Cost of Capital – Annual Update Report

Information Paper

Publication date: 4 June 2018

About this document

In May 2017, the UK Regulators' Network (UKRN), published an information paper entitled Cost of Capital – Annual Update Report[1].

The purpose of this short information paper is to refresh the 2017 report, provide an update on the cost of capital decisions taken by regulators over the last year and to highlight the reasons why the decisions about certain components of the cost of capital differ from the most recent decisions made by their peers.

Participating regulators have signed up to the UKRN Cost of Capital Principles[2] to ensure continued collaboration on cost of capital issues. We have identified ways in which we intend to continue to collaborate in the future[3]. 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 on the weighted average cost of capital (WACC) by each regulator and an overview of some differences between determined WACCs.

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 then 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 12 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)
- Water Industry commission for Scotland (WICS)
- Legal Services Board

The CMA participates as observer.

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1 UKRN also published a similar refresh paper in March 2016 – Cost of Capital – Annual Update Report

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

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

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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1. Summary

Price Controls and Cost of Capital

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 maintained at an appropriate level. 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 ensure that companies can finance their functions by setting an appropriate rate of return on the assets utilised in providing the regulated services. The rate of return, provided by setting a cost of capital, is considered essential to facilitate continuing investment in the infrastructure which supports the well-being of both individual customers and the wider UK economy. 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.

1.3. Regulators independently calculate a forward-looking cost of capital which can then be applied during a price control period. As such, a cost of capital may and will vary between sectors and between price controls, the length of which may also vary between regulated sectors. This is inevitable in sectors that differ in many respects – for example: the level of competition, the nature and economic life of the assets concerned, and the level of various types of risk. 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 the cost of capital and future trends.

1.4. Although the cost of capital may legitimately vary between regulated sectors, there are some components that would be expected to be similar if regulators were taking their decisions about the cost of capital 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 regulators have made and outline some differences. In addition, the UKRN Cost of Capital network support one another to make comparisons of cost of capital decisions when individual regulators are making a determination. Differences in cost of capital decisions may reflect variations in sector specific risk profiles, the timing of when decisions are made, movements in general market conditions, diverging views regarding the approach to the overall calculation of the cost of capital or a combination of these factors.

1.5. This paper provides a summary of the recent decisions about the cost of capital and an outline of how decisions varied between regulators. This paper covers only the principal price controls and not all decisions made by regulators.

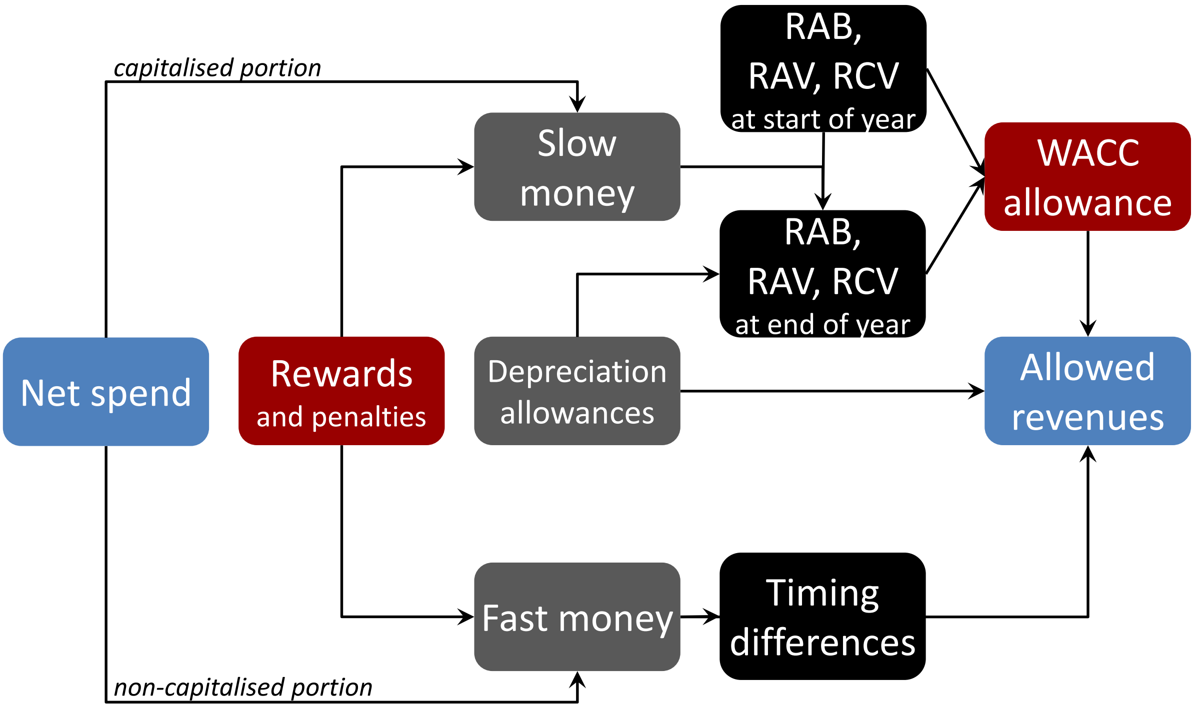
1.6. Regulators have adopted the approach described in this paper in making cost of capital decisions in recent price controls. Nevertheless, it is important to note that, in future price controls, each regulator may review its approach and deviate from its established precedent considering, for example, prevailing market conditions.

