allowed return on capital

- 2.5 Whilst there are some important differences in regulators' duties (as set out in Appendix 1), the broad approach taken by regulators operating a regulated asset base model is similar.
- 2.6 The classic 'building block' diagram of how price controls work and where the allowed return on capital fits in is set out below.<sup>3</sup>



<sup>2</sup> Ofwat, Ofgem, Ofcom, ORR, and UREGNI currently commit to having regard to the recommendations in this guidance for future price control determinations.

<sup>3</sup> Some regulators use the terms capex (for slow money) and opex (for fast money).

- 2.7 All regulators use a weighted average cost of capital (WACC) allowance, when estimating the allowed return. Usually the WACC is set for a notional company or licensee, by way of a notional gearing assumption which may be different to the actual gearing of company(s) in the sector.
- 2.8 Regulators will typically analyse each of the WACC components to inform an overall judgement on the appropriate allowed return on capital. The overall judgement may be informed by further sense-checking of the overall estimate using a range of evidence sources.
- 2.9 The Capital Asset Pricing Model (CAPM) is recognised by regulators as properly being the primary approach to estimating the cost of equity allowance. In recent decisions it has however been supported by estimates drawn from other evidence - including from equity transactions and comparisons with other regulated sectors.
- 2.10 Regulators typically apply the WACC allowance in real (i.e. inflation-adjusted) terms.<sup>4</sup> To derive a revenue allowance, the real WACC is applied to a regulatory asset base (RAB),<sup>5</sup> that is indexed by the same measure of inflation used to deflate the WACC.
- 2.11 Further information about the approach to calculating individual components of the WACC can be found in Appendix 3.

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<sup>4</sup> One exception is Ofcom, which tends to set a nominal WACC allowance.

<sup>5</sup> Ofwat call this Regulatory Capital Value (RCV), Ofgem call this Regulated Asset Vale (RAV).

### 3. Principal controls for which a cost of capital is estimated

**TABLE I CURRENT/UPCOMING PRICE CONTROLS**

Regulator	Sector	Current price control	Upcoming price control	Notes
CAA	Airports – Heathrow Airport	H7, for 5 years, from 01/01/2022 to 31/12/2026		
	Air traffic control – NATS (En Route) plc (NERL)	NR23, for 5 years, from 01/01/2023 to 31/12/2027		
Ofcom	Telecoms – Wholesale fixed telecoms services	WFTMR 2021, for 5 years, from 01/04/2021 to 31/03/2026		1
	Telecoms – Wholesale voice calls, interconnection and mobile call termination	Wholesale Voice Markets Review 2021, for 5 years, from 01/04/2021 to 31/03/2026		2
Ofgem	Gas & Electricity – Transmission	RIIO-T2, for 5 years, from 01/04/2021 to 31/03/2026	Gas and Electricity Transmission controls from 01/04/2026	
	Gas distribution	RIIO-GD2, for 5 years, from 01/04/2021 to 31/03/2026	Gas Distribution control from 01/04/2026	
	Electricity distribution	RIIO-ED2, for 5 years, from 01/04/2023 to 31/03/2028	Electricity Distribution control from 01/04/2028	
Ofwat	Wholesale water and wholesale wastewater	PR19, for 5 years, from 01/04/2020 to 31/03/2025	PR24, from 01/04/2025 onwards	
	Thames Tideway	PR19, for 5 years, from 01/04/2020 to 31/03/2025	PR24, from 01/04/2025 onwards	3
	Thames Tideway Tunnel	For 15 years, from 01/01/2015 to 31/12/2029	N/A	3
	Household retail water and wastewater	PR19, for 5 years, from 01/04/2020 to 31/03/2025	PR24, from 01/04/2025 onwards	
	Non-household retail water and wastewater	PR19, for 5 years, from 01/04/2020 to 31/03/2025	PR24, from 01/04/2025 onwards	4
ORR	Main rail network – Network Rail	CP6, for 5 years, from 01/04/2019 to 31/03/2024	CP7, from 01/04/2024 onwards	
	High speed rail – HSI	CP2, for 5 years, from 01/04/2020 to 31/03/2025	CP3, from 01/04/2025 onwards	5
Utility Regulator	Gas distribution	GD23, from 01/01/2023 to 31/12/2028	From 01/01/2029	
	Gas transmission	GT22, from 01/10/2022 to 30/09/2027	From 01/10/2027	
	Electricity – Northern Ireland Electricity Networks	RP6 (extended), from 01/10/2017 to 31/03/2025	From 01/04/2025	
	Electricity – Transmission System Operation (TSO)	SRP20, from 01/10/2020 to 30/09/2025	From 01/10/2025	6
	Water – Northern Ireland Water	PC21, from 01/04/2021 to 31/03/2027	From 01/04/2027	



## NOTES TO TABLE I

1. Wholesale fixed telecoms market review (WFTMR) covers both the wholesale local access and business connectivity markets.
2. Wholesale voice calls and interconnection are not subject to cost-based controls.
3. At PR14 and PR19 Ofwat set a separate control for Thames Water in relation to the activities that it was undertaking in respect of the development of the Thames Tideway Tunnel. The construction of the tunnel infrastructure is being undertaken by Bazalgette Tunnel Limited and this is subject to a separate 15-year price control.
4. The non-household retail market was opened to competition in England on 1 April 2017. Ofwat sets a non-household retail control only for Welsh water companies that cannot exit the non-retail market in Wales.
5. HSI is a concession that is subject to a different regulatory framework. In particular, it is not in the scope of CP2 to calculate a return to shareholders as part of the revenue requirement calculation, therefore HSI is not included in the subsequent sections of this document. Nevertheless, some of the issues involved with estimating a cost of capital, and determining allowed return on capital, also apply to HSI.
6. SONI is the electricity TSO for Northern Ireland. SPR20 is the SONI review of prices for the five-year period beginning in October 2020. The Utility Regulator has however just recently consulted on extending the price control by one year following a request from the TSO.



## 4. Recent decisions

### Decisions since the last version of the report

- 4.0 Since the previous annual report, there have been three price control decisions on allowed returns:
- In November 2022, Ofgem published its final determination of the RIIO-ED2 price control for electricity distribution networks. Ofgem used an initial vanilla WACC of 3.90% for frequent issuers of debt and 3.93% for infrequent issuers of debt (CPIH-real). This WACC will be updated through the control period to reflect the combined effect of debt and equity indexation mechanisms.
  - In February 2023, the UR made final licence modifications for GD23 using an initial WACC of 4.76% to 5.17% (CPIH-real).
  - In March 2023, the CAA published its final decision for Heathrow, which used a pre-tax RPI-real WACC of 4.04%, equivalent to an RPI-vanilla allowed return of 3.18%.

### Changes in inflation index used

- 4.1 Regulators have adopted different approaches as they transition away from RPI over time. Ofwat (for PR19) and Ofgem (for RIIO-2) and the Utility Regulator (for GD23) have decided to transition to CPIH – a measure of consumer price inflation including housing costs published by the Office of National Statistics (ONS). For Ofwat this move from RPI to CPIH was partial for PR19 (approximately half of the RCV was to remain RPI-linked over this period), however it has signalled it will wholly adopt CPIH indexation from April 2025. Ofgem has fully transitioned to full CPIH indexation of the RAV as part of its RIIO-2 network controls. For the Utility Regulator it is to be implemented immediately at the start of GD23.
- 4.2 Ofcom typically determines the allowed return in nominal terms.
- 4.3 The CAA decision for NERL and Heathrow as well as the UR decision for NI Water are in RPI terms.
- 4.4 For ease of comparison, Table 2 sets out recent decisions from Ofwat, Ofgem, the CMA and Ofcom in CPI/CPIH-terms, while Table 3 sets out all the recent decisions in RPI-real terms.

