

# Queensland Competition Authority

Appendices

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## Aurizon Network's 2017 draft access undertaking

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December 2018

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## GLOSSARY

<b>Short form</b>	<b>Description</b>
2017 DAU	The draft access undertaking for the regulatory period commencing 1 July 2017 submitted by Aurizon Network on 30 November 2016.
AC	alternating current
ACCC	Australian Competition and Consumer Commission
AER	Australian Energy Regulator
AID	access interface deed
AMP	asset management plan
APEX	advanced planning and execution
ARTC	Australian Rail Track Corporation
ASX	Australian Stock Exchange
ATO	Australian Tax Office
BCAR	baseline capacity assessment report
BOF	basic oxygen furnace
CAAC	critical asset alignment calendar
CDS	credit default swap
CGS	Commonwealth government securities
cl., cls.	clause, clauses
CLMPs	coal loss mitigation provisions
CPI	consumer price index
CQCN	Central Queensland coal network
CRIMP	coal rail infrastructure master plan
DAU	draft access undertaking
DBCT	Dalrymple Bay coal terminal
DCCC	Dalrymple Bay coal chain coordinator
DCF	discounted cash flow
DGM	dividend growth model
DTP	daily train plan
ec	electric energy charge
egtk	electric gross tonne kilometre
ERA	Economic Regulation Authority of Western Australia
ESCOSA	Essential Services Commission of South Australia
FAB	franking account balance
FERC	Federal Energy Regulatory Commission (United States)
FTEs	full-time equivalents
FY	financial year
GAPE	Goonyella to Abbot Point
GDP	gross domestic product
GFC	global financial crisis
GPR	ground penetrating radar
GSE	Goonyella System enhancements

gtk	gross tonne kilometre
HELE	High efficiency low emissions
HRATF	Hunter Rail access task force
HVAU	Hunter Valley access undertaking
HVCN	Hunter Valley coal network
IAP	indicative access proposal
IPART	Independent Pricing and Regulatory Tribunal
ISR	industrial special risks
IT	information technology
ITP	intermediate train plan
MCI	maintenance cost index
MRP	market risk premium
MSE	mean square error
MTP	master train plan
NAMS	network asset management system
NDP	network development plan
NEB	National Energy Board (Canada)
NER	National Electricity Rules
NMPs	network management principles
NPV	net present value
NS	Nelson-Siegel functional form
NSS	Nelson-Siegel-Svensson functional form
NTP	nominal train payload
OAS	option-adjusted spread
OTCI	overall track condition index
PIO	private infrastructure owner
PPE	personal protective equipment
PIO	private infrastructure owner
QCA	Queensland Competition Authority
QCA Act	<i>Queensland Competition Authority Act 1997</i>
QRC	Queensland Resources Council
QUU	Queensland Urban Utilities
RAB	regulatory asset base
RBA	Reserve Bank of Australia
RMSE	root mean square error
ROA	return on assets
s., ss.	section/sections of an Act
SAPN	SA Power Networks
SAR	surplus access rights
SL CAPM	Sharpe-Lintner (SL) CAPM
SOPs	system operating parameters
SRCA	standard rail connection agreement
STP	strategic train plan

sub.	submission
SUFA	standard user funding agreement
TMDMM	traffic management decision-making matrix
TSE	train service entitlements
UT1	Queensland Rail's 2001 access undertaking (approved December 2001)
UT2	Queensland Rail's 2006 access undertaking (approved June 2006, as amended)
UT3	QR Network's 2010 access undertaking (approved October 2010, as amended)
UT4	Aurizon Network's 2016 access undertaking (approved October 2016, as amended)
UT5	Aurizon Network's 2017 access undertaking (once approved)
UT6	Aurizon Network's subsequent access undertaking (if applicable)
WACC	weighted average cost of capital
WIRP	Wiggins Island rail project
WPI	wage price index

## APPENDIX A: LIST OF SUBMISSIONS

The QCA received the following submissions during its investigation of Aurizon Network's 2017 DAU. The submission numbers below are used in this final decision for referencing purposes. The submissions are available on the QCA website unless otherwise indicated.

### Submissions on Aurizon Network's 2017 DAU

Stakeholder	Submission	Sub. number	Date submitted
Anglo American Coal Australia (Anglo American)	Submission on Aurizon Network's 2017 DAU	18	17 Feb 2017
Aurizon Network	Submission of the 2017 Draft Access Undertaking (UT5)	1	30 Nov 2016
	<i>Best estimate of inflation: revaluations and revenue indexation</i> , report by Competition Economists Group (CEG)	2	30 Nov 2016
	<i>Aurizon Network IT Market Services Price</i> , report by IT Newcom	3	30 Nov 2016
	<i>Aurizon Network 2016 Access Undertaking—Aspects of the WACC</i> , report by The Brattle Group	4	30 Nov 2016
	<i>Debt risk premium of coal transporters</i> , report by CEG	5	30 Nov 2016
	<i>Equity beta</i> , report by Frontier Economics	6	30 Nov 2016
	<i>Estimating gamma for regulatory purposes</i> , report by Frontier Economics	7	30 Nov 2016
	<i>Market evidence on the cost of equity</i> , report by EY	8	30 Nov 2016
	<i>Market risk premium</i> , report by Frontier Economics	9	30 Nov 2016
	<i>Review of Self Insurance Risk Premium—Access Undertaking UT5</i> , report by Finity	10	30 Nov 2016
	<i>Conceptual insurance program design and pricing</i> , report by JLT	11	30 Nov 2016
	Presentation to the QCA	12	6 Dec 2016
	Presentation to the QCA: UT5 maintenance allowance	13	6 Dec 2016
	Presentation to the QCA	14	6 Dec 2016
	Presentation to the QCA	25	2 Mar 2017
	<i>Recent evidence on the market risk premium</i> , final report by Frontier Economics	30	10 May 2017
Submission of updated information on the 2017 DAU	31	22 Sep 2017	
<i>Estimating gamma within the regulatory context</i> , final report by Frontier Economics	32	22 Sep 2017	
<i>Best estimate of inflation for regulatory purposes</i> , report by CEG	33	22 Sep 2017	
<i>Appropriateness of the external credit ratings</i> , report by EY	34	22 Sep 2017	

