Cost of Capital – Annual Update Report

Information Paper

Publication date: December 2020

About this document

The purpose of this information paper is to refresh last years' 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 Cost of Capital Principles to ensure continued collaboration on cost of capital issues. 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.

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:

September 2019

June 2018

May 2017

March 2016

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1. Foreword by Rachel Fletcher, UKRN CEO

1.1 Welcome to the 2020 annual UK Regulators' Network (UKRN) Cost of Capital report. This paper provides a summary of the most recent cost of capital decisions and analysis by each regulator, serving as an easily accessible reference document for those interested in our sectors. It also sets out where regulators share a common approach, and where approaches diverge to reflect differences between sectors, regulatory timings and structures.

1.2 We are conscious of the overwhelming impact that Covid-19 has had on the people and sectors that we regulate. The impact has been particularly severe in the transport sectors, raising issues which the regulators are considering about the future approach to regulation. In essential services, the sectors adjusted well to Covid-19; as providers of public services we would expect them to remain resilient. What is clear is that all sectors have shown just how flexible they can be by adjusting to the immediate and longer-term challenges.

1.3 Through these challenging circumstances, our regulation has also proven itself to be robust. Companies have shown their resilience, and the positive interaction between companies and regulators through a difficult period for customers, is testament to the continued need to work together to ensure the best outcomes for customers across our sectors.

1.4 Looking ahead, the Green Recovery, climate change and the goal of reaching our Net Zero targets by 2050 are becoming more central to our approach. 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.

1.5 The UKRN is of the view that a stable and predictable regime is at the core of UK regulation and as a result, our model is highly regarded around the world. We support a consistent approach to established regulatory approaches, making evolutionary changes where necessary. The UKRN's Cost of Capital network brings together specialists from across UKRN members to share expertise and best practice, collaborating where appropriate. It allows regulators to benefit from shared experience, improving alignment across regulatory decisions.

1.6 Price controls are often the key way regulators protect the interests of current and future customers. Through them we look to ensure value for money and quality of service for today's customers and that the UK's infrastructure has the investment it needs to tackle big challenges like climate change, population growth and digital transformation into the future. By providing a fair base return on these investments, we help create an attractive and stable investment climate.

1.7 In recent years, the cost of capital has tracked downwards, which has been reflected in recent regulatory decisions. Regulated companies remain responsible for maintaining their own financial resilience in the context of lower allowed returns.

1.8 The CMA's recent provisional findings in the water sector has brought members together to further highlight shared principles, which we believe are central to the integrity of our regulatory regimes. Our response to the CMA's provisional findings can be found here.

1.9 I am grateful to the cost of capital network for their hard work in producing this report and for their continued collaborative efforts across these issues. The UKRN will continue to engage with all stakeholders to understand their views and to bring regulators together to ensure that price controls continue to deliver for all.

2. Background

Price Controls, the Cost of Capital, and setting allowed returns

2.1 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.

2.2 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 the assets utilised in providing the regulated services. An appropriate rate of return is essential to facilitate continuing investment in the infrastructure and supports the well-being of both individual customers and the wider UK economy.

2.3 Regulators independently estimate a cost of capital so that an allowance can be made within the price control. These allowances will vary between sectors and between price controls to reflect differences such as: variations in sector specific risk profiles, the level of risk arising from other aspects of the regulatory framework, the timing of when decisions are made, movements in general market conditions, diverging views regarding the estimated costs and the length of the price control period. 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.

2.4 Setting the level of the cost of capital is a matter of judgement for an individual regulator, taking all evidence in the round. Although the cost of capital will vary across regulated sectors, there are some components that inform the overall judgement that would be expected to be similar when regulators are taking decisions at the same time and using a similar method (such as the Capital Asset Pricing Model, CAPM). Each participating regulator has committed to contribute to the production of this annual update report to compare decisions. In addition, the UKRN Cost of Capital Working Group is available to support one another when individual regulators make determinations.

2.5 This paper provides a summary of recent decisions and describes how these varied between regulators. This paper covers only the principal price controls and not all decisions made by regulators.

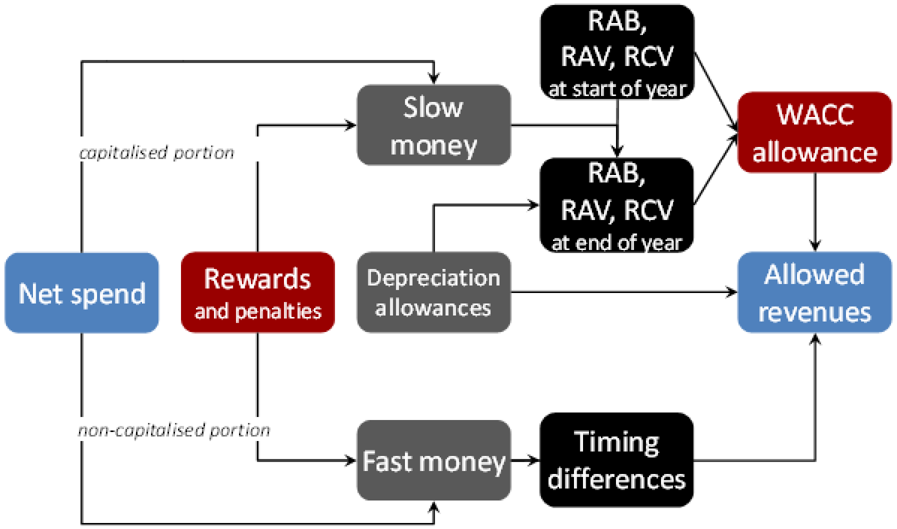
2.6 While this paper summarises the approach taken by each regulator in recent price controls, in future price controls, each regulator may review its approach and deviate from its previous decisions in considering, for example, prevailing market conditions.