### Treatment of corporation tax

- 4.5 Both tables use a simplified approach to corporation tax where the rates used are those stated by each regulator's determination. In practice, some of the regulators update the corporation tax rate for prevailing rates.

### Further notes

- 4.6 In August 2015, Ofwat accepted for the construction phase of the Thames Tideway Tunnel project an allowed return on capital of 2.497% (RPI, vanilla) which is fixed until 2030. The bid by Bazalgette Tunnel Limited, which gives lower returns on capital than determined by Ofwat for water and wastewater



companies at PR14, reflects both the absence of pre-existing embedded debt costs and the inclusion of bespoke licence features during the construction phase including a liquidity allowance, a debt indexation mechanism<sup>6</sup> and is influenced by a government support package. As the Bazalgette allowed return was established as part of a competitive tendering process we have excluded this from the tables below.

- 4.7 ORR have decided not to apply a further adjustment to the WACC ranges to reflect the fact that Network Rail's RAB value will be indexed by CPI instead of RPI in CP6, as they do not think that the complex calculations involved would be warranted. This is because Network Rail's RAB value will not be used in revenue requirement calculations in CP6. ORR will review this issue if there are changes to Network Rail's status or funding arrangements in the future.

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<sup>5</sup>The Financing Cost Adjustment Mechanism (FCAM) was designed to share the impact of movements in interest rates between Bazalgette and water customers. In 2022, Ofwat made adjustments to the FCAM in recognition of the scale of potential consequences of the decrease in interest rates on the company since its licence award in 2015. Ofwat's rationale was set out in ['Reasons for amending Tideway's project licence'](#).

**TABLE 2 RECENT PUBLICATIONS IN CPI/CPIH-REAL TERMS**

Date	Dec -20	Dec -20	Mar-21	Mar-21	May-22	Nov-22	Feb-23
<b>Regulator</b>	Ofgem	Utility Regulator	Ofcom	Ofcom	Utility Regulator	Ofgem	Utility Regulator
<b>Sector</b>		Electricity TSO	Telecoms	Telecoms	Gas TSO	Gas & Electricity	Gas Distribution
<b>Price control</b>	RIIO-GD&T2 <sup>1</sup>	SRP20	WFTMR – Openreach <sup>2</sup>	WFTMR/MCT – Other UK Telecoms <sup>2</sup>	GT22	RIIO-ED2 <sup>3</sup>	GD23 <sup>4</sup>
<b>Status</b>	Final	Final	Final	Final	Final	Final	Final
<b>Source</b>	Tables 9 & 12-13	Annex 5, Table 4	Table A21.12	Table A21.12	Table 17	Tables 13-14	Annex T
<b>Allowed Return on debt (pre-tax)</b>	1.82%	0.75%	1.5%	1.6%	1.15%	3.01%	2.52% - 3.94%
<b>Risk free rate</b>	-1.58%	-1.0%	-1.0%	-1.0%	-1.1%	1.23%	1.77%
<b>Equity risk premium</b>	8.08%	7.7%	7.7%	7.7%	7.9%	5.27%	4.73%
<b>Total market return</b>	6.5%	6.7%	6.7%	6.7%	6.8%	6.5%	6.5%
<b>Notional equity beta</b>	0.759	0.78	0.88	1.05	0.76	0.759	0.69 - 0.82
<b>Debt beta</b>	0.075	0.075	0.10	0.10	0.075	0.075	0.075
<b>Asset beta</b>	0.349	0.50	0.53	0.62	0.35	0.349	0.35 - 0.41
<b>Cost of equity (pre-tax)</b>		6.21%	7.6%	9.1%	6.08%		6.67% - 7.50%
<b>Gap expected vs allowed return</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Allowed return on equity (post-tax)</b>	4.55%	5.03%	5.8%	7.1%	4.92%	5.23%	5.02% - 5.65%
<b>Notional gearing</b>	60%	40%	45%	45%	60%	60%	55%
<b>Tax</b>		19%	19%	19%	19%	19%	19%
<b>Return on capital (pre-tax)</b>	n/a	4.03%	n/a	n/a	3.12%	n/a	4.76 - 5.17%
<b>Return on capital (vanilla)</b>	2.91%	3.32%	3.8%	4.6%	2.66%	3.90%	3.93%-4.42%
<b>Retail net margin deduction</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>WACC (vanilla)</b>	2.91%	3.32%	3.8%	4.6%	2.66%	3.90%	3.93% - 4.42%
<b>Notes</b>	1		2	2		3	4



## NOTES TO TABLE 2

1. Figures correspond to allowed returns for companies at 60% notional gearing and without allowance for infrequent debt issuers.
2. Decisions by Ofcom have been converted from nominal terms to CPI-real terms using CPI of 2.0%
3. Figures correspond to allow returns for frequent issuers of debt. For infrequent issuers of debt, the cost of debt allowance is 3.07% and the vanilla WACC is 3.93%. The cost of equity is the same for both categories.
4. Figures are averages over 2023 –2028 and the ranges represent differences between each of the 3 GDNs (PNGL, Firmus, and SGN).

**TABLE 3 RECENT PUBLICATIONS IN RPI-REAL TERMS <sup>∞</sup>**

Date	Dec-19	Aug-20	Mar-21	Mar-21	Mar-21	May-21	Mar-23
Regulator	Ofwat	CMA	CMA	Ofcom	Ofcom	UR	CAA
Sector	Water & Wastewater	NERL	Water & Wastewater	Telecoms	Telecoms	Water & Sewerage	Airports
Price control	PR19	RP3	PR19	WFTMR - Openreach	WFTMR – Other UK Telecoms	PC21	H7
Status	Final	Final	Final	Final	Final	Final	Final
Source	page 4	page 244	Table 9-38	Table A21.12	Table A21.12	page 12	Table 9.60
Allowed return on debt (pre-tax)	1.15% ¥	1.21%	1.27%¥	0.5%	0.6%	1.03% Ω	0.67% ¥
Risk free rate	-2.35%	-2.25%	-2.22%	-2.0%	-2.0%	-2.22%	0.59%
Equity risk premium	7.81%	7.25% to 8.25%	8.07%	7.7%	7.7%	8.07%	5.26%
Total market return	5.47%	5.00% to 6.00%	5.85%	5.7%	5.7%	5.85%	5.85%
Equity beta	0.71	0.71 to 0.86	0.71	0.88	1.05	0.64	0.95 to 1.47
Debt beta	0.125	0.05	0.075	0.1	0.1	N/A	0.05 to 0.10
Asset beta	0.36	0.52 to 0.62	0.29	0.53	0.62	N/A	0.44 to 0.62
Allowed return on equity (post-tax)	3.18%	2.93% to 4.82%	3.79%β	4.8%	6.0%	2.94%	5.59% to 8.32%
Gearing	60%	30%	60%	45%	45%	50%	60%
Tax	17%		19%	19%	19%	N/A	23.5% α
WACC (pre-tax)	2.24% ¥	3.48%		3.9%	4.7%	N/A	4.04% ¥
WACC (vanilla)	1.96% ¥	3.05%	2.20%¥	2.8%	3.6%	1.99% Ω	3.18% ¥
Notes		1		2	2	3	