Stakeholder	Submission	Sub. number	Date submitted
	<i>Risk comparison between Aurizon Network and water and energy networks</i> , report by Synergies Economic Consulting	35	22 Sep 2017
	Submission of updated information on the 2017 DAU	36	29 Sep 2017
	<i>The term of the risk-free rate</i> , final report by Frontier Economics	37	29 Sep 2017
	<i>An updated estimate of the market risk premium</i> , report by Frontier Economics	38	29 Sep 2017
	<i>Required returns for infrastructure assets: market-based evidence</i> , report by Deloitte	39	29 Sep 2017
Aurizon Operations	Submission on Aurizon Network's 2017 DAU	15	17 Feb 2017
BHP Billiton Mitsubishi Alliance (BMA)	Submission on Aurizon Network's 2017 DAU	24	17 Feb 2017
Dalrymple Bay Coal Chain Coordinator (DCCC)	Submission on Aurizon Network's 2017 DAU	17	17 Feb 2017
Fitzroy Australia Resources (Fitzroy)	Submission on Aurizon Network's 2017 DAU	22	17 Feb 2017
Pacific National	Submission on Aurizon Network's 2017 DAU	19	17 Feb 2017
QCoal Group (QCoal)	Submission on Aurizon Network's 2017 DAU	16	17 Feb 2017
Queensland Resources Council (QRC)	Submission on Aurizon Network's 2017 DAU, Volume 1: Policy	20	17 Feb 2017
	Submission on Aurizon Network's 2017 DAU, Volume 1: Pricing	21	17 Feb 2017
Rio Tinto Coal Australia (Rio Tinto)	Submission on Aurizon Network's 2017 DAU	23	17 Feb 2017

### Collaborative submissions on Aurizon Network's 2017 DAU

Stakeholder	Submission	Sub. number	Date submitted
Aurizon Network	Submission following collaboration	26	17 Mar 2017
Aurizon Operations	Submission following collaboration	27	17 Mar 2017
Pacific National	Submission following collaboration	28	17 Mar 2017
Queensland Resources Council (QRC)	Submission following collaboration	29	17 Mar 2017

### Submissions on the QCA's draft decision

Stakeholder	Submission	Sub. number	Date submitted
Anglo American Coal Australia (Anglo American)	Response to the QCA draft decision	57	12 Mar 2018
Aurizon Bulk	Response to the QCA draft decision	56	12 Mar 2018
Aurizon Coal	Response to the QCA draft decision	55	12 Mar 2018
Aurizon Network	Response to the QCA draft decision	40	12 Mar 2018
	<i>Treatment of Expected Inflation</i> , report by CEG	41	12 Mar 2018
	<i>The Term of the Risk Free Rate</i> , report by Frontier Economics	42	12 Mar 2018
	<i>Market Risk Premium</i> , report by Frontier Economics	43	12 Mar 2018



Stakeholder	Submission	Sub. number	Date submitted
	<i>Equity Beta</i> , report by Frontier Economics	44	12 Mar 2018
	<i>Evaluating the Debt Risk Premium</i> , report by CEG	45	12 Mar 2018
	<i>The Value of Dividend Imputation Tax Credits (Gamma)</i> , report by Frontier Economics	46	12 Mar 2018
	<i>CBD and Fringe Office Market Analysis</i> , report by KPMG	47	12 Mar 2018
	The 2017 DAU — Mark up against the QCA's Draft Decision	48	12 Mar 2018
	Standard Access Agreement — Mark up	49	12 Mar 2018
	Train Operations Deed — Mark up	50	12 Mar 2018
	Standard Rail Connection Agreement — Mark up	51	12 Mar 2018
	Standard Studies Funding Agreement — Mark up	52	12 Mar 2018
Glencore	Response to the QCA draft decision	60	12 Mar 2018
IML Investors	Response to the QCA draft decision	62	21 Mar 2018
Pacific National	Response to the QCA draft decision	61	12 Mar 2018
Queensland Resources Council (QRC)	Response to the QCA draft decision	53	12 Mar 2018
	Response to QCA draft decision (CQCN volumes)	54	20 Mar 2018
Rio Tinto Coal Australia (Rio Tinto)	Response to the QCA draft decision	59	9 Mar 2018
TCI Fund Management	Response to the QCA draft decision	58	8 Mar 2018

### Submissions on maintenance allowance and practices

Stakeholder	Submission	Sub. number	Date submitted
Aurizon Coal	Submission on maintenance matters	67	22 June 2018
Aurizon Network	Submission on maintenance matters	64	20 June 2018
Pacific National	Submission on maintenance matters	66	20 June 2018
Queensland Resources Council (QRC)	Submission on maintenance matters (Part 1)	63	1 June 2018
	Submission on maintenance matters (Part 2)	65	20 June 2018

### Submissions on the averaging period

Stakeholder	Submission	Sub. number	Date submitted
Aurizon Network	Submission on the averaging period	68	10 July 2018
	Submission on the averaging period	70	20 Sept 2018
	Submission on the averaging period	71	15 Oct 2018
	Submission on the averaging period	71	15 Nov 2018
Queensland Resources Council (QRC)	Submission on the averaging period	69	11 July 2018

## APPENDIX B: REFERENCE TARIFFS AND ALLOWABLE REVENUES

### Blackwater System

**Table 1 QCA decision on UT5 reference tariff inputs—Blackwater System**

<i>Reference tariff input</i>	<i>2017–18<sup>1</sup></i>	<i>2018–19<sup>1</sup></i>	<i>2019–20</i>	<i>2020–21</i>
AT1	0.92	0.93	0.95	0.97
AT2	2,212.44	2,264.88	2,318.56	2,373.51
AT3	6.81	6.78	6.56	6.33
AT4	2.34	2.18	2.25	2.02
AT5	3.24	3.29	2.96	3.03
EC	1.01	0.91	0.92	0.94

Note: (1) 2017–18 and 2018–19 SAR includes the impact of 2015–16 and 2016–17 revenue cap adjustments. The difference between 2017–18 transitional and approved SAR has not been accounted for.