2. Setting the cost of capital

Broad Approach

2.1. Whilst there are some differences in each regulator's duties (as set out in Appendix 1) we each use a cost of capital in the calculation of some, or all, of the price controls that we set for the business activities we regulate. The approaches we take in setting the cost of capital are broadly similar, although Ofcom and Ofgem take a different approach in certain areas. 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 cost of capital fits in is set out below.

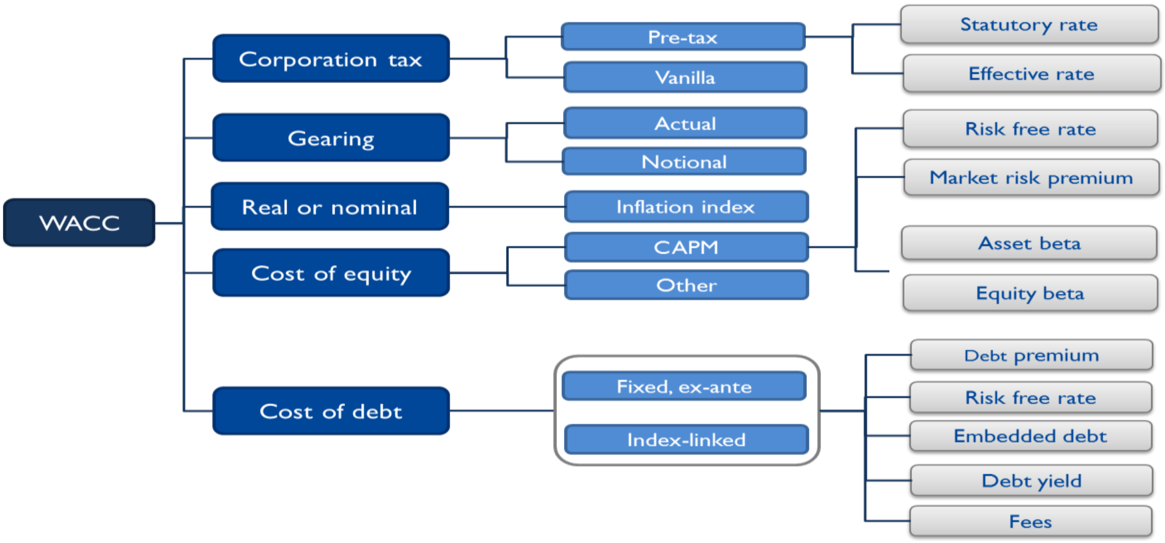


Weighted Average Cost of Capital

2.3. All regulators adopt a weighted average cost of capital (WACC) approach representing the cost of a blend (the gearing) of debt and equity finance.

2.4. The WACC is derived for a company or part of a company (the "regulated businesses"). 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.