<sup>∞</sup> Decisions by Ofcom have been converted from nominal terms to RPI-real terms using RPI of 3.0%; decisions by Ofgem and Ofwat have been converted from CPIH-real terms to RPI-real terms, using the RPI-CPIH wedge assumptions set out in Table 4

¥ Dynamic allowance subject to updates to reflect outturn market data

Ω Simple average as individual values have been set for each year of the price control

A Weighted average as individual values have been set for each year of the price control

β Uplifted by 0.25% as CMA aimed up above the midpoint of the parameter values

### NOTES TO TABLE 3

1. On the NERL appeal, the CMA published the provisional findings in March 2020 and the final decision in August 2020. Due to the COVID-19 pandemic, the CMA had decided that, for the final decision, it will limit their work on the cost of capital calculation to two areas: the calculation of the weight of embedded debt and consideration of the 'vanilla' WACC into a pre-tax WACC that is required in the price control. In the table, the WACC (pre-tax) and WACC (vanilla) can be found in the final decision, and all the WACC parameters can be found in the provisional findings.
2. Ofcom generally publishes and applies the WACC in nominal terms, therefore in the table above we have converted nominal figures into real terms using Ofcom stated RPI assumptions of 3.0% in 2021. Ofcom also publishes and applies the WACC in pre-tax terms, where it accounts for tax in nominal terms by grossing up the nominal cost of equity. In addition to the WACC for charge controls, Ofcom also estimates the cost of capital for other sectors, e.g. in determining financial terms for broadcasting and spectrum licences.
3. First Economics prepared a report for the Utility Regulator to estimate NI Water's cost of capital.

## 5. Analysis

### Inflation

**TABLE 4 INFLATION EXPECTATIONS**

Date	Dec-19	Aug-20	Dec-20	Dec -20	Mar-21	Mar-21	Mar-21	May-22	Nov-22	Feb-23	Mar-23
Regulator	Ofwat	CMA	Ofgem	Utility Regulator	CMA	Ofcom	Utility Regulator	Utility Regulator	Ofgem	Utility Regulator	CAA
Sector	Water & Wastewater	NERL	Gas & Electricity	Electricity TSO	Water & Wastewater	Telecoms	Water & Sewerage	Gas TSO	Gas & Electricity	Gas distribution	Airports
Price control	PR19	RP3	GD2 & T2	SRP20	PR19	WFTMR	PR21	GT22	RIIO-ED2	GD23	H7
Status	Final	Final §	Final	Final	Final	Final	Final	Final	Final	Final	Final
Source	<a href="#">page 4</a>	<a href="#">page 214</a>	<a href="#">page 7</a>	<a href="#">Annex 5, page 5</a>	<a href="#">9.36</a>	<a href="#">Table A20.24</a>	<a href="#">page 9</a>	<a href="#">Page 58-59</a>	<a href="#">Page 177</a>	<a href="#">Annex T</a>	<a href="#">Table 13.4</a>
Inflation reference	RPI and CPIH used to deflate nominal debt figures and RPI-CPI 'wedge' used to deflate ILG yields	RPI used to estimate debt, equity and RAV values, CPI used to set revenues	CPI/H used to estimate debt, equity and RAV values	Assumptions on forecast CPIH inflation over the price control period, of 2%. Source used was November 2020 OBR for CPI.	0.9% RPI-CPI wedge from the OBR	November 2020 RPI and CPI forecasts from the OBR	RPI used to calculate cost of debt	Assumptions on forecast RPI inflation over the price control period, of 2.8%. Source used was March 2022 OBR for RPI.	March 2022 OBR forecast of CPI inflation in 2026, using a 0.70% RPI-CPIH wedge	CPIH (forecast 1.85% average over 2023-28). Subject to an ex-post inflation adjustment if higher or lower than base case forecast)	OBR forecast of RPI from 2022-2026. For 2027-2029, used BoE CPI target plus 0.9% wedge. From 2030 used BoE CPI target
RPI inflation expectation (source)	3.0% (OBR)	2.78% (HMT)	2.85% (OBR)	n/a	2.9% (OBR)	3.0% (OBR)	2.67% (OBR) <sub>μ</sub>	2.8% (OBR)	2.71% (OBR)	n/a	4.6% (OBR) <sub>μ</sub>
CPI/CPIH expectation (source)	2.0% (OBR)	n/a	2.02% (OBR)	2.0% (OBR)	2.0% (OBR)	2.0% (OBR)	n/a	n/a	2.0% (OBR)	1.85% (OBR) <sub>μ</sub>	n/a

§ On the NERL appeal, the CMA published the provisional findings in March 2020 and the final decision in August 2020. Due to the COVID-19 pandemic, the CMA had decided that, for the final decision, it will limit their work on the cost of capital calculation to two areas: the calculation of the weight of embedded debt and consideration of the 'vanilla' WACC into a pre-tax WACC that is required in the price control. In the table, information on inflation can be found in the provisional findings.

μ Simple average as individual values have been set for each year of the price control

- 5.0 A number of regulators have now moved away from estimating the cost of capital in RPI-inflation adjusted terms as RPI is now seen as a less credible measure of inflation. Instead, a number of regulators now estimate the cost of capital in CPI/CPIH adjusted terms (Ofgem, Ofwat, UR) while Ofcom, estimates the cost of capital in nominal terms.
- 5.1 In the WFTMR Ofcom used RPI expectations to adjust the real risk-free rate (estimated by reference to index-linked gilts based on RPI) into nominal terms. Ofcom also used forecast CPI to adjust the real Expected Market Return (which was estimated on a CPI-real basis) into nominal terms.
- 5.2 For H7, the CAA has set allowed returns in RPI-real terms, in line with its approach in RP3. The CAA uses different approaches to deflate the different components of the nominal cost of debt, depending on whether it is fixed-rate or index-linked, and whether it is new or embedded debt.
- 5.3 The CMA presented its final determination in CPIH-real terms, and used inflation estimates to convert the parameters into nominal and RPI-real terms.

## Allowed Return on Debt

**TABLE 5 DEBT APPROACHES AND ALLOWANCES IN RPI-REAL TERMS**

Date	Dec-19	Aug-20	Dec-20	Mar-21	Mar-21	Mar-21	Mar-21	Nov-22	Mar-23
Regulator	Ofwat	CMA	Ofgem	CMA	Ofcom	Ofcom	Utility Regulator	Ofgem	CAA
Sector	Water & Wastewater	NERL	Gas & Electricity	Water & Wastewater	Telecoms - Openreach	Telecoms – Other UK telecoms	Water & Sewerage	Gas & Electricity	Airports
Price control	PR19	RP3	GD2 & T2	PR19	WFTMR	WFTMR	PR21	RIO-ED2	H7
Status	Final	Final §	Final	Final	Final	Final	Final	Final	Final
Source	<a href="#">page 4</a>	<a href="#">page 214</a>	<a href="#">page 71</a>	<a href="#">9.36</a>	<a href="#">A21.12</a>	<a href="#">A21.12</a>	<a href="#">page 10</a>	<a href="#">Appendix 1</a>	<a href="#">page 22</a>
Method	Allowance based on an indexed allowance for new debt and a fixed allowance for embedded debt. With a proportion of 20% of new debt	Fixed allowance based on weighted average, 54% embedded and 46% new debt	Full indexation based on observed outturn market rates	Allowance partially based on index (new debt) and partially on embedded sector average, adopting a 17% proportion of new debt	Fixed allowance based on a weighted average of embedded and new debt. Openreach cost of debt set 0.1 percentage points lower than BT Group to reflect lower systematic risk	Fixed allowance based on a weighted average of embedded and new debt. Other UK telecoms cost of debt set equal to BT Group cost of debt	Year specific allowances based on weighted average embedded and new debt.	Full indexation approach. 17yr trailing average of Utilities 10yr+ index +55bps calibration adjustment and +25bps issuance & liquidity costs.	Allowance based on a weighted average of the indexed allowance for new debt and a fixed allowance for embedded debt. New debt weighting of 11.61%
Allowed return on debt (pre-tax)	1.15% ¥	1.21%	0.81% ¥	-1.27%	0.5%	0.6%	1.03% Ω	1.99%-2.05% ¥	0.43% ¥