**Table 2 QCA decision on UT5 system discounts for train services using nominated unloading facilities—Blackwater System**

<i>Nominated unloading facilities</i>	<i>System discount<sup>1</sup> (\$/ntk)</i>			
	<i>2017–18</i>	<i>2018–19</i>	<i>2019–20</i>	<i>2020–21</i>
Stanwell power station	2.32	2.21	2.30	2.21

Note: (1) The discount is on the AT3 component. 2017–18 and 2018–19 tariff includes the impact of revenue cap adjustment.

**Table 3 QCA decision on reference tariff inputs for train services using nominated loading facilities—Blackwater System**

<i>Nominated loading facilities</i>	<i>System premium<sup>1</sup> (\$/ntk)</i>			
	<i>2017–18</i>	<i>2018–19</i>	<i>2019–20</i>	<i>2020–21</i>
Rolleston <sup>2</sup>	..	0.94	..	0.32
Minerva	2.41	3.44	3.10	4.02

Note: (1) The premium is on the AT3 component (2) Includes non-WIRP and WIRP Rolleston. 2017–18 and 2018–19 tariff includes the impact of revenue cap adjustments.

**Table 4 QCA decision on gtk forecasts and allowable revenues—Blackwater System<sup>1</sup>**

<i>Year</i>	<i>Gtk forecast ('000 gtk)</i>	<i>Allowable revenue AT2–4 (\$) <sup>1</sup></i>	<i>Allowable revenue AT5 (\$) <sup>1</sup></i>
2017–18	36,235,418	339,256	87,212
2018–19	37,579,215	348,638	90,102
2019–20	38,315,720	347,900	82,440
2020–21	39,029,861	335,648	84,215

Note: (1) 2017–18 and 2018–19 SAR includes the impact of 2015–16 and 2016–17 revenue cap adjustments. The difference between 2017–18 transitional and approved SAR has not been accounted for.

## Goonyella System

**Table 5 QCA decision on UT5 reference tariff inputs—Goonyella System**

<i>Reference tariff input</i>	<i>2017–18<sup>1</sup></i>	<i>2018–19<sup>1</sup></i>	<i>2019–20</i>	<i>2020–21</i>
AT1	0.63	0.65	0.66	0.67
AT2	1,401.71	1,434.93	1,468.94	1,503.76
AT3	3.93 <sup>2</sup>	4.62	4.64	4.17
AT4	0.83 <sup>2</sup>	0.98	0.98	0.88
AT5	1.60	1.72	1.65	1.69
EC	1.01	0.91	0.92	0.94

*Note: (1) 2017–18 and 2018–19 SAR includes the impact of 2015–16 and 2016–17 revenue cap adjustments. The difference between 2017–18 transitional and approved SAR has not been accounted for. (2) Including the approved 2015–16 flood review event claim.*

**Table 6 QCA decision on reference tariff inputs for train services using nominated loading facilities—Goonyella System<sup>1</sup>**

<i>Nominated loading facilities</i>	<i>Reference tariff input</i>	<i>2017–18</i>	<i>2018–19</i>	<i>2019–20</i>	<i>2020–21</i>
Middlemount	AT3	2.36	3.16	3.00	2.91
	AT4	0.66	0.83	0.80	0.78
	AT5	0.84	0.96	0.86	0.89
Caval Ridge	AT3	2.90	3.07	3.08	2.62
	AT4	0.62	0.66	0.66	0.56
	AT5	1.37	1.37	1.29	1.33

*Note: (1) These tariff components replace the tariff components in Table 5. 2017–18 and 2018–19 tariff includes the impact of revenue cap adjustments.*

**Table 7 QCA decision on gtk forecasts and allowable revenues—Goonyella System<sup>1</sup>**

<i>Year</i>	<i>Gtk forecast ('000 gtk)</i>	<i>Allowable revenue AT2–4 (\$)</i>	<i>Allowable revenue AT5 (\$)</i>
2017–18	41,620,058	241,936	65,470
2018–19	42,770,883	287,722	72,463
2019–20	42,823,869	290,146	69,418
2020–21	42,790,436	265,535	71,123

*Note: (1) 2017–18 and 2018–19 SAR includes the impact of 2015–16 and 2016–17 revenue cap adjustments. The difference between 2017–18 transitional and approved SAR has not been accounted for.*

## Moura System

**Table 8 QCA decision on UT5 reference tariff inputs—Moura System**

<i>Reference tariff input</i>	<i>2017–18<sup>1</sup></i>	<i>2018–19<sup>1</sup></i>	<i>2019–20</i>	<i>2020–21</i>
AT1	1.70	1.73	1.77	1.80
AT2	655.26	670.79	686.69	702.97
AT3	8.36	8.74	9.03	8.95
AT4	1.38	1.43	1.47	1.45

Note: (1) 2017–18 and 2018–19 SAR includes the impact of 2015–16 and 2016–17 revenue cap adjustments. The difference between 2017–18 transitional and approved SAR has not been accounted for.

**Table 9 QCA decision on reference tariff inputs for train services using nominated loading facilities—Moura System**

<i>Nominated loading facilities</i>	<i>System premium/discount (\$/ntk)</i>			
	<i>2017–18</i>	<i>2018–19</i>	<i>2019–20</i>	<i>2020–21</i>
Baralaba	..	..	..	..

**Table 10 QCA decision on gtk forecasts and allowable revenues—Moura System<sup>1,2</sup>**

<i>Year</i>	<i>Gtk forecast ('000 gtk)</i>	<i>Allowable revenue – AT2–4 (\$)</i>
2017–18	3,044,687	34,066
2018–19	3,928,807	41,231
2019–20	4,294,067	45,537
2020–21	4,294,067	45,232

Note: (1) 2017–18 and 2018–19 SAR includes the impact of revenue cap adjustments (2) Including WIRP NCL.