Broad Approach for estimating the cost of capital

2.7 Whilst there are some differences in each regulator's duties (as set out in Appendix 1) we each estimate the cost of capital to inform decisions on price controls for business activities we regulate. The approaches we take in estimating the cost of capital, and determining allowed returns, are similar. The methods adopted and the differences that arise are discussed below and further detail on the parameters used in recent price controls can be found in the appendices.

2.8 The classic building block diagram of how price controls work and where the allowed return on capital fits in is set out below.[1]

[1] Some regulators use the terms capex (for slow money) and opex (for fast money).



2.9 All regulators adopt a weighted average approach, when estimating the WACC to reflect the proportion of debt and equity financing. 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 the regulated company or its group.

2.10 Regulators will typically analyse each of the WACC components to inform an overall judgement of the appropriate cost of capital. The overall judgement may be informed by further sense testing of the overall estimate.

2.11 The Capital Asset Pricing Model (CAPM) is used as the primary approach in estimating the cost of equity and has been reinforced by some regulators with other evidence including transaction evidence and comparison with other regulated sectors.

2.12 Regulators typically estimate the WACC and determine allowed returns in real terms (which is applied for price control purposes to a regulatory asset base (RAB), regulatory asset value (RAV) or regulatory capital value (RCV) that is indexed by inflation); although for most price controls Ofcom determines and applies a nominal cost of capital.

2.13 Further information about the approach to calculating individual components of the WACC can be found in Appendix 3.

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

Table 1 Current/upcoming price controls

Regulator	Sector	Current price control	Upcoming price control	Notes
CAA	Airports – Heathrow Airport	iH7, for 2 years, from 01/01/2020 to 31/12/2021	H7, from 01/01/2022 onwards	1
	Airports – Gatwick Airport	Q6, for 7 years, from 01/04/2014 to 31/03/2021	G7, from 01/04/2021 onwards	2
	Air traffic control – NATS (En Route) plc (NERL)	RP2, for 5 years, from 01/01/2015 to 31/12/2020	RP3, from 01/01/2021 onwards	
Ofcom	Telecoms – Mobile call termination	MCT 2018, for 3 years, from 01/04/2018 to 31/03/2021	Wholesale voice markets review 2021, for 5 years, from 01/04/2021 to 31/03/2026	
	Telecoms – Wholesale voice calls and interconnection	for 3 years and 3 months, from 01/04/2018 to 31/03/2021	Termination and interconnection covered by the Wholesale voice markets review 2021, for 5 years, from 01/04/2021 to 31/03/2026	
	Telecoms – Leased lines charge control	LLCC 2019, for 2 years, from 01/04/2019 to 31/03/2021	Replaced by the fixed telecoms market review (FTMR)	3
	Telecoms – Wholesale local access	WLA 2018, for 3 years, from 01/04/2018 to 31/03/2021	Replaced by the fixed telecoms market review (FTMR)	3
	Telecoms – Fixed telecoms market review	N/A	FTMR 2021, for 5 years, from 01/04/2021 to 31/03/2026	
Ofgem	Gas & Electricity – Transmission	RIIO-T1, for 8 years, from 01/04/2013 to 31/03/2021	RIIO-T2, for 5 years, from 01/04/2021 to 31/03/2026	
	Gas distribution	RIIO-GD1, for 8 years, from 01/04/2013 to 31/03/2021	RIIO-GD2, for 5 years, from 01/04/2021 to 31/03/2026	
	Electricity distribution	RIIO-ED1, for 8 years, from 01/04/2015 to 31/03/2023	RIIO-ED2, for 5 years, from 01/04/2023 to 31/03/2028	
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	4
	Thames Tideway Tunnel	For 15 years, from 01/01/2015 to 31/12/2029	N/A	4
	Household retail water and wastewater	PR14, 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		5
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 – HS1	CP2, for 5 years, from 01/04/2020 to 31/03/2025	CP3, from 01/04/2025 onwards	6
Utility Regulator	Gas distribution	GD17, for 6 years, from 01/01/2017 to 31/12/2022	GD23, from 01/01/2023 onwards	
	Gas transmission	GT17, for 5 years and 3 months, from 01/10/2017 to 30/09/2022	GT22, from 01/10/2022 onwards	
	Electricity – Northern Ireland Electricity Networks	RP6, For 6 years and 6 months, from 01/10/2017 to 31/03/2024	From 01/04/2024 onwards	
	Water – Northern Ireland Water	PC15, for 6 years, 01/04/2015 – 31/03/2021	PC21, from 01/04/2021 onwards	

Notes to Table 1

1. In April 2018, the CAA decided to put in place an interim price control for HAL (iH7), for a two-year period ending December 2021. No cost of capital has been set for the interim price control as the arrangements were agreed between Heathrow Airport and the main airlines and reviewed by the CAA to consider whether they were in the interests of consumers.
2. For Q6, the CAA proposed a cost of capital that was adopted in setting the fair price benchmark. Gatwick Airport subsequently made price commitments to the airlines, therefore the regulatory arrangements do not require the CAA to decide on the cost of capital.
3. Fixed telecoms market review (FTMR) covers both the wholesale local access and business connectivity markets.
4. 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.
5. The non-household retail market was opened to competition in England on 1 April 2017. Ofwat sets a non-household retail control only for the companies that cannot exit the non-retail market in Wales.
6. HS1 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 HS1 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, also apply to HS1.