2.5. The diagram below depicts 'standard' component analysis undertaken by regulators to determine a cost of capital.



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. All regulators have used a cost of capital which can be expressed 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)); although for some price controls Ofcom has used a nominal cost of capital, while Ofgem utilises a modified approach to reflect the impact of a longer price control period.

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 set

2.9. The table below highlights the different principal price controls the regulators set and the duration of the current controls.

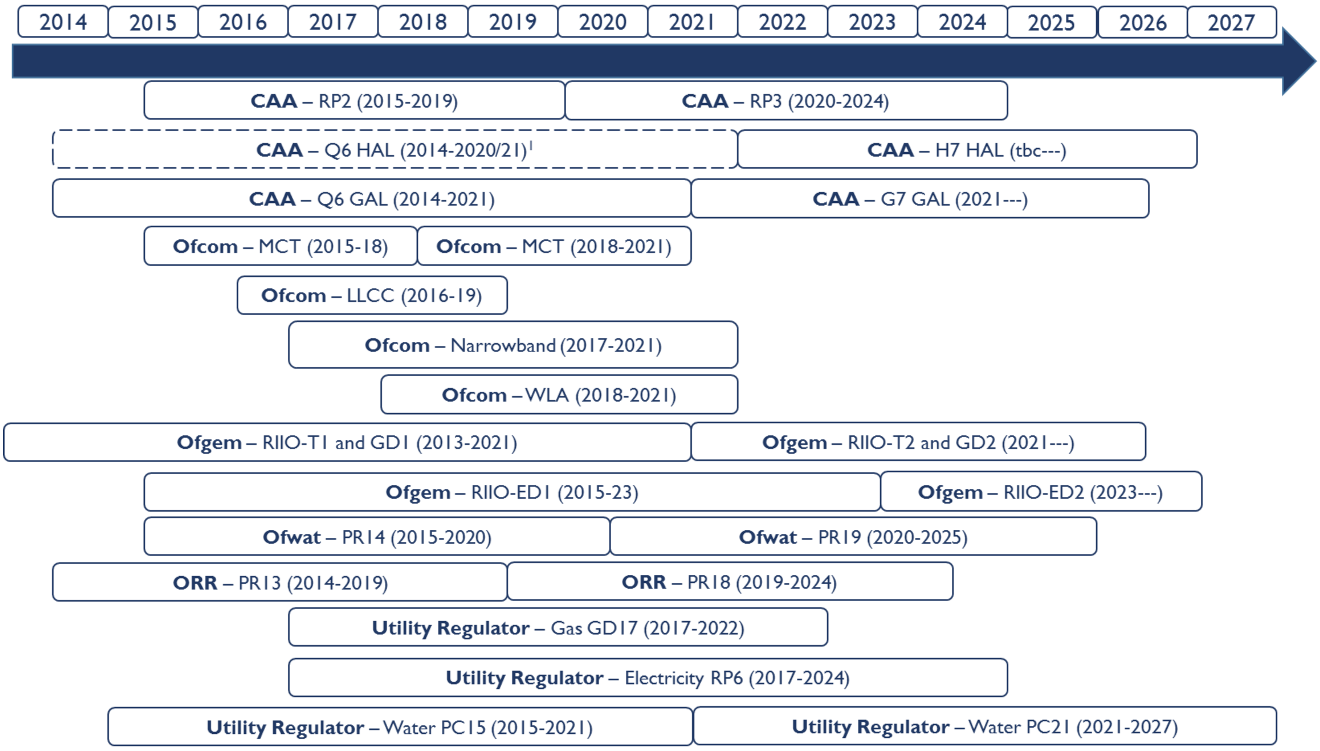
Regulator	Sector	Principal price control	Duration of the current control	Notes
CAA	Airports	Q6 – Heathrow	5 years and 9 months (CAA is consulting on a further one to two year extension)	1
	Airports	Q6 – Gatwick	7 years	
	Air traffic control	RP2 – NATS (En Route) plc (NERL)	5 years	
Ofcom	Telecoms	Leased lines charge control (LLCC)	3 years	
	Telecoms	Mobile call termination (MCT)	3 years	
	Telecoms	Wholesale local access (WLA)	3 years	
	Telecoms	Narrowband	3 years and 3 months	
Ofgem	Gas & Electricity	RIIO-T1 – Transmission	8 years	
	Gas	RIIO-GD1 – Gas distribution	8 years	
	Electricity	RIIO-ED1 – Electricity distribution	8 years	
Ofwat	Water & wastewater	PR14 – wholesale water	5 years	
	Water & wastewater	PR14 – wholesale wastewater	5 years	
	Water & wastewater	PR14 – Thames Tideway	5 Years	2
	Water & wastewater	PR14 – household retail	5 years	
	Water & wastewater	PR16 – non-household retail	3 years	3
	Water & wastewater	Thames Tideway Tunnel	15 years	2
ORR	Rail network	CP5 – Network Rail	5 years	
	High speed rail	CP2 – HS1	5 years	4
Utility Regulator	Gas	GD17	6 years	
	Electricity	RP6	6 years and 6 months	
	Water	PC15	6 years	