## Newlands System

**Table 11 QCA decision on UT5 reference tariff inputs—Newlands System**

<i>Reference tariff input</i>	<i>2017–18<sup>1</sup></i>	<i>2018–19<sup>1</sup></i>	<i>2019–20</i>	<i>2020–21</i>
AT1	1.77	1.81	1.84	1.88
AT2	296.31	303.33	310.52	317.88
AT3	5.99	5.13	6.73	6.84
AT4	0.78	0.65	0.86	0.87

Note: (1) 2017–18 and 2018–19 SAR includes the impact of 2015–16 and 2016–17 revenue cap adjustments. The difference between 2017–18 transitional and approved SAR has not been accounted for.

**Table 12 QCA decision on gtk forecasts and allowable revenues—Newlands System<sup>1</sup>**

<i>Year</i>	<i>Gtk Forecast ('000 gtk)</i>	<i>Allowable Revenue – AT2–4 (\$)</i>
2017–18	2,439,079	19,198
2018–19	2,684,004	18,283
2019–20	2,684,004	23,672
2020–21	2,684,004	24,073

*Note: (1) 2017–18 and 2018–19 SAR includes the impact of 2015–16 and 2016–17 revenue cap adjustments. The difference between 2017–18 transitional and approved SAR has not been accounted for.*

### Goonyella to Abbot Point System

**Table 13 QCA decision on UT5 reference tariff inputs—Goonyella to Abbot Point System<sup>1</sup>**

<i>Reference tariff input</i>	<i>2017–18</i>	<i>2018–19</i>	<i>2019–20</i>	<i>2020–21</i>
AT1	1.43	1.45	1.48	1.51
AT2	13,755.21	14,081.21	14,414.93	14,756.57
AT3	1.35	1.31	1.30	1.31
AT4	2.56	1.70	1.62	1.56

*Note: (1) 2017–18 and 2018–19 SAR includes the impact of 2015–16 and 2016–17 revenue cap adjustments. The difference between 2017–18 transitional and approved SAR has not been accounted for.*

**Table 14 QCA decision on gtk forecasts and allowable revenues—Goonyella to Abbot Point System<sup>1</sup>**

<i>Year</i>	<i>Gtk forecast ('000 gtk)</i>	<i>Allowable revenue – AT2–4 (\$)</i>
2017–18	8,686,485	110,889
2018–19	9,579,993	115,916
2019–20	9,579,993	116,245
2020–21	9,579,993	117,151

*Note: (1) 2017–18 and 2018–19 SAR includes the impact of 2015–16 and 2016–17 revenue cap adjustments. The difference between 2017–18 transitional and approved SAR has not been accounted for.*

## APPENDIX C: QCA DECISION MAXIMUM ALLOWABLE REVENUES

### System-by system break-down of QCA decision maximum allowable revenues

#### Blackwater System

**Table 15 QCA decision maximum allowable revenue — non-electric (\$'000, nominal)**

<i>Building block</i>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
Opening Asset Value (for pricing)	2,276,997	2,287,061	2,282,154	2,265,065
Capital Expenditure	95,355	78,123	108,183	112,438
Return on capital (WACC)	131,527	131,130	132,525	131,813
Return of capital (depreciation)	137,647	135,283	176,950	168,040
Less Inflationary gain	(54,688)	(54,523)	(55,102)	(54,806)
Maintenance expenditure allowance	87,975	91,625	58,585	59,965
Operating expenditure allowance	46,550	47,311	52,380	53,938
Working capital	1,047	1,052	1,096	1,077
Tax allowance (gamma adjusted)	12,093	11,491	20,261	19,189
<b>Total annual (unsmoothed) MAR</b>	<b>362,153</b>	<b>363,370</b>	<b>386,694</b>	<b>379,216</b>
2016 Undertaking capital carryover account	(1,727)	(1,768)	(1,810)	(1,853)
<b>Total (adjusted) MAR</b>	<b>360,425</b>	<b>361,602</b>	<b>384,884</b>	<b>377,363</b>

**Table 16 QCA decision maximum allowable revenue — electric assets (\$'000, nominal)**

<i>Building block</i>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
Opening Asset Value (for pricing)	440,791	428,883	418,307	405,712
Capital Expenditure	2,599	5,006	4,080	6,060
Return on capital (WACC)	24,582	24,056	23,418	22,829
Return of capital (depreciation)	24,332	25,158	25,957	26,874
Less Inflationary gain	(10,221)	(10,002)	(9,737)	(9,492)
Maintenance expenditure allowance	4,645	4,707	4,774	4,845
Operating expenditure allowance	36,362	34,553	35,374	36,212
Working capital	239	235	239	244
Tax allowance (gamma adjusted)	1,623	1,924	2,189	2,472
<b>Total annual (unsmoothed) MAR</b>	<b>81,563</b>	<b>80,631</b>	<b>82,214</b>	<b>83,984</b>
2016 Undertaking capital carryover account	216	221	226	231
<b>Total (adjusted) MAR</b>	<b>81,778</b>	<b>80,852</b>	<b>82,440</b>	<b>84,215</b>

## Goonyella System

**Table 17 QCA decision maximum allowable revenue — non-electric (\$'000, nominal)**

<i>Building block</i>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
Opening Asset Value (for pricing)	1,546,505	1,574,938	1,589,318	1,594,364
Capital Expenditure	89,531	74,928	100,625	97,991
Return on capital (WACC)	90,705	91,472	93,693	93,827
Return of capital (depreciation)	97,141	96,926	131,923	110,008
Less Inflationary gain	(37,714)	(38,033)	(38,957)	(39,012)
Maintenance expenditure allowance	84,768	87,695	56,399	57,295
Operating expenditure allowance	53,124	53,508	58,218	58,827
Working capital	864	875	904	843
Tax allowance (gamma adjusted)	9,161	8,619	15,857	12,103
<b>Total annual (unsmoothed) MAR</b>	<b>298,048</b>	<b>301,061</b>	<b>318,037</b>	<b>293,892</b>
2016 Undertaking capital carryover account	320	328	335	343
<b>Total (adjusted) MAR</b>	<b>298,369</b>	<b>301,389</b>	<b>318,373</b>	<b>294,235</b>