4. Recent decisions

Decisions since the last version of the report

4.1 Since the previous annual report, there have been six main price control decisions:

- In August 2019, the CAA published an RPI-Vanilla WACC of 2.68% for National Air Traffic (En Route) Limited (NERL).
- In December 2019, Ofwat made final determinations for PR19, with a CPIH-Vanilla WACC of 2.96% (equivalent to 1.96% in RPI terms with a 100 basis point wedge to RPI).[2]
- In March 2020, the Competition and Markets Authority (CMA) published its provisional findings on the NERL regulatory appeal, setting an RPI-vanilla allowed return of 3.05%. In the final report published in August 2020, the CMA had decided to make only minor adjustments to its provisional findings.
- In July 2020, Ofgem made draft determinations for energy networks, equivalent to an CPIH-Vanilla allowed return on capital of 2.63%. In December 2020, Ofgem made a final determination for GB gas (transmission and distribution) and GB electricity transmission networks for RIIO-2. The equivalent-to CPIH-Vanilla allowed return on capital was 2.81% (for a licensee with 60% gearing), depending on licensee.
- In September 2020, the Utility Regulator made a draft determination for NI Water, equivalent to an RPI-vanilla return on capital of 1.7% (average) over the PC21 period.
- In September 2020, the CMA published the draft decision on the water appeals, which were equivalent to an RPI-vanilla allowed return of 2.57%

4.2 Ofcom consulted in 2020 on proposals for its fixed telecoms market review (FTMR) which will take effect from 1 April 2021 but as a final statement for that review has not yet been issued, the LLCC 2019 is the latest decision from Ofcom presented in this report.

Changes in inflation index used

4.3 Regulators have adopted different approaches as they transition away from RPI over time. Ofwat (for PR19) and Ofgem (for RIIO-2) 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 is phased in from 2020. For Ofgem it is to be implemented immediately at the start of RIIO-2. These decisions, together with the provisional findings of the CMA water appeals, are set out in Table 2.

4.4 Ofcom often determines the allowed return in nominal terms. The CAA decision for NERL and UR decision for NI Water are in RPI terms.

4.5 Table 3 sets out regulators' decision in RPI-real terms, for ease of comparison. This involves conversion of the Ofgem and Ofwat decisions from CPIH-real to RPI-real terms, and of the Ofcom decisions from nominal terms to RPI-real terms, using the regulators' inflation assumptions. No price base conversion is required for the CAA and UR decisions.

Treatment of corporation tax

4.6 Both tables use a simplified approach to corporation tax where the rates used are those stated by each regulator's determination. In

[2] This is appointee level allowed return. The wholesale return is directly comparable with Ofgem/Ofcom allowed returns and is 1.92%. See "PR19 final determinations allowed return on capital technical appendix" December 2019 p 5.

practice, some of the regulators update the corporation tax rate for prevailing rates.

Further notes

4.7 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 and is influenced by a government guarantee. As the Bazalgette allowed return was established as part of a competitive tendering process we have excluded this from the tables below.

4.8 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.[3]'

[3] See ORR "2018 periodic review draft determination Supplementary document – financial framework June 2018". Para 3.34 to 3.35, p 27.

Table 2 Recent Publications in CPIH-real terms

Date	Dec-19	Sep-20	Dec-20
Regulator	Ofwat	CMA	Ofgem
Sector	Water & Wastewater	Water & Wastewater	Gas & Electricity
Price control	PR19	PR19	GD2 & T2
Status	final	provisional	Final
Source	page 4 & 5	page 675	page 24
Allowed Return on debt (pre-tax)	2.14%	2.45%	1.82%
Risk free rate	-1.39%	-0.96%	-1.58%
Equity risk premium	7.89%	7.91%	8.08%
Total market return	6.50%	6.95%	6.50%
Notional equity beta	0.71	0.76	0.759
Debt beta	0.125	0.04	0.075
Asset beta	0.36	0.31	0.349
Cost of equity (pre-tax)	N/A		4.55%
Gap expected vs allowed return	N/A	N/A	0.25%
Allowed return on equity (post-tax)	4.19%	N/A	4.30%
Notional gearing	60%	60%	60%
Tax	17%		
Return on capital (pre-tax)	3.30%		
Return on capital (vanilla)	2.96%	3.50%	2.81%
Retail net margin deduction	0.04%		
WACC (vanilla)	2.92%		
WACC (fully post-tax)	2.74%		
Notes	1	2	3

Notes to Table 2

1. Ofwat "Allowed return on capital technical appendix" PR19, December 2019
2. CMA "Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations, Provisional findings" September 2020
3. Ofgem, RIIO-2 Final determinations – Finance Annex, December 2020. Ofgem cost of capital parameters vary by company and subsector. For the electricity transmission companies notional gearing is set to 55% but allowed return on capital is set to be equal to the level of the notional company at 60%, see page 141. Certain cost of debt and cost of equity parameters are to be updated annually through the period of the RIIO-2 price control to reflect market movements.