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. In December 2017, the CAA consulted on a further one to two year extension of the Q6 price control.
2. 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.
3. The current PR16 control only 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.
4. 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 calculating a cost of capital do apply to HS1.

Recent and upcoming principal price reviews

2.10. The chart below shows the recent and upcoming principal price reviews for each of the regulators involved in the Cost of Capital network all of whom have signed up to the UKRN cost of capital principles.



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. In December 2017, the CAA consulted on a further one to two year extension of the Q6 price control.

Decisions on WACC components

2.11. The following section (3. Recent cost of capital decisions) presents the decisions on cost of capital components in recent principal controls.

2.12. Since their last cost of capital decision, some regulators have commissioned reports/analysis to inform future cost of capital decisions. A schedule of these documents can be found in Appendix 4 for information.

3. Recent cost of capital decisions

3.1. The most recent cost of capital decisions made by each of the regulators, and any subsequent decisions by the Competition and Markets Authority (CMA) are set out in the tables on page 10 and 11. Ofcom often sets the cost of capital in nominal terms, therefore, for Ofcom's capital decisions, the table below present the decisions in both nominal terms and in real terms assuming RPI inflation for ease of comparison.

3.2. In August 2015, Ofwat accepted for the construction phase of the Thames Tideway Tunnel project a cost of capital of 2.497% (vanilla) which is fixed until 2030. The cost of capital bid by Bazalgette Tunnel Limited, which is lower than that 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 cost of debt indexation mechanism and is influenced by a government guarantee. As this cost of capital was established as part of a competitive tendering process and individual components were not set by Ofwat, we have excluded this from the analysis above.

3.3. The table on page 11 includes a simplified approach to corporation tax where the rates used are those stated by each regulator's determination whereas in reality some of the regulators update the corporation tax rate for prevailing rates.

3.4. In March 2018 Ofcom published its final statement on the mobile call termination (MCT) market review. As part of this decision it considered whether the pre-tax real WACC of 7.0% used in the 2015 MCT market review remained reasonable in light of parameter developments since then. It was Ofcom's view that the pre-tax real WACC for an average efficient mobile provider would lie between 5.9% and 7.6% assuming a corporate tax rate of 17% and between 6.1% to 7.7% assuming a corporate tax rate of 19%. As the 2015 MCT pre-tax real WACC of 7.0% was comfortably within these ranges, it concluded that a pre-tax real WACC of 7.0% remained reasonable.[4]

[4] MCT market review statement available here: https://www.ofcom.org.uk/consultations-and-statements/category-1/mobile-call-termination-market-review