- ¥ Dynamic allowance subject to updates to reflect outturn market data
  - § On the NERL appeal, the CMA published the provisional findings in March 2020 and the final decision in August 2020. Due to the COVID-19 pandemic, the CMA had decided that, for the final decision, it will limit their work on the cost of capital calculation to two areas: the calculation of the weight of embedded debt and consideration of the 'vanilla' WACC into a pre-tax WACC that is required in the price control. In the table, information on allowed return on debt can be found in the provisional findings
  - Ω Simple average as individual values have been set for each year of the price control
- 5.4 Allowed returns on debt differ because regulated sectors have different characteristics driving debt yields (e.g. sector risk). In addition, each regulator may make different assumptions around the share of embedded and new debt, reflecting the appropriate share for each price control. Over the period 2000-2022, new debt costs followed a declining trend, but since 2022 there has been a significant increase in new debt costs. These trends tend to be reflected in regulatory allowances, that tend to make assumptions about efficient company issuance reflecting the trends affecting the period in which regulated firms have issued debt. Each regulator also tends to consider the weight placed on historic (or 'embedded') debt vs. debt raised over the ensuing control, as the relative price of these two types of debt can be very different.
- 5.5 The common principle, to reflect efficient costs, is achieved using various methods, including the use of relevant market benchmarks and the companies' expected actual debt costs.

## Risk-free rates

**TABLE 6 RISK-FREE RATES: APPROACHES AND ESTIMATES IN RPI-REAL TERMS**

Date	Dec-19	Aug-20	Dec-20	Dec -20	Mar-21	Mar-21	Mar-21	May-22	Nov-22	Feb-23	Mar-23
Regulator	Ofwat	CMA	Ofgem	Utility Regulator	CMA	Ofcom	Utility Regulator	Utility Regulator	Ofgem	Utility Regulator	CAA
Sector	Water & Wastewater	NERL	Gas & Electricity	Electricity TSO	Water & Wastewater	Telecoms	Water & Sewerage	Gas TSO	Gas & Electricity	Gas distribution	Airports
Price control	PR19	RP3	GD2 & T2	SRP20	PR19	WFTMR	PR21	GT22	RIIO-ED2	GD23	H7
Status	Final	Final §	Final	Final	Final	Final	Final	Final	Final	Final	Final
Source	page 4	page 244	page 26	Annex 5	Table 9-37	A20.24	page 11	Annex 3	Appendix 1	Annex T	page 14
Method	Ex-ante fixed allowance using spot plus forecast increase	Ex-ante fixed allowance using UK ILG forward curves to adjust spot yields plus	Indexed allowance will update to reflect market rates (working assumption: spot + forward)	Indexed allowance based on forward curves for ILG rate and regulatory present	Ex-ante fixed allowance using midpoint of 'ILG – AAA' range	Fixed allowance based on recent and historical averages as well as forward rates	Regulatory precedent	Indexed allowance based on 20yr ILG rate and AAA non-gilt rate.	Indexed allowance based on 20yr ILG rate and updated annually.	Indexed allowance based on 20yr ILG rate and AAA non-gilt rate.	Average of 1-month trailing average yield on ILG and 1-month trailing average yield on ILG plus

		forecast increase								Updated annually based on changes in 20yr ILG rate.	convenience yield (based on AAA-rated indices)
Assumed value	-2.35%	-2.25%	-2.55%¥ Ω	-1.96% Ω	-2.22%	-2.0%	-2.22%	-2.06% Ω	0.23%¥ Ω	0.78% Ω	0.59%

¥ dynamic allowance subject to updates to reflect outturn market data

§ On the NERL appeal, the CMA published the provisional findings in March 2020 and the final decision in August 2020. Due to the COVID-19 pandemic, the CMA had decided that, for the final decision, it will limit their work on the cost of capital calculation to two areas: the calculation of the weight of embedded debt and consideration of the 'vanilla' WACC into a pre-tax WACC that is required in the price control. In the table, information on TMR can be found in the provisional findings

Ω CPIH-basis figures converted to RPI assuming CPIH of 2.00% and RPI of 3.00%.

5.6 Generally, regulators estimate the risk-free rate based on yields of RPI-index linked gilts with long term tenors, although some regulators have in recent decisions placed some weight on AAA-rated corporate bonds.

## Total Market Return (TMR)

**TABLE 7 TOTAL MARKET RETURN: APPROACHES AND ALLOWANCES IN RPI-REAL TERMS**

Date	Dec-19	Aug-20	Dec-20	Dec -20	Mar-21	Mar-21	Mar-21	May-22	Nov-22	Feb-23	Mar-23
Regulator	Ofwat	CMA	Ofgem	Utility Regulator	CMA	Oftcom	Utility Regulator	Utility Regulator	Ofgem	Utility Regulator	CAA
Sector	Water & Wastewater	NERL	Gas & Electricity	Electricity TSO	Water & Wastewater	Telecoms	Water & Sewerage	Gas TSO	Gas & Electricity	Gas distribution	Airports
Price control	PR19	RP3	GD2 & T2	SRP20	PR19	WFTMR	PR21	GT22	RIIO-ED2	GD23	H7
Status	Final	Final §	Final	Final	Final	Final	Final	Final	Final	Final	Final
Source	page 4	page 232	page 24	Annex 5	Table 9-38	A20.50	page 12	Annex 3	Appendix 1	Annex 1	page 13
Considerations	1) historical averages, 2) forward-looking returns, 3) regulatory precedent	1) historical averages, 2) regulatory precedent 3) investor studies	1) historical averages, 2) forward-looking returns, 3) regulatory precedent 4) investor studies	1) historical averages, 2) regulatory precedent	1) historical ex post 2) historical ex ante 3) forward looking approaches (with no weight placed)	1) historical ex post 2) historical ex ante 3) forward looking approaches	1) regulatory precedent	1) regulatory precedent	1) historical ex-post 2) forward-looking approaches (cross-check only)	1) regulatory precedent	1) regulatory precedent

						(with limited weight placed)					
Allowance (RPI terms)	5.47%	5.0% to 6.0%	5.45%	5.66% Ω	5.85%	5.7%	5.85%	5.76% Ω	5.45% Ω	5.47% Ω	5.85%

§ On the NERL appeal, the CMA published the provisional findings in March 2020 and the final decision in August 2020. Due to the COVID-19 pandemic, the CMA had decided that, for the final decision, it will limit their work on the cost of capital calculation to two areas: the calculation of the weight of embedded debt and consideration of the ‘vanilla’ WACC into a pre-tax WACC that is required in the price control. In the table, information on TMR can be found in the provisional findings

Ω CPIH-basis figures converted to RPI assuming CPIH of 2.00% and RPI of 3.00%.