TABLE 3 RECENT PUBLICATIONS IN RPI-REAL TERMS ∞

Date	Jun-19	Jun-19	Aug-19	Dec-19	Aug-20	Sep-20	Sep-20	Dec-20
Regulator	Ofcom	Ofcom	CAA	Ofwat	CMA	UR	CMA	Ofgem
Sector	Telecoms	Telecoms	NERL	Water & Wastewater	NERL	Water & Sewerage	Water & Wastewater	Gas & Electricity
Price control	LLCC – Openreach	LLCC – Other UK telecoms	RP3	PR19	RP3	PC21	PR19	GD2 & T2
Status	Final	final	final	final	final	draft	provisional	final
Source	Table A21.1	Table A21.1	page 69	page 4	page 202 (provisional) page 244 (final)	page 16	page 675	page 24
Allowed return on debt (pre-tax)	1.1%	1.2%	0.86%	1.15% ¥	1.21%	0.71% Ω	1.53% ¥	0.999% ¥
Risk free rate	-1.3%	-1.3%	-1.70%	-2.35%	-2.25%	-2.25%	-1.85%	-2.37% ¥
Equity risk premium	7.1%	7.1%	7.1%	7.81%	7.25% to 8.25%	7.75%	7.84%	7.21% ¥ †
Total market return	5.8%	5.8%	5.4%	5.47%	5.00% to 6.00%	5.5%	5.99%	5.64%
Equity beta	0.85	1.02	1.00	0.71	0.71 to 0.86	0.64	0.76	0.759
Debt beta	0.1	0.1	0.10	0.125	0.05		0.04	0.075
Asset beta	0.55	0.65	0.46	0.36	0.52 to 0.62		0.31	0.349
Allowed return on equity (post-tax)	4.7%	5.9%	5.40%	3.18%	2.93% to 4.82%	2.71%	4.14%	3.46% ¥
Gearing	40%	40%	60%	60%	30%	50%	60%	60%
Tax	17%	17%	9.9%	17%			N/A	
WACC (pre-tax)	4.2%	5.1%	2.91%	2.24% ¥	3.48%			
WACC (vanilla)	3.1%	3.9%	2.68%	1.96% ¥	3.05%	1.7% Ω	2.57% ¥	1.98% ¥
Notes	1	1			2			3

∞ Decisions by Ofcom have been converted from nominal terms to RPI-real terms; decisions by Ofgem and Ofwat have been converted from CPIH-real terms to RPI-real terms

¥ Dynamic allowance subject to updates to reflect outturn market data

† Ofgem makes a further adjustment between allowed and expected return of 0.25%. For TMR information see Section 6.4

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

Notes to Table 3

1. 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 2.9% for 2018 and 2.8% for 2019. 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.
2. 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.
3. Ofgem value for allowed return on equity converted from 4.30% CPIH-real to 3.46% RPI using an RPI-CPIH differential of 0.813%. Similarly, the allowed return on debt figure is also converted to RPI using the same approach.

5. Analysis

Inflation

Table 4 Inflation expectations

Date	Jun-19	Aug-19	Dec-19	Aug-20	Sep-20	Sep-20	Dec-20
Regulator	Ofcom	CAA	Ofwat	CMA	UR	CMA	Ofgem
Sector	Telecoms	NERL	Water & Wastewater	NERL	Water & Sewerage	Water & Wastewater	Gas & Electricity
Price control	LLCC	RP3	PR19	RP3	PC21	PR19	GD2 & T2
Status	final	final	final	final §	draft	provisional	final
Source	page 349	page 69	page 9	page 170 (provisional)	page 17	page 674	page 7
Inflation reference	Focus is on CPI indexation except where yields on RPI-index gilts are used to inform the RFR where RPI adjustment is applied	RPI used to estimate debt, equity and RAV values, CPI used to set revenues	RPI & CPI/H used to estimate debt, equity and RAV values	RPI used to estimate debt, equity and RAV values, CPI used to set revenues	RPI	RPI & CPI/H used to estimate debt, equity and RAV values	CPI/H used to estimate debt, equity and RAV values
RPI inflation expectation (source)	2.8% (OBR)	3.0% (various)	3.0% (HMT)	2.78% (HMT)	3.00% (Business Plan) µ	2.9% (OBR)	2.85% (OBR)
CPI/CPIH expectation (source)	1.9% (OBR)	2.0% (various)	2.0% (HMT)			2.0% (Bank of England)	2.02% (OBR)

§ 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 The UR used the NI Water Business Plan assumption for simplicity in its draft determination. The latest forecast will be sourced for the final determination

5.1 Since privatisation, regulators typically estimate the cost of capital in RPI-inflation-adjusted terms (Ofgem, Ofwat, CAA, ORR, UR) with the notable exception being Ofcom, where the cost of capital has generally been estimated in nominal terms. However, RPI is now seen as a less credible measure of inflation. Therefore, a number of regulators have decided to move away from the use of RPI, preferring instead to use alternative measures of inflation, such CPI and CPIH, where possible.[4]

[4] For more detail on inflation issues, including current and proposed use of inflation by regulators, see UKRN paper, "Position paper on the use of inflation indices" published in November 2018.