**Table 18 QCA decision maximum allowable revenue — electric assets (\$'000, nominal)**

<i>Building block</i>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
Opening Asset Value (for pricing)	241,751	236,460	234,717	231,274
Capital Expenditure	3,139	6,587	5,572	5,935
Return on capital (WACC)	13,577	13,475	13,322	13,151
Return of capital (depreciation)	13,845	13,706	14,308	14,942
Less Inflationary gain	(5,645)	(5,603)	(5,539)	(5,468)
Maintenance expenditure allowance	5,638	5,713	5,794	5,880
Operating expenditure allowance	36,134	36,090	36,943	37,819
Working capital	191	190	194	199
Tax allowance (gamma adjusted)	1,157	1,238	1,356	1,489
<b>Total annual (unsmoothed) MAR</b>	<b>64,897</b>	<b>64,809</b>	<b>66,379</b>	<b>68,012</b>
2016 Undertaking capital carryover account	2,899	2,968	3,038	3,110
<b>Total (adjusted) MAR</b>	<b>67,796</b>	<b>67,777</b>	<b>69,418</b>	<b>71,123</b>

## Goonyella to Abbot Point System

**Table 19 QCA decision maximum allowable revenue — non-electric (\$'000, nominal)**

<i>Building block</i>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
Opening Asset Value (for pricing)	961,644	963,946	916,999	868,970
Capital Expenditure	5,885	216	1,967	2,267
Return on capital (WACC)	53,642	53,455	50,949	48,303
Return of capital (depreciation)	63,676	68,100	69,814	71,581
Less Inflationary gain	(22,304)	(22,226)	(21,184)	(20,084)
Maintenance expenditure allowance	14,546	13,214	11,362	11,581
Operating expenditure allowance	10,882	11,759	12,792	12,931
Working capital	361	373	371	373
Tax allowance (gamma adjusted)	6,579	7,842	8,537	9,188
<b>Total annual (unsmoothed) MAR</b>	<b>127,383</b>	<b>132,518</b>	<b>132,641</b>	<b>133,873</b>
2016 Undertaking capital carryover account	(2,100)	(2,149)	(2,200)	(2,252)
<b>Total (adjusted) MAR</b>	<b>125,283</b>	<b>130,368</b>	<b>130,441</b>	<b>131,620</b>

## Moura System

**Table 20 QCA decision maximum allowable revenue — non-electric (\$'000, nominal)**

<i>Building block</i>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
Opening Asset Value (for pricing)	263,126	317,496	323,079	325,592
Capital Expenditure	9,055	14,591	15,115	11,026
Return on capital (WACC)	15,090	18,412	18,750	18,663
Return of capital (depreciation)	12,673	16,418	20,053	19,579
Less Inflationary gain	(6,274)	(7,655)	(7,796)	(7,760)
Maintenance expenditure allowance	11,301	12,997	11,626	11,862
Operating expenditure allowance	3,814	4,823	5,734	5,796
Working capital	110	135	145	144
Tax allowance (gamma adjusted)	1,970	2,072	2,811	2,842
<b>Total annual (unsmoothed) MAR</b>	<b>38,684</b>	<b>47,200</b>	<b>51,323</b>	<b>51,127</b>
2016 Undertaking capital carryover account	758	776	795	814
<b>Total (adjusted) MAR</b>	<b>39,443</b>	<b>47,977</b>	<b>52,118</b>	<b>51,940</b>



## Newlands System

**Table 21 QCA decision maximum allowable revenue - non-electric (\$'000, nominal)**

<i>Building block</i>	<i>2017–18</i>	<i>2018–19</i>	<i>2019–20</i>	<i>2020–21</i>
Opening Asset Value (for pricing)	195,312	202,149	205,667	205,934
Capital Expenditure	13,157	10,529	8,499	6,771
Return on capital (WACC)	11,558	11,791	11,874	11,793
Return of capital (depreciation)	10,952	11,722	12,944	13,310
Less Inflationary gain	(4,806)	(4,903)	(4,937)	(4,903)
Maintenance expenditure allowance	4,084	3,702	3,183	3,245
Operating expenditure allowance	3,056	3,295	3,584	3,623
Working capital	75	77	80	81
Tax allowance (gamma adjusted)	1,320	1,347	1,569	1,637
<b>Total annual (unsmoothed) MAR</b>	<b>26,239</b>	<b>27,031</b>	<b>28,297</b>	<b>28,786</b>
2016 Undertaking capital carryover account	299	306	314	321
<b>Total (adjusted) MAR</b>	<b>26,538</b>	<b>27,338</b>	<b>28,611</b>	<b>29,107</b>

## APPENDIX D: UT5 RAB ROLL-FORWARD

**Table 22 QCA decision on RAB values by system—non-electric (\$ million, nominal)<sup>1</sup>**

<b>System</b>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
<b>1. Blackwater (excluding WIRP)</b>				
Opening asset value	1,558.3	1,588.2	1,604.4	1,609.9
<i>Plus capital indicator</i>	95.4	78.1	108.2	112.4
<i>Plus indexation</i>	39.2	39.5	40.6	40.8
<i>Less depreciation</i>	104.7	101.3	143.3	133.2
Closing asset value	1,588.2	1,604.4	1,609.9	1,629.9
<b>2. WIRP in the Blackwater System<sup>2</sup></b>				
Opening asset value	718.7	698.9	677.7	655.2
<i>Plus capital indicator</i>	..	..	..	..
<i>Plus indexation</i>	17.0	16.6	16.1	15.5
<i>Less depreciation</i>	36.9	37.7	38.6	39.5
Closing asset value	698.9	677.7	655.2	631.1
<b>3. Goonyella</b>				
Opening asset value	1,546.5	1,574.9	1,589.3	1,594.4
<i>Plus capital indicator</i>	89.5	74.9	100.6	98.0
<i>Plus indexation</i>	38.8	39.1	40.1	40.1
<i>Less depreciation</i>	99.9	99.7	135.6	113.1
Closing asset value	1,574.9	1,589.3	1,594.4	1,619.4
<b>4. Newlands (excluding GAPE and NAPE deferrals)</b>				
Opening asset value	221.6	266.2	266.4	263.2
<i>Plus capital indicator</i>	13.2	10.5	8.5	6.8
<i>Plus indexation</i>	5.6	6.6	6.5	6.4
<i>Less depreciation</i>	13.1	16.9	18.3	18.8
Closing asset value	227.3	266.4	263.2	257.6
<b>5. GAPE<sup>3</sup></b>				
Opening asset value	935.3	899.8	856.0	811.5
<i>Plus capital indicator</i>	5.8	..	2.0	2.3
<i>Plus indexation</i>	22.3	21.3	20.3	19.3
<i>Less depreciation</i>	63.6	65.2	66.8	68.5
Closing asset value	899.8	856.0	811.5	764.5