Date	Dec-12	Mar-13	Oct-13	Feb-14	Feb-14	Jun-14	Mar-14	Jun-14		Jun-14		Dec-14	Dec-14	Feb-15	
Regulator	Ofgem	Ofgem	ORR	CAA	CAA	CAA	CC	Ofcom		Ofcom		Ofwat	UR	Ofcom	
Sector	Electricity	Electricity	Rail network	Airports	Airports	Air traffic control	NI Electricity	Telecoms		Telecoms		Water & sewerage	Water & sewerage	Telecoms	
Price control	RIIO-T1/GD1	RIIO-ED1	CP5	Q6-Heathrow	Q6-Gatwick	NERL	RP5	LLU WLA		WBA		PR14	PC15	MCT	
Source	Table 3.5 on p.24	Page 1	Table 13.1 on p.491	Figure 7.1 on p.44	Figure 7.1 on p.44	Figure E.2 on p.259	Table 13.10 on p.13-38	Table A14.1 'Openreach' on p.163		Table A14.1 'Rest of BT' on p.163		Table A7.10 on p.41-42	Table 3.1 on p.11	Table A10.1 'January 2015' on p.84	
Inflation assumption			RPI	RPI	RPI	RPI	RPI	Nom	RPI	Nom	RPI	RPI	RPI	Nom	RPI
Cost of embedded debt	n/a	n/a	n/a	3.30%	3.10%	n/a		n/a	n/a	n/a	n/a	2.75%	1.48%	n/a	n/a
Cost of new debt	n/a	n/a	n/a	2.50%	2.75%	n/a		n/a	n/a	n/a	n/a	2.00%	1.28%	n/a	n/a
Weighting of new to embedded debt	n/a	n/a	n/a	30:70	30:70	n/a		n/a	n/a	n/a	n/a	25:75	34:66	n/a	n/a
Debt beta				0.10	0.10	0.10				0.10	0.10			0.10	0.10
Debt issuance / liquidity costs				0.15%	0.20%	n/a									
Cost of debt (pre-tax)	1.49% - 2.22%	2.22% - 2.29%	3.00%	3.20%	3.20%	2.50%	3.10%	5.5%	2.3%	6.00%	2.80%	2.59%	1.41%	5.40%	2.10%
Risk-free rate	2.00%		1.75%	0.50%	0.50%	0.75%	1.50%	4.5%	1.3%	4.50%	1.30%	1.25%	1.50%	4.30%	1.00%
Equity risk premium	5.30%		5.00%	5.75%	5.75%	5.50%	5.00%	5.0%	4.8%	5.00%	4.80%	5.50%	5.00%	5.30%	5.10%
Equity beta	0.90 - 0.95		0.95	1.10	1.13	1.11	0.70	0.69	0.69	1.17	1.17	0.80	0.83	0.93	0.93
Asset beta			0.37	0.50	0.56	0.51	0.40	0.50	0.50	0.83	0.83	0.30	0.44	0.60	0.60
Cost of equity (post-tax)	6.70% - 7.00%	6.00% - 6.40%	6.50%	6.84%	6.99%	6.87%	5.00%	8.0%	4.6%	10.40%	7.00%	5.65%	5.65%	9.30%	5.80%
Gearing	55.0% - 65.0%	65.0%	62.5%	60.0%	55.0%	60.0%	45.0%	32.0%	32.0%	32.0%	32.0%	62.5%	50.0%	40.0%	40.0%
WACC (vanilla)	3.79% - 4.37%	3.59% - 3.68%	4.31%	4.66%	4.90%	4.25%	4.15%	7.2%	3.9%	9.00%	5.62%	3.74%	3.53%	7.70%	4.29%
Tax	19.0%	19.0%	20.2%	20.2%	20.2%	37.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
WACC (fully post-tax)			3.90%	4.30%	4.60%	3.70%	3.90%	6.80%	3.70%	8.60%	5.40%	3.47%	3.39%	7.30%	4.10%
WACC (pre-tax)			4.93%	5.35%	5.70%	5.86%	4.83%	8.60%	5.19%	10.80%	7.34%	4.27%	4.24%	9.14%	5.63%
Notes	1, 3	1, 2, 3							4		4				4