5.2 Ofcom used RPI expectations to adjust the real risk-free rate (estimated by reference to index-linked gilts based on RPI) into nominal terms. In its 2019 LLCC decision, Ofcom also used forecast CPI to adjust the real Total Market Return (which was estimated on a CPI-real basis) into nominal terms.

5.3 In 2019, Ofgem and Ofwat estimated the cost of capital, and proposed to set the allowed returns, in CPIH terms. In its determinations in 2019, Ofwat implemented a phased transition away from RPI to CPIH from 2020 onwards. Ofgem decided in 2019 to implement an immediate transition for price controls beginning 2021, using either CPI or CPIH for allowed returns. In part, the different approaches reflect the greater share of RPI-linked debt as a proportion of the total outstanding in the water sector.

5.4 The CAA has retained RPI indexation for the RAB for RP3, citing concerns around the limited availability of CPI or CPIH-linked bonds in the current market and the potential for higher costs to customers, but intends to move to CPI (or CPIH) indexation for the RAB in the future.[5]

5.5 The CMA presented its provisional findings in CPIH-real terms, and used inflation estimates to convert the parameters into nominal and RPI-real terms.

[5] See CAA "CAP1758 RP3 Consultation Document". Para 7.5 page 78

Allowed Return on Debt

TABLE 5 DEBT APPROACHES AND ALLOWANCES IN RPI-REAL TERMS

Date	Jun-19	Jun-19	Aug-19	Dec-19	Aug-20	Sep-20	Sep-20	Dec-20
Regulator	Ofcom	Ofcom	CAA	Ofwat	CMA	UR	CMA	Ofgem
Sector	Telecoms	Telecoms	NERL	Water & Wastewater	NERL	Water & Wastewater	Water & Wastewater	Gas & Electricity
Price control	LLCC – Openreach	LLCC – Other UK telecoms	RP3	PR19	RP3	PC21	PR19	GD2 & T2
Status	final	final	final	final	final §	draft	provisional	Final
Source	pages 340 to 349 and pages 367 to 368	pages 340 to 349 and pages 367 to 368	page 69	page 4	pages 162 to 172 (provisional)	page 16	page 675	page 71
Method	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	Fixed allowance based on weighted average, 30% embedded and 70% new debt	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	Fixed annual allowances based on weighted average embedded and new debt.	Allowance partially based on index (new debt) and partially on embedded sector average, adopting a 17% proportion of new debt	Full indexation based on observed outturn market rates
Allowed return on debt (pre-tax)	1.1%	1.2%	0.86%	1.15% ¥	1.21%	0.71% Ω	1.53% ¥	0.999% ¥

¥ 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

5.6 In its 2019 decision Ofcom estimated the cost of new debt by reference to the nominal risk-free rate and a debt premium allowance. The pre-tax nominal allowed return on debt, based on the weighted average of new and existing debt, was 3.9% and 4.0% for Openreach and Other UK telecoms respectively. These values have been deflated using RPI inflation of 2.8%.

5.7 Allowed returns on debt differ because expected costs differ. Firms have different credit ratings and are in different sectors which affects the cost of raising new debt. They also have different amounts of embedded and new debt. They issue debt at different times and with different tenor. In general, allowances have trended downwards over time, reflecting falls in the benchmark borrowing rate for gilts and lower costs for the respective companies. Each regulator also takes into account the quantum of new debt that is likely to be issued in each price control, so that allowances should closely reflect expected costs.

5.8 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. Although Ofcom does not apply a mechanistic update to reflect outturn rates within a price control, to date its price controls have been relatively short (3-year periods) thus reducing forecasting risks. Allowances by Ofgem and Ofwat are cross checked against sector average expected costs, whereas CAA and UR are able to tailor allowances for individual licensees/companies.

5.9 Ofcom & the CAA (NERL) allowances are fixed ex-ante, whereas UR, Ofgem, Ofwat update allowances ex-post to reflect outturn market data.[6] The CAA has indicated it is considering an ex-post approach for future regulation of Heathrow Airport.

[6] For Ofgem this updating occurs on a yearly basis and for Ofwat it is at the end of 5 years.

Risk-free rates

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

Date	Jun-19	Aug-19	Dec-19	Aug-20	Sep-20	Sep-20	Dec-20
Regulator	Ofcom	CAA	Ofwat	CMA	UR	CMA	Ofgem
Sector	Telecoms	NERL	Water & Wastewater	NERL	Water & Sewerage	Water & Wastewater	Gas & Electricity
Price control	LLCC	RP3	PR19	RP3	PC21	PR19	GD2 & T2
Status	final	final	final	final §	draft	provisional	final
Source	pages 323 to 329	page 69	page 4	pages 191 to 197 (provisional)	page 11	page 674	page 26
Method	Historic averages of ten-year index-link gilts and forward rates. Used as an input for debt and equity allowances	Ex-ante fixed allowance using spot plus forecast increase	Ex-ante fixed allowance using spot plus forecast increase	Ex-ante fixed allowance using UK ILG forward curves to adjust spot yields plus forecast increase	Ex-ante allowance based on ILG gilt yields and recent relevant regulatory reviews	Ex-ante fixed allowance using 6-month trail of UK ILG and AAA-rated non-gilt yields, and no adjustments for future spot yield using forward curves	Indexed allowance will update to reflect market rates (working assumption: spot + forward)
Assumed value	-1.3%	-1.70%	-2.35%	-2.25%	-2.25%	-2.25%	-2.37% ¥

