



Cost of Capital – Annual Update Report

Information Paper

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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 Principles¹ to ensure continued collaboration on cost of capital issues. We have identified a number of ways we intend to continue to collaborate in the future². Regulators have committed to producing and publishing an annual update³ 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)
- Legal Services Board (LSB)
- Information Commissioner's Office (ICO)

The CMA participates as an observer.

¹ UKRN Cost of Capital Principles – <http://www.ukrn.org.uk/wp-content/uploads/2016/07/2016MarCoC-Principles.pdf>

² UKRN Cost of Capital collaborative working – <http://www.ukrn.org.uk/wp-content/uploads/2016/07/2016MarCoC-CollaborativeWorking.pdf>

³ UKRN also published a similar refresh paper in June 2017 – [Cost of Capital – Annual Update Report](#), and in June 2018 – [Cost of Capital – Annual Update Report](#)



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.



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Foreword from Jonathan Oxley, UKRN CEO



Welcome to the 2019 annual UKRN cost of capital report. While 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. In assessing whether a business is and will remain financeable in delivering its regulated functions the cost of capital forms a key component of regulators' price control work.

This paper provides a summary of the most recent cost of capital decisions and analysis by each regulator, providing 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. This report does not cover any regulator consultations or decisions published after July 2019.

The report is the product of the UKRN's cost of capital network. The network brings together specialists from across UKRN members to share expertise and best practice, and to develop shared approaches where appropriate. This report is just one example of that collaboration. In the coming months we will also be publishing joint work on debt betas, running shared cost of capital training programmes and exploring other ways in which we can analyse issues together, with a view to developing shared positions and approaches. I am grateful to the cost of capital network for the hard work that went into this report and for their continued collaborative efforts across these issues.

Price controls are an important tool for regulators to deliver for current consumers, ensuring prices provide value for money and quality of service meets consumer needs, and that consumers in vulnerable circumstances receive the support they need. They are also the way regulators deliver for future consumers, ensuring the UK's infrastructure has the investment it needs to tackle big challenges like climate change, population growth and digital transformation. The cost of capital is an important input into these price control decisions, helping ensure companies have an incentive to invest and the opportunity to earn a fair return on those investments.

To do this successfully regulators need to gather evidence and apply high quality analysis, of the sort evidenced in this report. We need to reach out to a wide range of stakeholders, including investors, regulated companies and consumer representatives, to understand their views. And we need to exercise judgement, often in the context of considerable uncertainty. There is debate about where the balance of those judgements should fall, and differences in the regulatory frameworks and risks between each sector mean that there will be differences in the cost of capital estimates between each sector. However, we are focused on getting the best possible deal for current consumers while maintaining incentives to invest and securing the financeability of long-lived infrastructure that will meet the needs of future consumers. Setting an appropriate cost of capital supports these objectives by ensuring consumers don't pay more than necessary to ensure regulated companies continue to invest.

We will continue to learn from past experience and from each other to refine and improve our approach to setting the cost of capital, as well as more broadly ensuring the process of setting price controls benefits both current and future consumers. The collaboration that takes place through the UKRN is central to this learning and I look forward to continuing our collective journey.

Jonathan Oxley, Chief Executive, UKRN

I. Summary

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

- 1.1 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.
- 1.2 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.
- 1.3 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.
- 1.4 In 2018, regulators received advice as part of a joint study.⁴ One recommendation from that study was to clarify the terminology used for the Weighted Average Cost of Capital (WACC) and allowed returns, as follows:

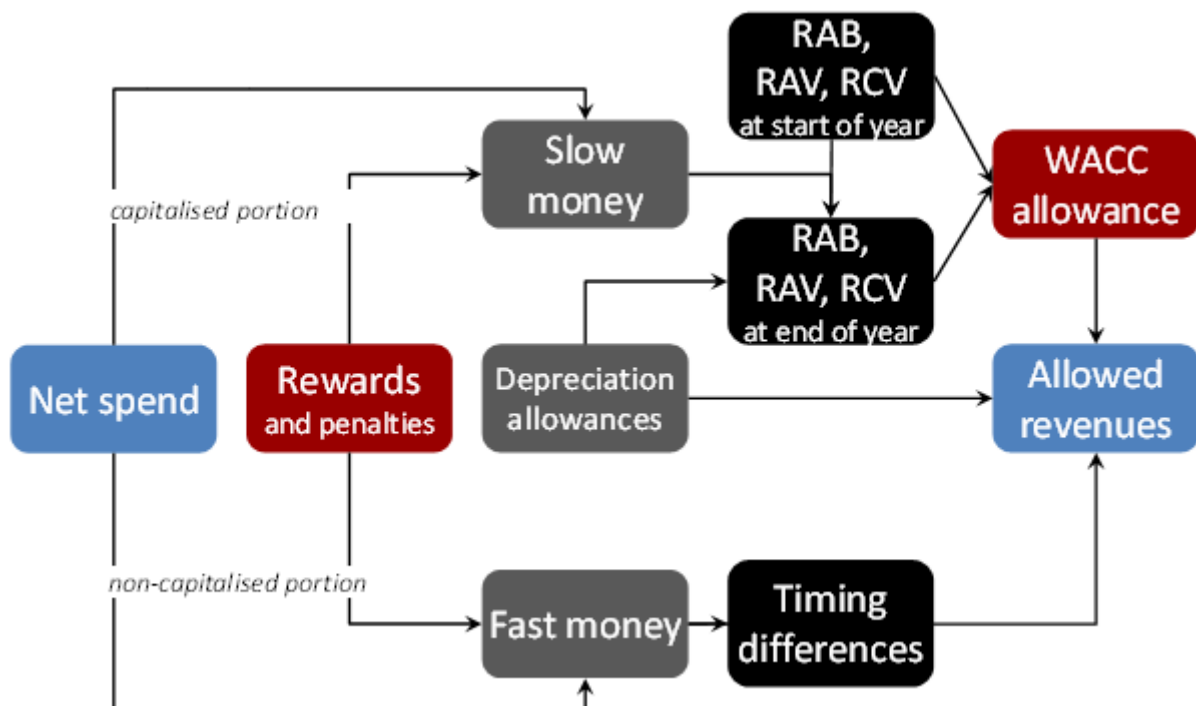
“Recommendation 10 (The CAPM-WACC Methodology): The term “WACC” should be restricted to the concept of an expected market return on capital of a given degree of systematic risk. It should not be used to refer to an allowed return.”
- 1.5 Setting the level of the cost of capital is a matter of judgement 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). 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.
- 1.6 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.
- 1.7 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.