5.7 When estimating the TMR, regulators have drawn on a range of different evidence, including: historical ex post (e.g. historical average returns), historical ex ante (e.g. average returns adjusted for unrepeatable events), and forward-looking (e.g. from dividend discount models). The weight attached to each approach has varied to some extent across sectors, although approaches based on averaging historical returns remain most widely used.

**TABLE 8 BETAS: APPROACHES AND ASSUMPTIONS**

Date	Dec-19	Aug-20	Dec-20	Mar-21	Mar-21	Mar-21	Mar-21	Nov-22	Feb-23	Mar-23
Regulator	Ofwat	CMA	Ofgem	CMA	Ofcom	Ofcom	Utility Regulator	Ofgem	Utility Regulator	CAA
Sector	Water & Wastewater	NERL	Gas & Electricity	Water & Wastewater	Telecoms	Telecoms	Water & Sewerage	Gas & Electricity	Gas distribution	Airports
Price control	PR19	RP3	GD2 & T2	PR19	WFTMR - Openreach	WFTMR – Other UK Telecoms	PC21	RIIO-ED2	GD23	H7
Status	Final	Final §	Final	Final	Final	Final	Final	Final	Final	Final
Source	page 4	Table 13-17	page 24	Table 9-38	Table A21.12	Table A21.12	page 7	Table 12	Page 86	Page 15
Primary proxies	SVT, UU	Large European airports, ENAV	NG, PNN, SVT, UU	SVT, UU	BT Group, utilities	BT Group, UK and European telecoms	SVT, UU	SSE, NG, SVT and UU.	Regulatory precedent from RIIO-GD2	Six listed comparator airports
Primary estimation window & frequency (Raw equity beta)	2y daily and 5y monthly data.	2- and 5-year, current and 1-, 2- and 5-year rolling windows, daily and weekly Eurostoxx 600	2-year, 5-year and 10-year estimation periods. Spot, 2-year, 5-year and 10-year rolling averages	2-, 5- and 10-year daily, weekly and monthly spot and rolling averages of FTSE data	5-year rolling window, daily data, FTSE All Share index	5-year rolling window, daily data, FTSE All Share, FTSE All Europe and FTSE All World indexes	2-year rolling window, daily data	2-year, 5-year and 10-year estimation periods. Spot, 2-year, 5-year and 10-year rolling averages.	Regulatory precedent from RIIO-GD2	5 year (pre-COVID) and 2 year (Post-COVID) betas, with latter having a probability weighting.

		international index								
<b>Notable methods</b>	Use of GARCH as well as ONS betas.	Adopt a lower gearing to remove the need to re-gear comparator data and avoid resulting in WACCs that strictly increase with levels of gearing. Avoid domestic indices	Ofgem placed greater weight on NG and on longer estimation periods/trailing averages.	Enterprise value gearing to degear. Less emphasis on monthly data due to outliers, OLS estimation	Point estimate between BT Group and listed utilities, taking account of Ofcom's approach to disaggregate the BT Group asset beta	Point estimate selected from a range based on listed UK and European telecoms companies, taking account of our approach to disaggregate the BT Group asset beta into OR, OUT and Rest of BT (ICT)	Point estimate based on regulatory precedent	Ofgem chose a figure in line with RIIO-GD&T2, placing greater weight on NG and on longer estimation periods/trailing averages.	At final determinations, a different decision was made for SGN than for PNGL and FE (see rows below)	Beta estimated using weighted least squares method with lower weight assigned to pandemic-affected observations, together with a downward adjustment to reflect reduction in systematic risk due to the application of traffic risk sharing
Debt beta	0.125	0.05	0.075	0.075	0.1	0.1		0.075	0.075	0.05 - 0.10
Asset beta	0.36	0.5 - 0.6	0.349	0.29	0.53	0.62		0.349	0.35 (0.41 for SGN)	0.44 - 0.62
Notional gearing	60%	30%	60%	60%	45%	45%	50%	60%	55%	60%
Notional equity betas	0.71	0.71 to 0.86	0.759	0.71	0.88	1.05	0.64	0.759	0.69 (0.81 for SGN)	0.95-1.47

§ On the NERL appeal, the CMA published the provisional findings in March 2020 and the final decision in August 2020. Due to the COVID-19 pandemic, the CMA had decided that, for the final decision, it will limit their work on the cost of capital calculation to two areas: the calculation of the weight of embedded debt and consideration of the 'vanilla' WACC into a pre-tax WACC that is required in the price control. In the table, information on betas can be found in the provisional findings

5.8 Each regulator and the CMA has relied upon stock market data for relevant listed stocks to estimate the systematic risk within respective price controls. Share price returns allow regulators to estimate equity betas (sometimes referred to as 'raw equity betas'). However, these equity betas are specific to actual companies that are often different from the relevant notional company that is subject to price controls. For example, actual companies may operate non-regulated businesses or be exposed to different levels of gearing/financial risk.

5.9 To reflect gearing/financial-risk differences between actual and notional companies, each notional equity beta is an outcome of the following steps:

- Estimating raw equity betas, either directly or using regulatory precedent/relevant proxies
- De-levering raw equity betas, using assumptions for debt beta and actual gearing, to derive unlevered betas



- Deriving asset betas from the unlevered betas and debt betas
- Re-levering asset betas to desired notional gearing levels, producing a notional equity beta for the relevant notional company/licensee.

5.10 Differences in asset betas between sectors primarily reflect the different systematic risks faced by companies in each regulated sector. For example, companies regulated by the CAA and Ofcom face material volume risk whereas the network utilities regulated by Ofgem and Ofwat typically do not. Asset beta estimations can also differ due to: i) different estimation windows, ii) different assumptions for debt beta, and iii) different estimates of actual gearing.