¥ 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 risk-free rates can be found in the provisional findings

5.10 Analysis by each regulator is based on long term tenors, with Ofcom placing most weight on 10-year tenors whereas UR, CAA, Ofgem and Ofwat focused on an average of 10-year and 20-year tenors. The CMA used 20-year tenors. In general, analysis is concentrated on RPI-linked gilts. The CMA also used AAA-rated non-gilt yields in its provisional findings for water, though this is the subject of further representations. When forecasting risk-free rates, regulators took account of a range of approaches which include: regulatory precedent (UR), historic averages (Ofcom); real RPI forward curves (CAA, Ofgem, Ofcom, Ofwat); and nominal forward curves (Ofcom).

5.11 Primarily, two factors explain the difference between regulatory assumptions for the risk-free rate: forecast uncertainty, and estimation date. For example, Ofgem's approach of setting an allowance that reflects outturn market rates avoids the need to rely on forecasts. The Ofgem working assumption value is therefore lower than recent assumptions by Ofcom, CAA and Ofwat. However, Ofgem's approach also means that allowances could turn out higher than those set by Ofcom, CAA and Ofwat, should market rates increase substantially over the control period. In effect, Ofgem's approach places interest-rate risk with energy consumers, whereas in the other price controls listed, this risk rests with companies.

5.12 Risk-free rate assumptions have decreased over time, as a reflection of the downward trend in gilt yields and all current regulatory determinations assume negative risk-free rates in RPI terms.

Total Market Return (TMR)

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

Date	Jun-19	Aug-19	Dec-19	Aug-20	Sep-20	Sep-20	Dec-20
Regulator	Ofcom	CAA	Ofwat	CMA	UR	CMA	Ofgem
Sector	Telecoms	NERL	Water & Wastewater	NERL	Water & Sewerage	Water & Wastewater	Gas & Electricity
Price control	LLCC	RP3	PR19	RP3	PC21	PR19	GD2 & T2
Status	final	final	final	final §	draft	provisional	final
Source	pages 329 to 339	page 70	page 4	pages 173 to 190 (provisional)	page 12	page 674	page 24
Considerations	1) historical ex-post, 2) historical ex-ante, 3) forward looking returns (DGM) 4) relationship between TMR and RFR 5) cross-check implied ERP	1) historical averages, 2) forward-looking returns, 3) regulatory precedent 4) investor studies	1) historical averages, 2) forward-looking returns, 3) regulatory precedent 4) investor studies	1) historical averages, 2) regulatory precedent 3) investor studies	1) regulatory precedent	1) historical ex post 2) historical ex ante 3) forward looking approaches (with no weight placed)	1) historical averages, 2) forward-looking returns, 3) regulatory precedent 4) investor studies
Allowance (RPI terms)	5.8%	5.4%	5.47%	5.4%	5.5%	5.99%	5.64%
Allowance (nominal terms) Ω	8.7%	8.6%	8.63%	8.6%		8.89%	8.65%

Ω Using each regulator's relevant inflation forecast at the time of the decision, except for Ofcom, where the allowance is set in nominal terms

§ 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

5.13 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. The table shows a notable decrease in the TMR used in decisions post December 2017. This reflects estimates derived using all three approaches that suggest lower TMRs than those used in previous regulatory publications. It also reflects the recommendation that regulators received in a 2018 from a report by academics and practitioners, commissioned by the UKRN Cost of Capital Working

Group, that current evidence would support a TMR between 6 and 7 per cent in CPI terms.[7] One of the lead authors, professor Stephen Wright of Birkbeck College, confirmed that the study recommendations (page E-125) can be interpreted as a range of 5 to 6 per cent in RPI terms.[8] Subsequently, in December 2018 Ofgem published a reconciliation of this advice to previous advice that UK regulators received in 2003.[9]

5.14 When interpreting this table, a degree of caution is required in terms of the comparability of TMR estimates across regulators and across time. For example, regulators have used slightly different inflation assumptions to derive their RPI-based estimates of the TMR. In addition, changes to the ONS's approach to measuring inflation in 2010 have also led to a step change increase in the difference arising from the RPI-CPI formula effect, meaning that pre-2010 RPI-deflated returns data should not be used to derive historical ex-post or ex-ante estimates of the TMR without applying an adjustment factor to reflect this change.

5.15 While there may be some differences in precise emphasis, regulators are increasingly aligned that it is appropriate to consider a mix of historical and forward-looking evidence to estimate the TMR and not to rely solely on historical evidence. We note that the CMA, in its provisional findings on the Water appeals, chose to place no weight on forward-looking dividend discount/growth models due to their sensitivity to the assumptions made.