⁴ See page 11 “[Estimating the cost of capital for implementation of price controls by UK Regulators](#)” March 2018

2. Estimating the cost of capital to determine allowed returns

Broad Approach

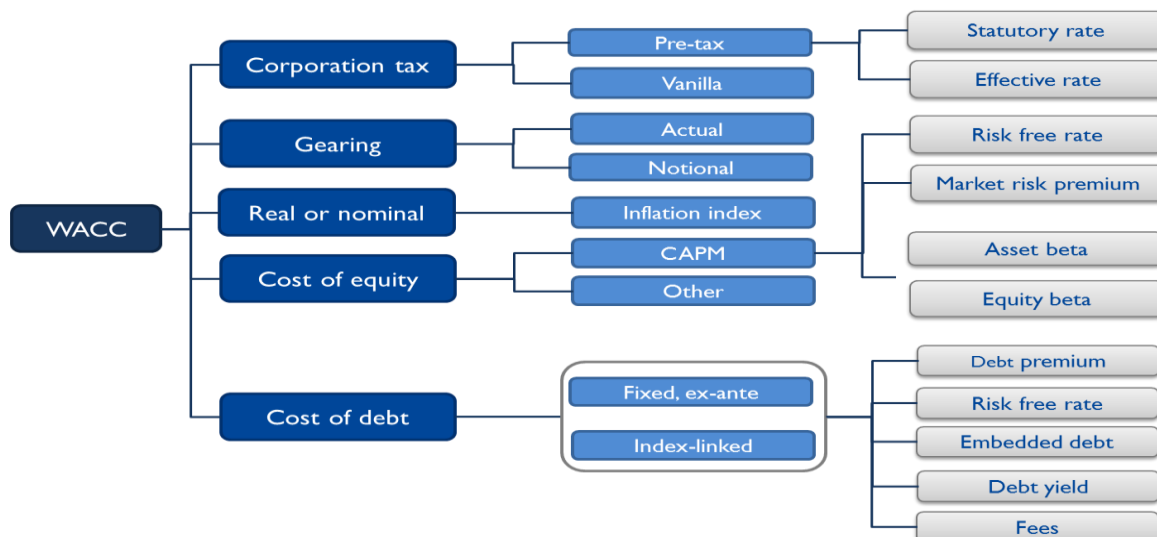
- 2.1 Whilst there are some differences in each regulator’s duties (as set out in Appendix I) we each estimate the cost of capital to inform decisions on price controls for business activities we regulate. The approaches we take in estimating the cost of capital, and determining allowed returns, are 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.
- 2.2 The classic building block diagram of how price controls work and where the allowed return on capital fits in is set out below.⁵



- 2.3 All regulators adopt a weighted average approach, when estimating the WACC to reflect the proportion of debt and equity financing.
- 2.4 The WACC and allowed return are set by most regulators for a notional company or licensee. This is usually by way of a notional gearing assumption which may be different to the actual gearing of the regulated company or its group.

⁵ Some regulators use the terms capex (for slow money) and opex (for fast money).

2.5 The diagram below depicts ‘standard’ component analysis undertaken by regulators when estimating the cost of capital, and therefore when determining the allowed return. Regulators will typically analyse each of the 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.



2.6 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.

2.7 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.