Date	Oct-15	Apr-16		Apr-16		Sep-16	Sep-16	Jun-17	Jun-17	Dec-17	Mar-18		Mar-18	
Regulator	CMA	Ofcom		Ofcom		UR	UR	CMA	UR	Ofwat	Ofcom		Ofcom	
Sector	Water	Telecoms		Telecoms		Gas	Gas	Gas	Electricity	Water & sewerage	Telecoms		Telecoms	
Price control	CMA-Bristol Water	LLCC		LLCC		GD17-PNGL	GD17-Firmus	GD17-Firmus	RP6-NIEN	PR19 (provisional)	WLA		WLA	
Source	Table 10.4 on p.335	Table A30.1 'Openreach copper' on p.57		Table A30.1 'Other UK telecoms' on p.57		Table 192 on p.282	Table 192 on p.282	Paragraph 7.124 on p.188	Table 81 on p.226	Table 10.2 on p.172	Table A20.1 'Openreach copper access' on p.75		Table A20.1 'Other UK telecoms' on p.75	
Inflation assumption	RPI	Nom	RPI	Nom	RPI	RPI	RPI	RPI	RPI	RPI	Nom	RPI	Nom	RPI
Cost of embedded debt	2.95%	n/a	n/a	n/a	n/a	1.48%	1.58%	n/a	3.19%	1.59%	n/a	n/a	n/a	n/a
Cost of new debt	1.60%	n/a	n/a	n/a	n/a	2.45%	3.04%	n/a	0.19%	0.38%	n/a	n/a	n/a	n/a
Weighting of new to embedded debt	25:75	n/a	n/a	n/a	n/a	90:10	60:40	n/a	52:48	30:70	n/a	n/a	n/a	n/a
Debt beta		0.10	0.10	0.10	0.10						0.10	0.10	0.10	0.10
Debt issuance / liquidity costs														
Cost of debt (pre-tax)	2.60%	5.40%	2.10%	5.50%	2.20%	2.36%	2.45%	2.45%	1.63%	1.33%	3.90%	1.00%	4.00%	1.10%
Risk-free rate	1.30%	4.30%	1.00%	4.30%	1.00%	1.25%	1.25%	1.25%	1.25%	-0.88%	2.90%	0.00%	2.90%	0.00%
Equity risk premium	5.30%	5.30%	5.10%	5.30%	5.10%	5.25%	5.25%	5.25%	5.25%	6.31%	6.30%	6.10%	6.30%	6.10%
Equity beta	0.85	0.74	0.74	0.96	0.96	0.77	0.77	0.77	0.61	0.77	0.80	0.80	1.00	1.00
Asset beta	0.32	0.55	0.55	0.70	0.70	0.40	0.40	0.40	0.38	0.37	0.59	0.59	0.73	0.73
Cost of equity (post-tax)	5.70%	8.30%	4.80%	9.40%	5.90%	5.28%	5.28%	5.29%	4.45%	4.01%	7.90%	4.90%	9.20%	6.10%
Gearing	62.5%	30.0%	30.0%	30.0%	30.0%	55.0%	55.0%	55.0%	45.0%	60.0%	30.0%	30.0%	30.0%	30.0%
WACC (vanilla)	3.78%	7.40%	3.98%	8.26%	4.80%	3.67%	3.72%	3.73%	3.18%	2.40%	6.70%	3.70%	7.60%	4.60%
Tax	20.0%	19.0%	19.0%	19.0%	19.0%	20.0%	20.0%	20.0%	20.0%	17.0%	17.0%	17.0%	17.0%	17.0%
WACC (fully post-tax)	3.46%	7.12%	3.87%	8.11%	4.66%	3.41%	3.45%	3.46%	3.04%	2.27%	6.50%	3.50%	7.40%	4.40%
WACC (pre-tax)	4.32%	8.80%	5.29%	9.80%	6.29%	4.26%	4.32%	4.32%	3.80%	2.73%	7.90%	4.90%	8.90%	5.80%
Notes			4		4	5	5, 6	7	5			4		4

Notes

1. Ofgem made the cost of capital decision for RIIO-T1/GD1 on 1 December 2012 and that for RIIO-ED1 on 1 March 2013. Ofgem updates the cost of debt component of the WACC on an annual basis to reflect changes in benchmark rates. The table shows the cost of debt allowances for 2017-18 determined for the RIIO-T1/GD1 and ED1 price controls in the November 2016 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. The latest annual update is presented in this table.
2. 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%.
3. 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%.
4. Ofcom generally publishes and applies 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, 3.3% for 2015 & 2016 and 2.9% for 2018. Ofcom also publishes and applies WACC in pre-tax terms, where it accounts for tax in nominal terms by grossing up the nominal cost of equity. In addition to setting WACC for charge controls, Ofcom also considers WACC for other issues, such as in determining financial terms for broadcasting and spectrum licences.
5. UR determined an ex post adjustment mechanism which updates the WACC using benchmark rates at the points in time when the companies raise new debt.
6. UR decided a pre-tax WACC of 4.32% for Firmus Energy. The asset beta and therefore the cost of equity was referred to the CMA but was not found to be wrong.
7. The CMA did not find the UR's assets beta estimate, and therefore the cost of equity, was wrong.