## Appendix I. Financing Duties

**TABLE 9 SUMMARY OF REGULATORS' DUTIES REGARDING FINANCEABILITY IN THE CONTEXT OF THEIR OTHER RESPONSIBILITIES (1/2)**

Regulator	CAA	CAA	Ofcom	Ofgem	Ofgem	Ofwat	ORR	Utility Regulator	Utility Regulator	Utility Regulator
Sector	Air traffic control	Airports	Telecoms	Gas	Electricity	Water & wastewater	Rail network	Water & sewerage	Electricity	Gas
Number of companies subject to price controls	1	2	Fixed telecoms (excluding call termination): 2 Call termination (fixed and mobile): c.200 (Note 1)	9 (Note 2)	17 (Note 2)	17 (Note 3)	2 (Note 4)	1	2	3
Primary legislation	Transport Act 2000	Civil Aviation Act 2012	Communications Act 2003	Gas Act 1986	Electricity Act 1989	Water Industry Act 1991	Railways Act 1993 (plus amendments)	Water and Sewerage Services (NI) Order 2006	The Electricity (NI) Order 1992 & Energy Order (NI) 2003	The Gas (NI) Order 1996 & Energy Order (NI) 2003
Structure of Duties	Primary duty and 'have regard to...'	Primary duty and 'have regard to...'	Primary duty 'have regard to...' and 'duties in relation to certain regulatory functions'	Primary duty and 'have regard to...'	Primary duty and 'have regard to...'	5 primary and 6 secondary duties, plus general environmental and recreational duties and 'have regard to...'	Statutory duties to funders, business and users. No hierarchy in duties	Core duties (3 primary, 5 secondary duties plus general environmental and recreational duties) and 'have regard to...'	Primary duty and 'have regard to...'	Primary duty and 'have regard to...'
Financing duty?	Yes, must have regard to ...	Yes, must have regard to ...	Although Ofcom does not have an explicit financing duty, it must take account of the extent of investment where it imposes price controls	Yes, must have regard to ...	Yes, must have regard to ...	Yes, one of the primary duties	Yes, must act in a manner which it considers will not render it unduly difficult for licence holders to finance their activities	Yes, one of the primary duties	Yes, must have regard to the need to secure that licence holders are able to finance their statutory activities	Yes, ensure the company can finance its activities
Economy and/or efficiency duty?	Yes, must have regard to ...	Yes, must have regard to ...	Although Ofcom does not have an explicit efficiency duty, efficiency must be considered when setting price regulation	Yes, must have regard to ... when carrying out its functions	Yes, must have regard to ... when carrying out its functions	Yes, one of the secondary duties	Yes	Yes, one of the secondary duties	Yes	Yes

**TABLE 9 SUMMARY OF REGULATORS' DUTIES REGARDING FINANCEABILITY IN THE CONTEXT OF THEIR OTHER RESPONSIBILITIES (2/2)**

Regulator	CAA	CAA	Ofcom	Ofgem	Ofgem	Ofwat	ORR	Utility Regulator	Utility Regulator	Utility Regulator
Sector	Air traffic control	Airports	Telecoms	Gas	Electricity	Water & wastewater	Rail network	Water & sewerage	Electricity	Gas
Primary duty / duties	Maintain a high standard of safety, which has priority over other 'secondary' duties	Further the interests of users, where appropriate promote competition	Further the interests of citizens in relation to communication matters and to further the interests of consumers in relevant markets where appropriate by promoting competition	<p>To protect the interests of existing and future consumers in relation to:</p> <ul style="list-style-type: none"> <li>– the gas conveyed through pipes...; or</li> <li>– electricity conveyed by distribution systems or distribution systems...;</li> <li>– where appropriate by promoting effective competition.</li> </ul> <p>In performing these duties...have regard to:</p> <ul style="list-style-type: none"> <li>- The need to secure that reasonable demands for energy are met.<sup>5</sup></li> <li>- The need to secure that licence holders are able to finance the activities which are the subject of obligations imposed under the relevant Acts.</li> <li>- The need to contribute to the achievement of sustainable development</li> </ul>		<p>Protect the interests of consumers, wherever appropriate by promoting effective competition</p> <p>Secure that the functions of undertakers are properly carried out</p> <p>Secure that undertakers are able (in particular by securing reasonable returns on their capital) to finance the proper carrying out of those functions</p> <p>Secure that the activities authorised by business retail licences and the relevant statutory functions are properly carried out</p> <p>Secure the long-term resilience of water supply and wastewater systems and secure that undertakers take steps to enable them, in the long term, to meet the need for water supplies and wastewater services</p>	No primacy within ORR's duties	<p>Protection of consumer interests (wherever appropriate by facilitating effective competition)</p> <p>Ensuring undertakers are able to finance their functions</p> <p>Ensuring undertakers carry out their functions properly as respects every area of Northern Ireland</p>	Principal objective is to protect the interests of electricity consumers, wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities, connected with, the generation, transmission, distribution or supply of electricity	<p>Principal objective is to promote the development and maintenance of an efficient, economic and coordinated gas industry in Northern Ireland</p> <p>The principal objective must also be pursued in a way that is consistent with the objectives defined in Article 40 of the Gas Directive, the most relevant of which – in the context of carrying out price controls – are promoting an efficient market, and protecting consumers</p> <p>In carrying our gas functions, we are also required to further this principal objective in the best manner that we see fit whilst also having regard to a number of other considerations. The key relevant one being the need to ensure that licence holders are able to finance their licensed activities</p>

**NOTES TO TABLE 9**

- I. Ofcom: Ofcom has additional duties under the Postal Services Act 2011 (PSA11) when carrying out functions in relation to postal services. These state that Ofcom must carry out such functions in a way that it considers will secure the provision of a universal postal service. In performing this duty, Ofcom must have regard to the need for the provision of a universal postal service to be financially sustainable, and the need for the provision of a universal postal service to be efficient before the end of a reasonable period and for its provision to continue to be efficient at all subsequent times. Ofcom also has duties under the Wireless Telegraphy Act 2006.



2. Ofgem: Excluding independent gas transporters and independent electricity distribution network operators who are subject to relative price control.
3. Ofwat: The 17 licence holders referred to are the 11 regional water companies that are both water undertakers and sewerage undertakers and the 6 regional water companies that are only water undertakers. Each of these companies is subject to the full price review price determinations process. Ofwat also regulates in a lighter way 8 small local water companies that are water and/or sewerage undertakers and business retailers (water supply and/or sewerage licensees) offering water and wastewater services to businesses, charities and public sector organisations. Ofwat also regulates the licensed infrastructure provider for the Thames Tideway Tunnel and in that capacity the duties summarised above are applied in a modified but consistent form by The Water Industry (Specified Infrastructure Projects) (English Undertakers) Regulations 2013.
4. ORR: As well as Network Rail, ORR conducts a periodic review of HSI Ltd.'s charges. HSI is a concession that is subject to a different regulatory framework. In particular, it is not in the scope of HSI's price control to calculate a return to shareholders as part of the revenue requirement calculation, therefore HSI is not included in this document. Nevertheless, some of the issues involved with calculating a cost of capital do apply to HSI.
5. The wording of the Gas Act 1986 is 'the need to secure that, so far as it is economical to meet them, all reasonable demands in Great Britain for gas conveyed through pipes are met;' while the working of the Electricity Act 1989 is 'the need to secure that all reasonable demands for electricity are met'.



## Appendix 2. Ring Fencing

**TABLE 10 SUMMARY OF EACH REGULATORS' RING-FENCING PROVISIONS<sup>1</sup>**

Regulator	CAA	CAA	Ofcom	Ofgem	Ofgem	Ofwat	ORR	Utility Regulator	Utility Regulator	Utility Regulator
Sector	Air traffic control	Airports	Telecoms	Gas	Electricity	Water & wastewater	Rail network	Water & sewerage	Electricity	Gas
Restrictions on disposal of assets	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓ / ✗
Restrictions on activity and financial ring fencing	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓ / ✗
Requirement to annually provide certification of availability of resources and at each dividend declaration	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓ / ✗
Ultimate holding company undertakings	✓	✓	✗	✓	✓	✓	✓	N/A	✓	✓ / ✗
Requirement to maintain an investment grade credit rating	✓	✗	✗	✓	✓	✓	✓	Deferred given deferral of domestic charging	✓	✓ / ✗
Restrictions on indebtedness	✓	✗	✗	✓	✓	✗	✓	Guidelines provided but no restrictions as such	✓	✓ / ✗
Independent licensee directors	✗	✗		✓	✓	✓				
Restrictions on granting of security over network assets	✓	✗	✗	✓	✓	✓	✓	N/A	✓	✓ / ✗
Insolvency	Special admin	No special admin., standard insolvency rules	No special admin., standard insolvency rules	Special admin	Special admin	Special admin	Special admin	Special admin	✓	Special admin
Notes		2								3

### NOTES TO TABLE 10

1. The details of ring fence licence conditions vary from regulator to regulator. The ticks in the table above indicate the presence of a licence condition of each type.
2. Airport licences for Heathrow Airport Limited and Gatwick Airport Limited issued by the CAA in February 2014, which took effect on 1 April 2014.
3. Dependent on the ownership structure (private or government owned) of the licensed business, which is currently under review.