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7 See "Estimating the cost of capital for implementation of price controls by UK Regulators" March 2018

8 See "Estimating the cost of capital for implementation of price controls by UK Regulators" March 2018

9 See page 84 to 91, "RIIO-2 Sector Specific Methodology Annex: Finance" December 2018

Equity beta, debt beta and asset beta

TABLE 8 BETAS: APPROACHES AND ASSUMPTIONS

Date	Jun-19	Jun-19	Aug-19	Dec-19	Aug-20	Sep-20	Sep-20	Dec-20
Regulator	Ofcom	Ofcom	CAA	Ofwat	CMA	UR	CMA	Ofgem
Sector	Telecoms	Telecoms	NERL	Water & Wastewater	NERL	Water & Sewerage	Water & Wastewater	Gas & Electricity
Price control	LLCC – Openreach	LLCC – Other UK telecoms	RP3	PR19	RP3	PC21	PR19	GD2 & T2
Status	Final	final	final	final	final §	draft	provisional	final
Source	pages 363 to 364	pages 364 to 367	page 70	page 4	pages 130 to 161 (provisional)	page 6	page 674	page 24
Primary proxies	BT Group, utilities	BT Group, UK and European telecoms	ENAV, airports and utilities	SVT, UU	Large European airports, ENAV, airlines,	SVT, UU	SVT, UU	NG, PNN, SVT, UU
Primary estimation window & frequency (Raw equity beta)	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, domestic (e.g. FTSE MIB for Italy) & European indices (Stoxx Europe 600)	2-year rolling window (and placing some weight on 5-year as well), daily data FTSE All Share index	2- and 5-year, current and 1-, 2- and 5-year rolling windows, daily and weekly Eurostoxx 600 international index	2-year rolling window, daily data	2-, 5- and 10-year daily, weekly and monthly spot and rolling averages of FTSE data	5-year and 17.5-year windows, daily data FTSE All Share index
Notable methods	Midpoint of the range 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)	ENAV asset beta within bounds of utility and airport comparators	Enterprise value gearing to degear. 2-year betas. GARCH estimates are similar but less volatile than OLS	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		Enterprise value gearing to degear. Less emphasis on monthly data due to outliers, OLS estimation	Enterprise value gearing to degear. Market value of debt used.
Debt beta	0.1	0.1	0.10	0.125	0.05		0.04	0.075
Asset beta	0.55	0.65	0.46	0.36	0.5 - 0.6		0.31	0.349
Notional gearing	40%	40%	60%	60%	30%	50%	60%	60%
Notional equity betas	0.85	1.02	1.00	0.71	0.71 to 0.86	0.64	0.76	0.759

¥ mid-point taken of Ofgem working assumption range

§ 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

5.16 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: i) operate non-price-control activities/businesses and/or ii) be exposed to different levels of gearing/financial-risk.

5.17 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.

5.18 Most regulators, except for Ofgem, focus on 2-year or 5-year estimation windows using daily data. Only one regulator, Ofcom, estimates asset betas for regulated services using a disaggregation approach. Ofcom splits the BT Group asset beta into three lines of business by reference to benchmark companies and estimates of the asset weights associated with each group. Two regulators, CAA and Ofcom, use asset betas for non-UK companies to inform asset betas for regulated services, due to the limited number of UK listed stocks relevant to these sectors. All regulators have tended to focus on Ordinary Least Squares (OLS) estimation techniques although Ofwat and Ofgem have considered GARCH analysis[10]

5.19 Ofgem made one further adjustment at the sector specific methodology decision (SSMD) stage.[11] Ofgem de-levered and re-levered with reference to EV to RAV ratios gearing.[12] However at Draft Determination stage, Ofgem decided not to continue with this approach.[13]

5.20 Differences between sectors primarily reflect the different systematic risks faced by companies in each regulated sector. For example, companies regulated by the CAA face volume risks whereas Ofgem's and Ofwat's regulated companies generally do not. Asset beta estimations can also differ due to: i) differences in systematic risk between sectors, ii) different estimation windows, iii) different assumptions for debt beta, and iv) different estimates of actual gearing. Ofgem considers the effects of adjusting the gearing (taken on an enterprise value basis) to reflect the market value of debt. Differences in notional gearing also impact on notional equity beta estimates.

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10 See "Estimating β" Apr 2018 by Dr Donald Robertson. "Ofgem Beta Study – RIIO-2 Main Report" Dec 2018 report by Indepen. p 10 Section 2.3. The Ordinary Least Squares regression technique does not capture the time-varying properties within data. GARCH, or Generalized AutoRegressive Conditional Heteroscedasticity, is one technique used for analysing data with this property. Financial market data often has time varying properties.