<b>System</b>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
<b>6. Moura (excluding WIRP deferrals)</b>				
Opening asset value	263.1	317.5	323.1	325.6
<i>Plus capital indicator</i>	9.1	14.6	15.1	11.0
<i>Plus indexation</i>	6.5	7.9	8.0	8.0
<i>Less depreciation</i>	13.0	16.9	20.6	20.1
Closing asset value	265.6	323.1	325.6	324.5
<b>7. Total CQCN (excluding deferrals)</b>				
Opening asset value	5,243.6	5,345.5	5,316.9	5,259.6
<i>Plus capital indicator</i>	212.9	178.2	234.4	230.5
<i>Plus indexation</i>	129.3	130.9	131.6	130.1
<i>Less depreciation</i>	331.1	337.7	423.2	393.3
Closing asset value	5,254.7	5,316.9	5,259.6	5,227.0

Note: (1) Opening asset value includes equity raising cost. (2) WIRP in the Blackwater System consists of WIRP Blackwater and WIRP Rolleston. (3) Includes electric costs on the GSE segment as these costs are recovered through AT1 to AT4.

**Table 23 QCA decision on RAB values by system—electric (\$ million, nominal)**

<b>System</b>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
<b>1. Blackwater</b>				
Opening asset value	366.7	356.8	348.4	338.2
<i>plus capital indicator</i>	2.6	5.0	4.1	6.1
<i>plus indexation</i>	8.8	8.6	8.4	8.2
<i>less depreciation</i>	21.2	22.0	22.7	23.5
Closing asset value	356.8	348.4	338.2	328.8
<b>2. WIRP in the Blackwater System<sup>1</sup></b>				
Opening asset value	74.1	72.1	69.9	67.6
<i>plus capital indicator</i>	..	..	..	..
<i>plus indexation</i>	1.8	1.7	1.7	1.6
<i>less depreciation</i>	3.8	3.9	4.0	4.1
Closing asset value	72.1	69.9	67.6	65.1
<b>3. Goonyella</b>				
Opening asset value	241.8	236.5	234.7	231.3
<i>Plus capital indicator</i>	3.1	6.6	5.6	5.9
<i>Plus indexation</i>	5.8	5.8	5.7	5.6
<i>Less depreciation</i>	14.2	14.1	14.7	15.4
Closing asset value	236.5	234.7	231.3	227.5

<b>System</b>	<b>2017–18</b>	<b>2018–19</b>	<b>2019–20</b>	<b>2020–21</b>
<b>4. Total CQCN (excluding deferrals)</b>				
Opening asset value	682.5	665.3	653.0	637.0
<i>Plus capital indicator</i>	5.7	11.6	9.7	12.0
<i>Plus indexation</i>	16.3	16.0	15.7	15.4
<i>Less depreciation</i>	39.2	40.0	41.4	43.0
Closing asset value	665.3	653.0	637.0	621.4

Note: (1) WIRP in the Blackwater System consists of WIRP Blackwater and WIRP Rolleston.

## APPENDIX E: QCA APPROVED ASSET LIVES

<i>Asset type</i>		<i>Goonyella</i>	<i>Blackwater</i>	<i>Moura</i>	<i>Newlands</i>
<b>Track</b>	<i>Heavy</i>	35	35	30	30
	<i>Medium</i>	45	45	30	30
	<i>Light</i>	45	45	40	44
<b>Turnouts</b>	<i>Heavy</i>	20	25	20	25
	<i>Medium</i>	20	25	20	25
	<i>Light</i>	20	25	20	25
<b>Bridges</b>		50	50	50	50
<b>Culverts (concrete)</b>	<i>Heavy</i>	30	30	30	30
	<i>Medium</i>	50	50	50	50
<b>Culverts (steel)</b>	<i>Heavy</i>	30	30	30	30
	<i>Medium</i>	50	50	50	50
<b>Cuttings</b>		50	50	50	50
<b>Embankments</b>		50	50	50	50
<b>Administration buildings</b>		20	20	20	20
<b>Building facilities</b>		10	10	10	10
<b>Computer systems</b>		3	3	3	3
<b>Training equipment</b>		10	10	10	10
<b>Fences</b>		20	20	20	20
<b>Floodlighting</b>		20	20	20	20
<b>Unsealed roads</b>		38	38	38	38
<b>Control systems (signals - non-vital)</b>		15	15	15	15
<b>Train/Track/Environment monitoring systems</b>		15	15	15	15
<b>Crossing systems</b>		20	20	20	20
<b>Level crossing protection</b>		20	20	20	20
<b>Train protection systems</b>		15	15	15	15
<b>Signal interlockings</b>	<i>Relay</i>	30	30	30	30
	<i>Mechanical</i>	30	30	30	30
	<i>Processor</i>	30	30	30	30
<b>Field equipment and cables</b>		25	25	25	25
<b>Telecommunications equipment</b>	<i>Data Network</i>	15	15	15	15
	<i>Linking Network</i>	15	15	15	15

<b>Asset type</b>		<b>Goonyella</b>	<b>Blackwater</b>	<b>Moura</b>	<b>Newlands</b>
<b>Telephone exchanges equipment</b>		20	20	20	20
<b>Electrical system equipment</b>	<i>Traction supply transformers</i>	20	20	20	20
	<i>Traction power system equipment</i>	20	20	20	20
<b>Power distribution/Traction power distribution</b>		30	30	30	30
<b>Expensed</b>		5	5	5	5

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## APPENDIX F: ASSESSMENT OF INDIVIDUAL WACC PARAMETERS

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### The QCA's assessment approach

The QCA's role, when considering the reference tariffs and allowable revenues to apply for the UT5 pricing period, is to assess the rate of return proposed by Aurizon Network for providing below-rail services to coal-carrying trains, having regard to the factors at s. 138(2) of the QCA Act.