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

Principal controls for which a cost of capital is estimated

2.9 The table below highlights the duration of current/upcoming price controls.

Regulator	Sector	Principal price control	Duration	Dates	Notes
CAA	Airports	Q6 – Heathrow	5 years and 9 months	2014-19	1
	Airports	Q6 – Gatwick	7 years	2014-21	2
	Air traffic control	RP2 – NATS (En Route) plc (NERL)	5 years	2015-19	
	Airports	iH7 – Heathrow	2 years	2020-21	3
	Air traffic control	RP3 – NATS (En Route) plc (NERL)	5 years	2020-24	
Ofcom	Telecoms	Leased lines charge control 2019 (LLCC)	2 years	2019-21	
	Telecoms	Mobile call termination 2018 (MCT)	3 years	2018-21	
	Telecoms	Wholesale local access 2018 (WLA)	3 years	2018-21	
	Telecoms	Wholesale voice calls and interconnection 2017	3 years and 3 months	2018-21	
Ofgem	Gas & Electricity	RIIO-T1 – Transmission	8 years	2013-21	
	Gas	RIIO-GD1 – Gas distribution	8 years	2013-21	
	Electricity	RIIO-ED1 – Electricity distribution	8 years	2015-23	
	Gas & Electricity	RIIO-T2 – Transmission	5 years	2021-26	
	Gas	RIIO-GD2 – Gas distribution	5 years	2021-26	
Ofwat	Water & wastewater	PR14 – wholesale water, and wholesale wastewater	5 years	2015-20	
	Water & wastewater	PR14 – Thames Tideway	5 years	2015-20	4
	Water & wastewater	PR14 – household retail	5 years	2015-20	
	Water & wastewater	PR16 – non-household retail	3 years	2017-20	5
	Water & wastewater	Thames Tideway Tunnel	15 years	2015-30	4
	Water & wastewater	PR19 – wholesale water, and wholesale wastewater	5 years	2021-25	
ORR	Rail network	CP5 – Network Rail	5 years	2014-19	
	High speed rail	CP2 – HSI	5 years	2015-20	6
Utility Regulator	Gas	GD17	6 years	2017-22	
	Electricity	RP6	6 years and 6 months	2017-24	
	Water	PCI5	6 years	2015-2021	



Notes

1. In December 2016, the CAA extended the current price control for Heathrow for one year, from 4 years and 9 months to 5 years and 9 months, ending December 2019.
2. For Q6, the CAA proposed a cost of capital, which 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 make a decision on the cost of capital.
3. 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.
4. At PR14 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 current PR16 control applies to those companies which have not exited the market. The non-household retail market was opened to competition in England on 1 April 2017. Therefore, in future, Ofwat will only be setting a non-household retail control in Wales and for those companies in England which have not exited.
6. 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, also apply to HSI.

3. Recent decisions

- 3.1 The most recent decisions made by each of the regulators, and any subsequent decisions by the Competition and Markets Authority (CMA) are set out in the table on pages 13-14. Two points to note in the table:
- Ofcom often determines the allowed return in nominal terms, therefore, for ease of comparison, the table presents Ofcom’s decisions in RPI-real terms.
 - The table uses 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.
- 3.2 In August 2015, Ofwat accepted for the construction phase of the Thames Tideway Tunnel project an allowed return on capital of 2.497% (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 table below
- 3.3 Since the previous annual report, and excluding ORR’s decisions in October 2018 for Network Rail, there have been four main price control decisions:
- In February 2019, the CAA proposed initial determinations for NERL, publishing an RPI-Vanilla allowed return on capital of 2.57%.
 - In May 2019, Ofgem published its working assumption for energy networks, equivalent to an RPI-Vanilla allowed return on capital of 1.81%.
 - In June 2019, Ofcom published its final statement on its business connectivity market review. In setting prices for the Openreach dark fibre inter-exchange product, Ofcom used a pre-tax nominal WACC of 7.1%, equivalent to an RPI-deflated vanilla WACC of 3.1%.
 - In July 2019, Ofwat made draft determinations for PR19, equivalent to an RPI-Vanilla allowed return of 2.19%.⁶
- 3.4 Regulators have taken decisions with regard to the inflation index used going forward. Ofwat (for PR19) and Ofgem (for RIIO-2) have decided to transition to CPIH – an ONS measure of consumer price inflation including housing costs. 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. 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

⁶ This is appointee level allowed return. The wholesale return is directly comparable with Ofgem/Ofcom allowed returns and is 2.08%. See “[PR19 draft determinations Cost of capital technical appendix](#)” July 2019 p 5.



Rail's RAB value will not be used in revenue requirement calculations in CP6. They will review this issue if there are changes to Network Rail's status or funding arrangements in the future.⁷

3.5 Reports commissioned by regulators are set out in Appendix 4.

⁷ See ORR "[2018 periodic review draft determination Supplementary document – financial framework June 2018](#)". Para 3.34 to 3.35, p 27.