## Appendix 3. Components of the cost of capital

### WACC

A “pre-tax WACC” is normally calculated as

$$\text{Pre-tax WACC} = (\text{cost of debt} \times \text{gearing}) + \left[ \frac{1}{1-t} \right] \times \text{cost of equity} \times (1 - \text{gearing})$$

where

*cost of debt* = pre-tax cost of debt

*cost of equity* = post-tax cost of equity

*t* = tax rate

$$\text{gearing} = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

One of the most common calculations of WACC used by regulators is a “vanilla” WACC which is calculated using the formula below:

$$\text{Vanilla WACC} = (\text{cost of debt} \times \text{gearing}) + \text{cost of equity} \times (1 - \text{gearing})$$

where

*cost of debt* = pre-tax cost of debt

*cost of equity* = post-tax cost of equity

$$\text{gearing} = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

Alternatively, regulators can estimate a “fully post-tax” WACC as follows:

$$\text{Fully post-tax WACC} = [\text{cost of debt} \times (1 - t) \times \text{gearing}] + \text{cost of equity} \times (1 - \text{gearing})$$

where

*cost of debt* = pre-tax cost of debt

*cost of equity* = post-tax cost of equity

*t* = tax rate

$$\text{gearing} = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

The choice as to which approach to take is sector specific and will depend on the structure of companies within each sector, the level of tax which is paid in the sector and the modelling approach (i.e. whether cash flows are modelled pre or post tax). The regulator selects an approach which provides an appropriate tax allowance which covers companies’ tax costs while ensuring that customers are not being asked to pay for a tax allowance where no tax is being paid due to the company’s use of available tax allowances.

### Cost of Debt

The cost of debt is the minimum expected return that providers of debt finance require to prompt them to lend to companies, taking into account the risks involved.

The approach to calculating a cost of debt varies between regulators but often considers the cost of embedded debt and the cost of new debt. The cost of debt is calculated using market data on traded bonds as the primary source of evidence.



## Cost of Equity

The minimum expected return that equity investors require to prompt them to invest in companies, taking account of the systematic risks involved.

The Capital Asset Pricing Model (CAPM) is used as the primary approach in estimating the cost of equity and is reinforced with evidence from the dividend growth model, transactional evidence and comparisons with other regulated sectors.

Under the CAPM approach, the cost of equity is estimated as the risk-free rate plus (equity beta x market risk premium). The risk-free rate and the market risk premium are general non-company specific market factors.

## Risk-Free Rate

The theoretical rate of return on an investment with zero systematic risk. The risk-free rate can be calculated using a variety of evidence including historical values (e.g. historic rates on government gilts and regulatory precedent) or current market values (e.g. forward rates). Most regulators use a combination of these when estimating the risk-free rate.

## Equity Risk Premium

The market risk premium is a measure of the expected return, on top of the risk-free rate, that an investor would expect when holding the market portfolio of available securities. This captures the non-diversifiable risk that is inherent to the market of securities.

Regulators employ two differing methodologies for calculating the market risk premium. They either use a standalone estimate using market indices or calculate it as the residual of the total equity market return after deducting the risk-free rate.

## Betas

The equity beta is a company or sector-specific factor which describes the relative risk of the company or sector to the market as a whole, so variation between sectors is to be expected. The existence of directly measurable betas will depend on whether there are regulated or other benchmark companies with equity listings.

## Gearing

Gearing is a company's debt expressed as a percentage of its total capital. In regulated utilities this is usually calculated as debt as a percentage of its regulated asset base (RAB), regulated asset value (RAV) or regulated capital value (RCV). Other common measures include the ratio of debt to (debt plus equity) expressed as a percentage.

When setting prices most regulators use an assumed notional capital structure and a notional level of gearing.

The UKRN also publish a Cost of Capital [terminology buster](#) on its website.



## Appendix 4. Consultant reports

This appendix includes a list of consultant reports and announcements published which are relevant to the latest cost of capital decisions detailed in this report, and cost of capital guidance or proposals for future price controls.

### CAA:

Flint: [H7 Updated Beta Assessment \(June 2022\)](#)

### Ofcom:

Brattle: [Cost of Capital: Beta and Gearing for WFTMR \(March 2021\)](#)

### Ofgem:

None

### Ofwat:

Europe Economics: [The allowed return on capital for the water sector at PR19 \(December 2019\)](#)

### Utility Regulator:

First Economics: [PC21: NI Water's Costs of Capital \(March 2021\)](#)

First Economics: [GD23 Cost of Capital Report \(October 2021\)](#)

### UKRN:

CEPA: [Considerations for UK regulators setting the value of debt beta \(December 2019\)](#)

Indepen: [Beta Study – RIIO-2 \(December 2018\)](#)

Wright, Burns, Mason, Pickford: [Estimating the cost of capital for implementation of price controls by UK Regulators \(March 2018\)](#)

## Appendix 5. Principal decisions from 2012 to 2020 in RPI terms

**TABLE 11 HISTORICAL PRICE CONTROL DECISIONS IN RPI-REAL TERMS (1/3)**

Date	Dec-12	Mar-13	Oct-13	Feb-14	Feb-14	Feb-14	Mar-14	Jun-14	Jun-14	Dec-14
Regulator	Ofgem	Ofgem	ORR	CAA	CAA	CAA	CC	Ofcom	Ofcom	Ofwat
Sector	Electricity / Gas	Electricity	Rail network	Airports	Airports	Air traffic control	NI Electricity	Telecoms	Telecoms	Water & sewerage
Price control	RIIO-T1/GD1	RIIO-ED1	CP5	Q6 – Heathrow	Q6 – Gatwick	NERL	RP5	LLU WLA - Openreach	WBA- Rest of BT	PR14
Status										
Source	Table 3.5	page 1	page 49.1	page 44	page 44	page 50	pages 13 to 38	Table A14.1	Table A14.1	page 41
Allowed return on debt (pre-tax)	1%-1.58%	1.94%	3%	3.20%	3.20%	2.45%	3.10%	2.3%	2.8%	2.59%
Risk free rate	2.00%		1.75%	0.50%	0.50%	0.75%	1.50%	1.3%	1.3%	1.25%
Equity risk premium	5.3%		5.00%	5.75%	5.77%	5.50%	5.00%	4.8%	4.8%	5.50%
Total market return	7.3%		6.75%	6.25%	6.27%	6.25%	6.5%	6.1%	6.1%	6.75%
Equity beta	0.90 – 0.95		0.95	1.10	1.13	1.11	0.70	0.69	1.17	0.80
Debt beta										
Asset beta	n/a		0.37	0.50	0.56	0.50	0.40	0.50	0.83	0.30
Allowed return on equity (post-tax)	6.7% - 7.0%		6.5%	6.84%	7.0%	6.86%	5.00%	4.6%	7.0%	5.65%
Gearing	55% - 65%		62.5%	60%	55%	60%	45%	32.0%	32.0%	62.5%
Tax	19%		20.2%	20.2%	20.2%	36%	20%	20.0%	20.0%	20%
WACC (pre-tax)			4.93%	5.35%	5.70%	5.75%	4.83%	5.19%	7.34%	4.27%
WACC (vanilla)			4.31%	4.65%	4.90%	4.22%	4.15%	3.88%	5.62%	3.74%
Notes	1, 2	1, 2, 3						4	4	5