Appendix 1: Financing Duties

Table A1: 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 & sewerage**	**Rail network**	**Water & sewerage**	**Electricity**	**Gas**
No. of companies subject to price controls	1	2	5	9	17	17 + Thames Tideway Tunnel	2	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 principal duties	Primary duty and 'have regard to…'	Primary duty and 'have regard to…'	Primary duty and 'have regard to…'	Primary duty and 'have regard to…'	Primary duty and 'have regard to…'	4 primary and 6 secondary duties and other 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 …	No	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 …	No	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

Regulator	CAA		Ofcom	Ofgem		Ofwat	ORR	Utility Regulator		
Sector	**Air Traffic Control**	**Airports**	**Telecoms**	**Gas**	**Electricity**	**Water & sewerage**	**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 the proper carrying out of 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			1	2		3	4			

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.

2. Ofgem: Excluding independent gas transporters and independent electricity distribution network operators who are subject to relative price control.

3. Ofwat: The 17 licence holders referred to are the 10 regional companies that provide both water and sewerage services and the 7 regional companies that provide water services only. Each of these companies is subject to the full period review price determinations process. Separately Ofwat regulate Bazalgette Tunnel Limited the infrastructure provider in connection with the Thames Tideway Tunnel. 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.

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 A2: Summary of each regulator's ring fencing provisions

Regulator	CAA		Ofcom	Ofgem		Ofwat	ORR	Utility Regulator		
Sector	**Airports**	**Air Traffic Control**	**Telecoms**	**Gas**	**Electricity**	**Water & sewerage**	**Rail network**	**Water & sewerage**	**Electricity – NIEN**	**Gas distribution**
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	✓	✓	✗	✓	✓	Annually	✓	✓	✓	✓ / ✗
Ultimate holding company undertakings	✓	✓	✗	✓	✓	✓	✓	N/A	✓	✓ / ✗
Requirements with respect to maintaining 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	No special admin., standard insolvency rules	Special Admin	No special admin., standard insolvency rules	Special admin	Special admin	Special admin	Special admin	Special admin	✓	Special admin
Notes	1	2								3

Notes

1. Airport licences for Heathrow Airport Limited and Gatwick Airport Limited issued by the CAA in February 2014 took effect on 1 April 2014.
2. The Air Traffic Services licence for NATS (En Route) PLC includes a requirement for two mandated independent directors. This requirement is currently subject to a conditional consent for its disapplication.
3. Dependent on licensee.

Appendix 3: Components of cost of capital

WACC

All regulators calculate a weighted average cost of capital (WACC) to calculate a return for investors which represents the cost of a blend (the gearing) of debt and equity finance.

One of the most common calculations of WACC is a "vanilla" WACC which is calculated using the formula below, where gearing is the ratio of debt to equity

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

In the calculation above, the cost of debt is calculated pre-tax, while the cost of equity is a post-tax figure.

Alternatively, regulators may elect to use a "fully post-tax" WACC, which is calculated 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 and the level of tax which is paid in the sector. 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 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 into account the 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 risk. The risk-free rate can be calculated as either a historical value or under a current market approach. Regulators set the risk-free rate by reference to yields on government gilts and typically consider forward rates and longer-term average yields.

Market 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. This captures the non-diversifiable risk that is inherent to the market.

Regulators typically either estimate the market risk premium directly or calculate it as the residual of the 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, so variation between sectors is to be expected. The existence of directly measurable betas will depend on whether there are regulated 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: Consultants 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:

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

Ofgem:

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

Ofwat:

- PwC: Updated analysis on cost of equity for PR19 (published in December 2017)
- Europe Economics: PR19 – Initial Assessment of the Cost of Capital (published in December 2017)

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)