Recent publications from 2016 to 2019 in RPI terms

Date	Sep-16	Sep-16	Jun-17	Jun-17	Mar-18	Mar-18	Feb-19	May-19	Jun-19	Jun-19	Jul-19
Regulator	UR	UR	CMA	UR	Ofcom	Ofcom	CAA	Ofgem	Ofcom	Ofcom	Ofwat
Sector	Gas	Gas	Gas	Electricity	Telecoms	Telecoms	NERL	Gas & Electricity	Telecoms	Telecoms	Water & Wastewater
Price control	GD17 – PNGL	GD17 – FE	GD17 – FE	RP6 – NIEN	WLA – Openreach Copper ⁸	WLA – Other UK telecoms ⁹	RP3 (initial)	GD2 & T2 (methodology)	LLCC – Openreach	LLCC – Other UK telecoms	PR19 (initial)
Status	final	final	final	final	final	final	initial	initial	final	final	draft
Source	See Table 192	See Table 192	See page 172	See here Table 81	See Table A20.1	See Table A20.1	See page 53	See page 121 & 122	See Table A21.1	See Table A21.1	See page 5
Allowed Return on Debt (pre-tax)	2.36% [‡]	2.45% [‡]	n/a	1.63% [‡]	1.00%	1.10%	0.86%	0.87% [‡]	1.1%	1.2%	1.34% [‡]
Risk free rate	1.25%	1.25%	n/a	1.25%	0.00%	0.00%	-1.40%	-1.78% [‡]	-1.3%	-1.3%	-1.42%
Equity risk premium	5.25%	5.25%	n/a	5.25%	6.1%	6.1%	6.80%	7.28% ^{‡§}	7.1%	7.1%	6.88%
Total market return	6.50%	6.50%	n/a	6.50%	6.1%	6.1%	5.4%	5.5%	5.8%	5.8%	5.4%
Equity beta	0.77	0.77	n/a	0.61	0.80	1.00	0.96	0.75	0.85	1.02	0.71

⁸ Openreach is referred to as OR in further tables in this document.

⁹ Other UK telecoms is referred to as OUT in further tables in this document.

Date	Sep-16	Sep-16	Jun-17	Jun-17	Mar-18	Mar-18	Feb-19	May-19	Jun-19	Jun-19	Jul-19
Regulator	UR	UR	CMA	UR	Ofcom	Ofcom	CAA	Ofgem	Ofcom	Ofcom	Ofwat
Sector	Gas	Gas	Gas	Electricity	Telecoms	Telecoms	NERL	Gas & Electricity	Telecoms	Telecoms	Water & Wastewater
Price control	GD17 – PNGL	GD17 – FE	GD17 – FE	RP6 – NIEN	WLA – Openreach Copper ⁸	WLA – Other UK telecoms ⁹	RP3 (initial)	GD2 & T2 (methodology)	LLCC – Openreach	LLCC – Other UK telecoms	PR19 (initial)
Status	final	final	final	final	final	final	initial	initial	final	final	draft
Source	See Table 192	See Table 192	See page 172	See here Table 81	See Table A20.1	See Table A20.1	See page 53	See page 121 & 122	See Table A21.1	See Table A21.1	See page 5
Debt beta	0.1	0.1	0.1	0.1	0.1	0.1	0.13	0.125	0.1	0.1	0.125
Asset beta	0.40	0.40	0.40	0.38	0.59	0.73	0.46	0.38	0.55	0.65	0.36
Allowed Return on Equity (post-tax)	5.3%	5.28%	n/a	4.45%	4.9%	6.1%	5.13%	3.2% [‡]	4.7%	5.9%	3.46%
Gearing	55%	55%	n/a	45%	30%	30%	60%	60%	40%	40%	60%
Tax	20%	20%	n/a	20%	17%	17%	11.7%	17%	17%	17%	17%
Allowed Return on Capital (pre-tax)	4.26% [‡]	4.32% [‡]	n/a	3.80% [‡]	4.8%	5.90%	2.84%	2.08% [‡]	4.2%	5.1%	2.47% [‡]
Allowed Return on Capital (Vanilla)	3.67% [‡]	3.72% [‡]	n/a	3.18% [‡]	3.7%	4.6%	2.57%	1.81% [‡]	3.1%	3.9%	2.19% [‡]
Notes	2	2, 3	2,3	2				4			

[‡] Dynamic allowance subject to updates to reflect outturn market data

[§] Ofgem makes a further adjustment between allowed and expected return of 0.5%. For TMR information see Section 4.

Notes

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. 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.
3. 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.
4. 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.

Recent Publications using CPIH

Date	May-19	Jul-19
Regulator	Ofgem	Ofwat
Sector	Gas & Electricity	Water & wastewater
Price control	GD2 & T2	PR19
Status	Strategy	Draft determination
Source	See page 121 & 122	See page 4 & 5
Allowed return on debt (pre-tax)	1.93%	2.33%
Risk free rate	-0.96%	-0.45%
Equity risk premium	7.46%	6.95%
Total Market Return	6.5%	6.5%
Notional Equity beta	0.75	0.71
Debt beta	0.125	0.125
Asset beta	0.38	0.36
Cost of equity (pre-tax)	4.80%	4.47%
Gap expected v. allowed return	0.50%	N/A
Allowed return on equity	4.30%	N/A
Notional Gearing	60%	60%
Tax	17%	17%
Return on Capital (pre-tax)	3.23%	3.55%
Return on Capital (Vanilla)	2.88%	3.19%
Retail net margin deduction	N/A	0.11%
Wholesale WACC (Vanilla)	N/A	3.08%
WACC (fully post-tax)	2.68%	2.95%
Notes:	1	2
1. Ofgem " RIIO-2 Sector Specific Methodology Decision " May 2019		
2. Ofwat " Cost of capital technical appendix " PR19 July 2019		

4. Analysis

Inflation

4.1 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 increasingly 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 as CPI and CPIH, where possible.¹⁰