**TABLE II HISTORICAL PRICE CONTROL DECISIONS IN RPI-REAL TERMS (2/3)**

Date	Dec-14	Feb-15	Oct-15	Sep-16	Sep-16	Jun-17	Jun-17	Mar-18	Mar-18	Feb-19
Regulator	UR	Ofcom	CMA	UR	UR	CMA	UR	Ofcom	Ofcom	CAA
Sector	Water & sewerage	Telecoms	Water	Gas	Gas	Gas	Electricity	Telecoms	Telecoms	NERL
Price control	PC15	MCT	CMA – Bristol Water	GD17 – PNGL	GD17 – FE	GD17 – FE	RP6 – NIEN	WLA – Openreach Copper	WLA – Other UK telecoms	RP3 (initial)
Status				Final	Final	Final	Final	Final	Final	Initial
Source	p.10	Table A10.1	p.335	Table 192	Table 192	page 172	Table 81	Table A20.1	Table A20.1	page 69
Allowed return on debt (pre-tax)	1.2%	2.1%	2.6%	2.36% ¥	2.45% ¥	n/a	1.63% ¥	1.00%	1.10%	0.86%
Risk free rate	1.5%	1.0%	1.3%	1.25%	1.25%	n/a	1.25%	0.00%	0.00%	-1.40%
Equity risk premium	5.0%	5.1%	5.3%	5.25%	5.25%	n/a	5.25%	6.1%	6.1%	6.80%
Total market return	6.5%	6.1%	6.6%	6.50%	6.50%	n/a	6.50%	6.1%	6.1%	5.4%
Equity beta	0.83	0.93	0.85	0.77	0.77	n/a	0.61	0.80	1.00	0.96
Debt beta				0.1	0.1	0.1	0.1	0.1	0.1	0.13
Asset beta	0.44	0.60	0.32	0.40	0.40	0.40	0.38	0.59	0.73	0.46
Allowed return on equity (post-tax)	5.7%	5.8%	5.7%	5.3%	5.28%	n/a	4.45%	4.9%	6.1%	5.13%
Gearing	50.0%	40.0%	62.5%	55%	55%	n/a	45%	30%	30%	60%
Tax	20.0%	20.0%	20.0%	20%	20%	n/a	20%	17%	17%	11.7%
WACC (pre-tax)	4.14%	5.63%	4.32%	4.26% ¥	4.32% ¥	n/a	3.80% ¥	4.8%	5.90%	2.84%
WACC (vanilla)	3.44%	4.29%	3.78%	3.67% ¥	3.72% ¥	n/a	3.18% ¥	3.7%	4.6%	2.57%
Notes		1		6	6, 7	6, 7	6	4	4	

¥ Dynamic allowance subject to updates to reflect outturn market data

**TABLE II HISTORICAL PRICE CONTROL DECISIONS IN RPI-REAL TERMS (3/3)**

Date	May-19	Jun-19	Jun-19	Jul-19	Aug-19	Dec-19
Regulator	Ofgem	Ofcom	Ofcom	Ofwat	CAA	Ofwat
Sector	Gas & Electricity	Telecoms	Telecoms	Water & Wastewater	NERL	Water & Wastewater
Price control	GD2 & T2 (methodology)	LLCC – Openreach	LLCC – Other UK telecoms	PR19	RP3	PR19
Status	Initial	Final	Final	Draft	Final	Final
Source	page 121 & 122	Table A21.1	Table A21.1	page 5	page 69	page 4
Allowed return on debt (pre-tax)	0.87% ¥	1.1%	1.2%	1.34% ¥	0.86%	1.15% ¥
Risk free rate	-1.78% ¥	-1.3%	-1.3%	-1.42%	-1.70%	-2.35%
Equity risk premium	7.28% ¥ §	7.1%	7.1%	6.88%	7.1%	7.81%
Total market return	5.5%	5.8%	5.8%	5.47%	5.4%	5.47%
Equity beta	0.75	0.85	1.02	0.71	1.00	0.71
Debt beta	0.125	0.1	0.1	0.125	0.10	0.125
Asset beta	0.38	0.55	0.65	0.36	0.46	0.36
Allowed return on equity (post-tax)	3.2% ¥	4.7%	5.9%	3.46%	5.40%	3.18%
Gearing	60%	40%	40%	60%	60%	60%
Tax	17%	17%	17%	17%	9.9%	17%
WACC (pre-tax)	2.08% ¥	4.2%	5.1%	2.47% ¥	2.91%	2.24% ¥
WACC (vanilla)	1.81% ¥	3.1%	3.9%	2.19% ¥	2.68%	1.96% ¥
Notes		4	4			

¥ Dynamic allowance subject to updates to reflect outturn market data

## NOTES TO TABLE 11

1. Ofgem updates allowances for the cost of debt on an annual basis to reflect changes in benchmark rates. The table above shows the cost of debt allowances for financial year ending 31st March 2020 determined for the RIIO-T1/GD1 and ED1 price controls in the November 2019 annual iteration process. Cost of equity estimates were determined in 2012 for RIIO-T1/GD1 and 2014 for RIIO-ED-1 and are fixed for the duration of the respective price controls.
2. Ofgem's allowances for corporation tax are subject to a 'tax trigger' mechanism that provides for material changes in the tax regime, including changes in corporation tax rates. The rate of corporation tax for 2017-18 is 19%.
3. Ofgem's decision making board, GEMA, noted in its RIIO-ED1 slow track decision that there was significant uncertainty in all the numbers contributing to the WACC and that it was not therefore the intention to achieve a precise match to the actual WACC and its components for the electricity distribution network operators as this would represent spurious accuracy. Accordingly, Ofgem has not published a point estimate of all the individual components of its WACC allowances. The RIIO-ED1 decision provided for a cost of equity of 6.0% for slow track companies. Business plans for the fast-tracked companies had been accepted on the basis of a cost of equity of 6.4%.
4. Ofcom publish and apply WACC in nominal terms, therefore in the table above we have converted those figures into real terms by reference to their stated RPI assumptions of 3.2% for 2014 and 3.3% for 2015, 2.9% for 2018, 2.8% for 2019 and 4.6% for 2021. Ofcom also publishes and applies the WACC in pre-tax terms, where it accounts for tax in nominal terms by grossing up the nominal cost of equity. In addition to the WACC for charge controls, Ofcom also estimates the cost of capital for other sectors, e.g. in determining financial terms for broadcasting and spectrum licences.
5. The Appointee cost of capital was 3.74%, after disaggregation of the allowed return to retail and wholesale controls, the wholesale allowed return was 3.60%.
6. UR determined an ex post adjustment mechanism which updates the WACC using benchmark rates at the points in time when PNGL, FE or NIEN raise new debt.
7. UR decided a pre-tax WACC of 4.32% for Firmus Energy. The asset beta and therefore the allowed return on equity was referred to the CMA but was not found to be wrong.