The QCA considers that the WACC proposed by Aurizon Network will materially overcompensate it for the risks involved in providing the services, will therefore not be consistent with the promotion of the object of Part 5 of the QCA Act (s. 138(2)(a)) and is not in the interests of access seekers or access holders (s. 138(2)(e) and (h)). The QCA considers a WACC of 5.7 per cent is sufficient to compensate investors for Aurizon Network's exposure to risk, given the way in which risk is addressed in the regulatory framework. In this way it provides an appropriate balance between the interests of Aurizon Network and the interest of access seekers and access holders (s. 138(2) (b), (e) and (h)).

In undertaking this assessment, the QCA has developed a detailed, bottom-up estimate of the individual parameters and considered Aurizon Network's proposal and submissions from interested parties. While the QCA has undertaken a detailed review of the individual WACC parameters of Aurizon Network's proposed rate of return to test their reasonableness, the QCA is ultimately guided by whether the overall level of rate of return is appropriate to approve having regard to the criteria in s. 138(2) of the QCA Act. In making this assessment, the QCA has considered whether the proposed rate of return is sufficient for Aurizon Network to provide a return on investment commensurate with the commercial and regulatory risks involved, while balancing the legitimate business interests of Aurizon Network, the interests of its customers and the public interest.

The decision on Aurizon Network's UT5 WACC allows for the economically efficient operation of the declared service, as it is based on a reasonable rate of return required by the access provider for providing these services, while not overcompensating for the risks involved in providing the services. In considering the extent to which the decision promotes the economically efficient use of, and the economically efficient investment in, infrastructure, the QCA has taken into account the legitimate business interests of Aurizon Network, including the incentives for investment, by setting a WACC with consideration of the commercial and regulatory risks involved.

Aurizon Network submitted that it had undertaken a comprehensive review of the WACC methodology, noting that it disagreed with many aspects of the QCA's UT4 WACC decisions and that there have been changes in the financial market and coal market conditions.<sup>1</sup> Aurizon Network submitted that, although it has undertaken a fresh review of these matters, it has done so having regard to recent QCA precedent, as well as to relevant regulatory precedent from other jurisdictions.<sup>2</sup>

A number of other stakeholders considered that the application of accepted methodologies and parameters approved in the 2016 Undertaking investigation should be retained for consistency, while market-based parameters should be updated for the UT5 pricing period.<sup>3</sup> The QRC strongly supported the view that 'in

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<sup>1</sup> Aurizon Network, sub. 26: 22.

<sup>2</sup> Aurizon Network, sub. 1: 245.

<sup>3</sup> BMA, sub. 24: 2; Fitzroy, sub. 22: 2; QCoal, sub. 16: 7; Anglo American, sub. 18: 13; QRC; sub. 21, Annexure 1: 2, 7–9; QRC, sub. 21: 5.

the absence of compelling reasons to change the approach, the principle of regulatory continuity and predictability strongly supports continued application of the approach adopted in UT4'.<sup>4</sup>

In considering whether previous QCA decisions provided Aurizon Network with a return reflecting its efficient cost of capital, the QRC pointed to analysis undertaken by its consultant, Castalia, which did not show material decreases, or deterioration, in Aurizon's share price performance caused by QCA decisions.<sup>5</sup> Aurizon Network considered that such comparison of Aurizon's share price to provide meaningful indications of the appropriateness of the QCA's decision is flawed.<sup>6</sup>

There are clear limitations in using Aurizon's share price to consider the appropriateness of previous regulatory rate of return decisions.

The QCA Act requires the QCA to consider the 2017 DAU submitted by Aurizon Network and either approve, or refuse to approve, that DAU. The QCA may only approve Aurizon Network's 2017 DAU if it considers it appropriate to do so having regard to the factors outlined in s. 138(2) of the QCA Act. The QCA has considered Aurizon Network's WACC proposal afresh, examining whether the parameters proposed by Aurizon Network are appropriate having regard to whether the proposed WACC generates an appropriate return commensurate with the commercial and regulatory risks involved in providing the below-rail service,<sup>7</sup> as well as considering and weighing up the other factors in s. 138(2).

Aurizon Network considered it essential that the rate of return reflect its commercial and regulatory risks:

The rate of return must be tailored to the specific regulatory and commercial risks to which Aurizon Network is subject and any benchmarking must be aligned to those specific risks faced by Aurizon Network.<sup>8</sup>

Aurizon Network submitted that its UT5 revenue proposal has been prepared and assessed in the context of its current commercial and financial market environment, having regard to the conditions that are expected to prevail over the four-year regulatory period.<sup>9</sup> Aurizon Network submitted that, in establishing an appropriate return, the QCA must have regard to empirical market evidence and, where the QCA applies benchmarks, it must use data for firms that are comparable to Aurizon Network.<sup>10</sup>

The regulatory rate of return allows Aurizon Network to compensate investors for the risk of investing capital to fund the CQCN, reflecting Aurizon Network's commercial and regulatory risks. In assessing Aurizon Network's proposal, the QCA has taken into consideration the commercial and financial market environment that Aurizon Network faces. However, as outlined in Chapter 2, this needs to be considered in the context of how Aurizon Network's regulatory framework addresses relevant risks.