4.2 The table below summarises the approach taken in the most recent price control decisions.

Date	Sep-16	Sep-16	Jun-17	Mar-18	Feb-19	May-19	Jun-19	Jul-19
Regulator	UR	UR	UR	Ofcom	CAA	Ofgem	Ofcom	Ofwat
Sector	Gas	Gas	Electricity	Telecoms	NERL	Gas & Electricity	Telecoms	Water & wastewater
Price control	GD17 – PNGL	GD17 – FE	RP6 – NIEN	WLA -OR copper and OUT	RP3	GD2 & T2 (methodology)	LLCC	PR19
Status	final	final	final	final	Initial	initial	final	draft
Source	See page 281	See page 281	See page 225	See page 75	See page 53	See page 7	See page 349	See page 10
Inflation reference	RPI used to estimate debt, equity and RAV values	RPI used to estimate debt, equity and RAV values	RPI used to estimate debt, equity and RAV values	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	CPI/H used to estimate debt, equity and RAV values	Focus is on CPI indexation except where yields on RPI-index gilts are used to inform the RFR where RPI adjustment is applied	RPI & CPI/H used to estimate debt, equity and RAV values
RPI inflation expectation (source)	3.07% (OBR)	3.07% (OBR)	3.3%	2.9% (OBR)	3.0% (various)	3.07% (OBR)	2.8% (OBR)	3.0% (OBR)
CPI/CPIH expectation (source)	n/a	n/a	n/a	n/a	2.0% (various)	2.0% (OBR)	1.9% (OBR)	2.0% (Bank of England)

¹⁰ 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.

Inflation expectations used in cost of capital decisions, 2016 to 2019

- 4.3 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.
- 4.4 In 2019, Ofgem and Ofwat estimated the cost of capital, and proposed to set the allowed returns, in CPIH terms. Ofwat decided in 2017 to implement 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.
- 4.5 The CAA has retained RPI indexation for the regulatory asset base (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.¹¹

Allowed Return on Debt

- 4.6 The table below summarises the approach taken in the most recent price control decisions.

Debt approaches and allowances (RPI terms), 2016 to 2019

Date	Sep-16	Sep-16	Jun-17	Mar-18	Mar-18	Feb-19	May-19	Jun-19	Jun-19	Jul-19
Regulator	UR	UR	UR	Ofcom	Ofcom	CAA	Ofgem	Ofcom	Ofcom	Ofwat
Sector	Gas	Gas	Electricity	Telecoms	Telecoms	NERL	Gas & Electricity	Telecoms	Telecoms	Water & wastewater
Price control	GD17 – PNGL	GD17 – FE	RP6 - NIEN	WLA -OR copper	WLA-OUT	RP3	GD2 & T2 (methodology)	LLCC-OR	LLCC-OUT	PR19
Status	final	final	final	final	final	initial	initial	Final	final	draft
Source	See here	See here	See here	See pages 87 to 136 and pages 136 to 139	See pages 87 to 136 and pages 136 to 139	See page 53	See page 121 & 122	See pages 340 to 349 and pages 367 to 368	See pages 340 to 349 and pages 367 to 368	See page 5
Method	Ex-post true-up to reflect debt timing and tenor. Company exposed	Ex-post true-up to reflect debt timing and tenor. Company exposed	Ex-post true-up to reflect debt timing and tenor. Company exposed	Fixed allowance: Risk-free plus risk-premium with a cross check against weighted average of embedded and	Fixed allowance: Risk-free plus risk-premium with a cross check against weighted average of embedded and UK telecoms	Fixed allowance based on weighted average, 30% embedded and	Full indexation based on observed outturn market rates	Fixed allowance based on a weighted average of embedded and new debt. Openreach	Fixed allowance based on a weighted average of embedded and new debt.	Allowance partially based on index (new debt) and partially on embedded

¹¹ See CAA “[CAPI758 RP3 Consultation Document](#)”. Para 7.5 page 78

	to 20% of variance	to 20% of variance	to 20% of variance	new debt. Openreach cost of debt set 0.1 percentage points lower than BT Group to reflect lower systematic risk.	cost of debt set equal to BT Group cost of debt	70% new debt	cost of debt set 0.1 percentage points lower than BT Group to reflect lower systematic risk	Other UK telecoms cost of debt set equal to BT Group cost of debt	sector average	
Allowed return on debt (pre-tax)	2.36% [¥]	2.45% [¥]	1.63% [¥]	1.00%	1.10%	0.86%	0.87% [¥]	1.1%	1.2%	1.34% [¥]

[¥] Dynamic allowance subject to updates to reflect outturn market data

Notes

1. 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%.
2. 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.
3. The common principle, to reflect efficient costs, is achieved using various methods, including the use of relevant market benchmarks and 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 reflect sector average expected costs, whereas CAA and UR have the ability to tailor allowances for individual licensees/companies.
4. Ofcom & CAA (NERL) allowances are fixed ex-ante, whereas UR, Ofgem & Ofwat update allowances ex-post to reflect outturn market data.¹² CAA has indicated it is considering an ex-post approach for future regulation of Heathrow Airport.

¹² For Ofgem this updating occurs on a yearly basis and for Ofwat it is at the end of 5 years.