11 See "Ofgem Beta Study – RIIO-2" Dec 2018

12 See "RIIO-2 Sector Specific Methodology Decision – Finance" May 2019

13 See "RIIO-2 Draft Determinations – Finance p. 48" July 2020

Appendix 1. 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	5 (Note 1)	9 (Note 2)	17 (Note 2)	19 (Note 3)	2 (Note 4)	1	2	4
Primary legislation	Transport Act 2000	Civil Aviation Act 2012	Communications Act 2003	Gas Act 1986	Electricity Act 1989	Water Industry Act 1991 as amended	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…'	4 primary and 5 secondary duties	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 communi-cation matters and to further the interests of consumers in relevant markets where appropriate by promoting competition	Further the principal objective: – the shipping, transportation or supply of gas conveyed through pipes; – the generation, transmission, distribution or supply of electricity; – and the provision or use of electricity interconnectors… where appropriate by promoting effective competition		Secure that the functions of each undertaker are properly carried out Secure that they are able to finance their functions, in particular by securing reasonable returns on their capital Protect the interests of consumers, wherever appropriate by promoting competition Securing the long-term resilience of water supply and wastewater systems and that undertakers take steps to enable them, in the long term, to meet the need for water supplies and wastewater services	No primacy within ORR's duties	Protection of consumer interests (wherever appropriate by facilitating effective competition) Ensuring undertakers are able to finance their functions Ensuring undertakers carry out their functions properly as respects every area of Northern Ireland	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	Principal objective is to promote the development and maintenance of an efficient, economic and coordinated gas industry in Northern Ireland 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 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

NOTES TO TABLE 9

1. 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 license holders referred to are the 11 regional companies that provide both water and sewerage services and the 6 regional companies that provide water services only. Each of these companies is subject to the full period review price determinations process. Ofwat also regulates, albeit with a lighter process, 6 local companies providing either water or sewerage services or both; and 7 water supply licensees offering water services to large use customers. Ofwat also regulate the infrastructure provider in connection with the Thames Tideway Tunnel.
4. ORR: As well as Network Rail, ORR conducts a periodic review of HS1 Ltd.'s charges. HS1 is a concession that is subject to a different regulatory framework. In particular, it is not in the scope of HS1's price control to calculate a return to shareholders as part of the revenue requirement calculation, therefore HS1 is not included in this document. Nevertheless, some of the issues involved with calculating a cost of capital do apply to HS1.

Appendix 2. Ring Fencing

Table 10 Summary of each regulator's ring-fencing provisions [1]

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

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

where

$cost\ of\ debt$ = pre-tax cost of debt
$cost\ of\ equity$ = post-tax cost of equity
t = tax rate
$$gearing = \frac{Debt}{Debt + Equity}$$

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

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

where

$cost\ of\ debt$ = pre-tax cost of debt
$cost\ of\ equity$ = post-tax cost of equity
$$gearing = \frac{Debt}{Debt + Equity}$$

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

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

where

$cost\ of\ debt$ = pre-tax cost of debt
$cost\ of\ equity$ = post-tax cost of equity
t = tax rate
$$gearing = \frac{Debt}{Debt + Equity}$$

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: Report on WACC/Cost of Capital (April 2020)

PwC: Estimating the cost of capital for H7 and RP3 (August 2019)

Ofcom:

NERA: Cost of Capital: Beta and Gearing for the 2019 BCMR – Update (May 2019)

Europe Economic: Comments on BT's response to the BCMR consultation in relation to WACC market parameters (May 2019)

Europe Economics: Cost of Capital: Total Market Return (November 2018)

Ofgem:

CEPA: ESO Returns (July 2020)

Prof A. Smith: Alternative Methodologies Annex (March 2020)

CEPA: MAR (July 2020)

CEPA: Prior Year Adjustments (July 2020)

CEPA: Beta Estimation Issues Annex ((July 2020))

D. Robertson: Re-estimating Beta Annex (June 2020)

Ofwat:

Europe Economics: The Allowed Return on Capital for the Water Sector at PR19 – Final Advice (December 2019)

Europe Economics: The Cost of Capital for the Water Sector at PR19 (July 2019)

PwC: Updated Dividend Discount Model analysis for PR19 (July 2019)

Utility Regulator:

First Economics: PC21: NI Water's Costs of Capital (March 2020)

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 2019 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 on p.24	Page 1	page 491	e.g. p.44	e.g. p.44	e.g. p.151	p.13-38	Table A14.1 'Openreach'	Table A14.1 'Rest of BT'	p. 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 11 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 53
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	8	8	

¥ Dynamic allowance subject to updates to reflect outturn market data

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

Date	May-19	Jul-19
Regulator	Ofgem	Ofwat
Sector	Gas & Electricity	Water & Wastewater
Price control	GD2 & T2 (methodology)	PR19
Status	initial	draft
Source	page 121 & 122	page 5
Allowed return on debt (pre-tax)	0.87% ¥	1.34% ¥
Risk free rate	-1.78% ¥	-1.42%
Equity risk premium	7.28% ¥ §	6.88%
Total market return	5.5%	5.47%
Equity beta	0.75	0.71
Debt beta	0.125	0.125
Asset beta	0.38	0.36
Allowed return on equity (post-tax)	3.2% ¥	3.46%
Gearing	60%	60%
Tax	17%	17%
WACC (pre-tax)	2.08% ¥	2.47% ¥
WACC (vanilla)	1.81% ¥	2.19% ¥
Notes	9	

¥ 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. Ofcom also publish and apply WACC in pre-tax terms, however, unlike other regulators, Ofcom account for tax in nominal terms by grossing up the nominal cost of equity. In addition to WACC for charge controls, Ofcom also considers WACC for other issues, such as in considering Royal Mail's financial viability and 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.
8. 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 2.9% for 2018. 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.
9. Ofgem value for allowed return on equity converted from 4.3% CPIH-real to 3.2% RPI using an RPI-CPIH differential of 1.049%. Similarly, the allowed return on debt figure is also converted to RPI using the same approach.