Risk-free rates

4.7 The table below summarises the approach taken, and the values assumed, in the most recent price control decisions.

Risk-free rates: approaches and estimates (RPI terms), 2016 to 2019

Date	Sep-16	Sep-16	Jun-17	Mar-18	Feb-19	May-19	Jun-19	Jul-19
Regulator	UR	UR	UR	Ofcom	CAA	Ofgem	Ofcom	Ofwat
Sector	Gas	Gas	Electricity	Telecoms	NERL	Gas & Electricity	Telecoms	Water & wastewater
Price control	GD17 – PNGL	GD17 – FE	RP6 - NIEN	WLA- OR copper and OUT	RP3 (initial)	GD2 & T2 (methodology – draft determination)	LLCC – OR and OUT	PR19 (draft)
Status	final	final	final	final	initial	initial	final	draft
Source	See page 277	See page 277	See page 222	See pages 79 to 87	See page 53	See page 121 & 122	See pages 323 to 329	See page 5
Method	Regulatory precedent	Regulatory precedent	Regulatory precedent	Historic averages. Used as an input for debt and equity allowances	Ex-ante fixed allowance using spot plus forecast increase	Indexed allowance will update to reflect market rates (working assumption: spot + forward)	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
Assumed value	1.25%	1.25%	1.25%	0.00%	-1.40%	-1.78% ¥	-1.3%	-1.42%

¥ Dynamic allowance, subject to updates to reflect outturn market data

4.8 Analysis by each regulator is based on long term tenors, with Ofcom focusing on 10-year tenors whereas UR, CAA, Ofgem and Ofwat focused on an average of 10-year and 20-year tenors. In general, analysis is concentrated on RPI-linked gilts (Ofcom, CAA, UR and Ofgem) although Ofwat focused on nominal gilts, which were then adjusted for term premium and inflation forecasts. Regulators took account of a range of approaches when forecasting risk-free rates, which include: regulatory precedent (UR), historic averages (Ofcom); real RPI forward curves (CAA, Ofgem, Ofcom); and nominal forward curves (Ofwat and Ofcom).

4.9 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.

4.10 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)

4.11 The table below summarises the approach taken, and the values assumed, in the most recent price control decisions.

Total Market Return: approaches and allowances (RPI terms), 2016 to 2019

Date	Sep-16	Sep-16	Jun-17	Mar-18	Feb-19	May-19	Jun-19	Jul-19
Regulator	UR	UR	UR	Ofcom	CAA	Ofgem	Ofcom	Ofwat
Sector	Gas	Gas	Electricity	Telecoms	NERL	Gas & Electricity	Telecoms	Water & wastewater
Price control	GD17 – PNGL	GD17 – FE	RP6 - NIEN	WLA	RP3)	GD2 & T2 (methodology)	LLCC	PR19
Status	final	Final	final	final	initial	final	final	draft
Source	See page 276 and Table 189	See page 276 and Table 189	See page 223	See page 98 to 105	See page 28 to 39	See page 31 to 42	See pages 329 to 339	See page 5
Considerations	Regulatory precedent	Regulatory precedent	Regulatory precedent	1) historical ex-post, 2) historical ex-ante, 3) 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 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
Allowance (RPI terms)	6.5%	6.5%	6.5%	6.1%	5.4%	5.4%	5.8%	5.47%
Allowance (nominal terms) §	9.8%	9.8%	10.0%	9.2%	8.6%	8.6%	8.7%	8.63%

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

4.12 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 unrepeatability 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.¹³ 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.¹⁴ Subsequently, in December 2018 Ofgem published a reconciliation of this advice to previous advice that UK regulators received in 2003.¹⁵

4.13 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

¹³ See "[Estimating the cost of capital for implementation of price controls by UK Regulators](#)" March 2018

¹⁴ See "[Estimating the cost of capital for implementation of price controls by UK Regulators](#)" March 2018

¹⁵ See page 84 to 91, "[RIIO-2 Sector Specific Methodology Annex: Finance](#)" December 2018

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.

- 4.14 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.

Equity beta, debt beta and asset beta

4.15 The table below summarises the approach taken, and the values assumed, in the most recent price control decisions.

Betas: approaches and assumptions 2016 to 2019

Date	Sep-16	Sep-16	Jun-17	Jun-17	Mar-18	Mar-18	Feb-19	May-19	Jun-19	Jun-19	Jul-19
Regulator	UR	UR	CMA	UR	Ofcom	Ofcom	CAA	Ofgem	Ofcom	Ofcom	Ofwat
Sector	Gas	Gas	Gas	Electricity	Telecoms	Telecoms	NERL	Gas & Electricity	Telecoms	Telecoms	Water & wastewater
Price control	GD17 – PNGL	GD17 – FE	GD17 - FE	RP6 - NIEN	WLA- OR copper	WLA- OUT	RP3 (initial)	GD2 & T2 (methodology)	LLCC – OR	LLCC- OUT	PR19 (initial)
Status	final	final	n/a	final	final	final	initial	initial	final	final	draft
Source	See page 279	See page 279	See page 172 & page 187	See page 221 and 223	See Pages 124 to 126	See Pages 126 to 133	See page 53	See page 57	See pages 363 to 364	See pages 364 to 367	See page 5
Primary proxies	NG, PNN, SVT, UU	NG, PNN, SVT, UU	n/a	NG, PNN, SVT, UU	BT Group, utilities	BT Group, UK and European telecoms	ENAV, airports and utilities	NG, PNN, SVT, UU, SSE	BT Group, utilities	BT Group, UK and European telecoms	SVT, UU
Primary estimation window & frequency (Raw equity beta)	2-year rolling window, daily data	2-year rolling window, daily data	n/a	2-year rolling window, daily data	2-year rolling window, daily data	2-year rolling window, daily data	2-year rolling window, daily data, domestic (e.g. FTSE MIB for Italy) & European indices (Stoxx Europe 600)	5-year and 17.5-year windows, daily data FTSE All Share index	5-year rolling window, daily data, FTSE All Share index	5-year rolling window, daily data, FTSE All Europe and FTSE All World indexes	2-year rolling window, daily data FTSE All Share index
Notable methods	Relative risk-profile assessment informing an adjustment to precedents	Relative risk-profile assessment informing an adjustment to precedents	n/a	Relative risk-profile assessment informing an adjustment to precedents	Midpoint of the range between BT Group and listed utilities	Range based on listed UK and European telecoms companies with a disaggregation of BT Group beta into OR, OUT and Rest of BT (ICT)	ENAV asset beta within bounds of utility and airport comparators	Market Value of debt and EV:RAV ratio used to adjust book-value gearing	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)	Enterprise value gearing to degear. 2-year betas. GARCH estimates are similar but less volatile than OLS
Debt beta	0.1	0.1	0.1	0.1	0.1	0.1	0.13	0.125	0.1	0.1	0.125
Asset beta	0.4	0.4	0.4	0.38	0.59	0.73	0.46	0.38	0.55	0.65	0.36
Notional gearing	55%	55%	n/a	45%	30%	30%	60%	60%	40%	40%	60%
Notional Equity betas	0.77	0.77	n/a	0.61	0.80	1.00	0.96	0.75 [‡]	0.85	1.02	0.71

[‡] mid-point taken of Ofgem working assumption range

4.16 Each regulator 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 price controlled. For example, actual companies may: i) operate non-price-control activities/businesses and/or ii) be exposed to different levels of gearing/financial-risk.

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

- Estimate 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 asset betas
 - Re-levering asset betas to desired notional gearing levels, producing a notional equity beta for the relevant notional company/licensee.
- 4.18 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 analysis¹⁶
- 4.19 Ofgem makes one further adjustment.¹⁷ For consistency Ofgem de-lever and re-lever with reference to EV gearing.¹⁸
- 4.20 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 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. Only one regulator, Ofgem, has made an explicit adjustment to gearing to reflect the market value of debt and the difference between enterprise values and regulated asset values. Differences in notional gearing also impact on notional equity beta estimates.
- 4.21 Regulators have identified debt beta as an area for further study. See section 6 below for latest work-plans regarding shared work on this issue.

¹⁶ See “[Estimating \$\beta\$](#) ” 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.

¹⁷ See “[Ofgem Beta Study – RIIO-2](#)” Dec 2018

¹⁸ See “[RIIO-2 Sector Specific Methodology Decision – Finance](#)” May 2019

5. Work plans for the UKRN cost of capital working group

- 5.1 On 3rd July 2019, the UKRN published an Annual Report and 2019/20 Work Plan.¹⁹ This built on the UKRN Strategy and Forward Work Programme²⁰ for 2018/19, published on 25th May 2018. Both these documents set out the UKRN's focus on infrastructure and investment, including the ongoing work of the cost of capital network.
- 5.2 The UKRN's cost of capital network will continue to work closely together, bringing together experts from across our member regulators, ensuring that our work in this area is aligned where possible and sharing knowledge and best practice. We shall also be exploring how we can more effectively share resources, including through shared training programmes and exploring the potential for cross-regulator secondments.

Debt Beta study

- 5.3 In addition to these plans, we intend to commission work looking at debt betas, led by the cost of capital network. The scope of the work will cover approaches to debt beta estimation and an examination of the link between debt beta and gearing levels. It is intended that the study is to be published later this year.

¹⁹ See "[UKRN Annual Report and 2019/20 Work Plan](#)" July 2019

²⁰ See "[Strategy and Forward Work Programme for 2018/19](#)" May 2018

Appendix I. Financing Duties

Summary of each regulator's duties regarding financeability in the context of their other responsibilities

Regulator	CAA		Ofcom	Ofgem		Ofwat	ORR	Utility Regulator		
Sector	Air Traffic Control	Airports	Telecoms	Gas	Electricity	Water & wastewater	Rail network	Water & sewerage	Electricity	Gas
No. 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 for purpose of fulfilling EU obligations	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, 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 access conditions and price regulation	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
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Regulator	CAA		Ofcom	Ofgem		Ofwat	ORR	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	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	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 out gas functions, we are also required to further this principal objective in the

them, in the long term, to meet the need for water supplies and wastewater services

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

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 18 license holders referred to are the 10 regional companies that provide both water and sewerage services and the 8 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 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.

Appendix 2. Ring Fencing

Summary of each regulator's ring-fencing provisions

Regulator	CAA		Ofcom	Ofgem		Ofwat	ORR	Utility Regulator		
Sector	Air Traffic Control	Airports	Telecoms	Gas	Electricity	Water & wastewater	Rail network	Water & sewerage	Electricity – NIE	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		1								2

Notes

1. Airport licences for Heathrow Airport Limited and Gatwick Airport Limited issued by the CAA in February 2014, which took effect on 1 April 2014.
2. 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

$$\text{WACC} = (\text{Cost of Debt} \times \text{Gearing}) + ((1/(1 - \text{tax rate})) \times \text{Cost of Equity} \times (1 - \text{Gearing}))$$

Where Gearing = $(\text{Debt} / (\text{Debt} + \text{Equity}))$ – see below.

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

$$\text{WACC} = (\text{Cost of Debt} \times \text{Gearing}) + (\text{Cost of Equity} \times (1 - \text{Gearing}))$$

In the calculation above, the cost of debt is calculated pre-tax.

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

$$\text{WACC} = (\text{Cost of Debt} \times (1 - \text{tax rate}) \times \text{Gearing}) + (\text{Cost of Equity} \times (1 - \text{Gearing}))$$

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.

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.

Cost of Equity

The minimum expected return that equity investors require to prompt them to invest in companies, taking account 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.

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.

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 in the last year which are relevant to the latest cost of capital decisions detailed above in this report, and cost of capital guidance or proposals for future price controls.

CAA:

CEPA: Alternative approaches to setting the cost of debt for PR19 and H7 (published in June 2017)

PwC: Estimating the cost of capital for H7 (published in December 2017)

Europe Economics: Components of the Cost of Capital for NERL (published in December 2018)

PwC: Estimating the cost of capital for H7 (published in February 2019)

Ofgem:

CEPA: Review of cost of capital ranges for new assets for Ofgem's network division (published in January 2018)

Robertson: Estimating β (published in December 2018)

Ofwat:

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

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

Ofcom:

NERA: Incorporating BT's pension deficit in the cost of capital calculation (published in February 2018)

NERA: Update of the Equity Beta and Asset Beta for BT Group and Comparators (published in February 2018)

NERA: The Evidence for Differences in Risk for Fixed vs Mobile Telecoms (published in February 2018)

NERA: Cost of Capital: Beta and Gearing for the 2019 BCMR (published in November 2018)

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

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

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

UKRN:

Wright, Burns, Mason, Pickford: Estimating the cost of capital for implementation of price controls by UK Regulators (published in March 2018)

Indepen: Beta Study – RIIO-2 (published in December 2018)

Appendix 5. Principal decisions from 2012 to 2015 in RPI terms

Date	Dec-12	Mar-13	Oct-13	Feb-14	Feb-14	Feb-14	Mar-14	Jun-14	Jun-14	Dec-14	Dec-14	Feb-15	Oct-15
Regulator	Ofgem	Ofgem	ORR	CAA	CAA	CAA	CC	Ofcom	Ofcom	Ofwat	UR	Ofcom	CMA
Sector	Electricity / Gas	Electricity	Rail network	Airports	Airports	Air traffic control	NI Electricity	Telecoms	Telecoms	Water & sewerage	Water & sewerage	Telecoms	Water
Price control	RIIO-T1/GD1	RIIO-ED1	CP5	Q6 – Heathrow	Q6 – Gatwick	NERL	RP5	LLU WLA - Openreach	WBA- Rest of BT	PR14	PC15	MCT	CMA – Bristol Water
Source	Table 3.5 on p.24	Page 1	See (p.491)	See (e.g. p.44)	See (e.g. p.44)	See (e.g. p.151)	See (p.13-38)	See (Table A14.1 'Openreach')	See (Table A14.1 'Rest of BT')	See (p. 41)	See (p.10)	See Table A10.1	See (p.335)
Cost of debt (pre-tax)	1%-1.58%	1.94%	3%	3.20%	3.20%	2.45%	3.10%	2.3%	2.8%	2.59%	1.2%	2.1%	2.6%
Risk free rate	2.00%		1.75%	0.50%	0.50%	0.75%	1.50%	1.3%	1.3%	1.25%	1.5%	1.0%	1.3%
Equity risk premium	5.3%		5.00%	5.75%	5.77%	5.50%	5.00%	4.8%	4.8%	5.50%	5.0%	5.1%	5.3%
Equity beta	0.90 – 0.95		0.95	1.10	1.13	1.11	0.70	0.69	1.17	0.80	0.83	0.93	0.85
Asset beta	n/a		0.37	0.50	0.56	0.50	0.40	0.50	0.83	0.30	0.44	0.60	0.32
Cost of equity (post-tax)	6.7% - 7.0%		6.5%	6.84%	7.0%	6.86%	5.00%	4.6%	7.0%	5.65%	5.7%	5.8%	5.7%
Gearing	55% - 65%		62.5%	60%	55%	60%	45%	32.0%	32.0%	62.5%	50.0%	40.0%	62.5%
Tax	19%		20.2%	20.2%	20.2%	36%	20%	20.0%	20.0%	20%	20.0%	20.0%	20.0%
WACC (pre-tax)			4.93%	5.35%	5.70%	5.75%	4.83%	5.19%	7.34%	4.27%	4.14%	5.63%	4.32%
WACC (Vanilla)			4.31%	4.65%	4.90%	4.22%	4.15%	3.88%	5.62%	3.74%	3.44%	4.29%	3.78%
Notes	2,4	2,3,4											

Notes

1. 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 & 2016. 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.
2. 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.
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. 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%.