Aurizon Network considered the WACC needs to be estimated having regard to the following characteristics that drive its 'core' systematic risk profile:

- Aurizon Network operates a stand-alone below-rail coal network that has a long economic life and no alternative use.
- Aurizon Network has high operating leverage (that is, a high proportion of its costs are fixed).
- The CQCN operates as part of a complex integrated supply chain.

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<sup>4</sup> QRC, sub. 21: 14.

<sup>5</sup> QRC, sub. 21, Annexure 1: 7–9.

<sup>6</sup> Aurizon Network, sub. 26: 24–25.

<sup>7</sup> As reflected in the pricing principles in s. 168A(a) of the QCA Act.

<sup>8</sup> Aurizon Network, sub. 1: 247.

<sup>9</sup> Aurizon Network, sub. 1: 247.

<sup>10</sup> Aurizon Network, sub. 1: 247; Aurizon Network, sub. 40: 82.



- The nature and scale of Aurizon Network's operations require it to raise capital in both domestic and global markets.
- The demand for services is ultimately derived from the seaborne coal market, which depends on the relative competitiveness of CQCN producers and can also be influenced by government policy actions.
- Aurizon Network's user base is highly concentrated.
- Aurizon Network's RAB is highly segmented with metallurgical coal demand concentrated in a single system and future metallurgical coal projects occurring within a common geographical precinct.<sup>11</sup>

The QCA has taken into consideration these characteristics in assessing the overall rate of return and estimating specific WACC parameters, where relevant, in our assessment of an appropriate WACC for Aurizon Network.

Additionally, Aurizon Network submitted that it is essential that the rate of return:

- is assessed from the perspective of investors—it is necessary to have regard to the approach that investors will take in practice when forming their return expectations and evaluating alternative investments.
- has regard to the characteristics of the investor base and its requirements.<sup>12</sup>

Noting that its regulatory WACC allows it to compensate investors for the risk of committing capital to fund investments in the CQCN, Aurizon Network stated that its investor base has the following characteristics:

- It comprises sophisticated domestic and global investors, who are constantly evaluating opportunities in the global marketplace.
- Investors evaluate investments over a long-term, forward-looking horizon.
- Investors are becoming increasingly focused on regulatory risk, and value stability and predictability in the regulatory framework.
- Investors evaluate Aurizon Network as part of a broader infrastructure asset class, which comprises regulated and unregulated assets.
- Investors are more likely to focus on the overall return (relative to the risks involved), rather than on underlying parameter estimates.<sup>13</sup>

While Aurizon Network's regulatory rate of return is estimated using a benchmarking approach, the QCA's assessment of Aurizon Network's proposal has taken into account the perspective of investors, where it has been relevant to do so. This includes consideration of the commercial and financial market environment, as well as the regulatory and commercial risks faced by Aurizon Network.

## Risk-free rate

### Aurizon Network's proposal

Aurizon Network proposed that the averaging period be set confidentially, although it provided an indicative estimate of the risk-free rate of 2.13 per cent per annum, based on the nominal yields of 10-year

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<sup>11</sup> Aurizon Network, sub. 1: 258, 271; sub. 40: 82.

<sup>12</sup> Aurizon Network, sub. 1: 245–46.

<sup>13</sup> Aurizon Network, sub. 1: 258–59; sub. 40: 82.

Commonwealth Government bonds and an (indicative) averaging period of the 20 business days ending 30 June 2016.<sup>14</sup> Aurizon Network proposed the averaging period would be set as follows:

Aurizon Network proposes, consistent with QCA practice, that the risk free rate be updated prior to the QCA's Final Decision on UT5. Aurizon Network proposes that this is done by it confidentially proposing the averaging period for QCA approval. The final averaging period and resulting estimate is then published in the UT5 Final Decision.

Aurizon Network has applied a risk free rate of 2.13% for the purpose of this proposal. This will be updated prior to the QCA's Final Decision on UT5 based on an averaging period to be confidentially agreed with the QCA.<sup>15</sup>

On 13 February 2017, Aurizon Network proposed the actual averaging period to be the 20 business days immediately prior to the UT5 period. On 10 March 2017, the QCA noted Aurizon Network's proposal was consistent with established regulatory practice and that the QCA was favourably disposed towards this proposal.<sup>16</sup>

### QCA analysis and decision

The rate of return on a risk-free asset (that is, the risk-free rate) compensates the investor for the time value of money. As such, the risk-free rate is the base rate to which the investor adds a premium for risk. It is used as an input to estimate both the cost of equity and cost of debt components of the WACC. The QCA considers that a risk-free rate of 1.90 per cent is a useful starting point for estimating the overall WACC.

#### The averaging period

The QCA accepts Aurizon Network's proposed averaging period of the 20 business days immediately prior to 1 July 2017, using Commonwealth Government nominal bonds as the proxy for the risk-free asset.<sup>17</sup> The QCA notes that the Reserve Bank of Australia (RBA) provides a reliable information source, and the rates, as well as the estimation approach, are simple to understand, transparent and auditable.

Subsequently, in a September 2017 submission, Aurizon Network observed that the risk-free rate outcome of its proposed June 2017 averaging period was significantly lower than rates observed both before and after this period. Aurizon Network considered this would appear to be due to anomalous market factors and would not appear to reflect the likely rate that would apply during the regulatory period; therefore, the QCA should take this matter into account in determining the overall WACC.<sup>18</sup>

The QCA has investigated this matter and is not aware of anomalous market factors that would justify departing from Aurizon Network's proposed June 2017 averaging period. While bond rates were observably lower during Aurizon Network's proposed June 2017 averaging period, bond rates can vary in the short term and could be expected to do so over the course of the regulatory period. The QRC considered that there is 'nothing particularly anomalous' about the June 2017 averaging period.<sup>19</sup> Aurizon Network has not identified, or provided evidence for, any anomaly.

In its submission on our draft decision, the QRC argued that Aurizon Network should not be able to revise its proposed averaging period after that period has passed, 'simply because the agreed period returns a particular result.'<sup>20</sup> Further, the QRC noted that, if June 2017 is judged to be anomalous, then over the

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<sup>14</sup> Aurizon Network, sub. 1: 246.

<sup>15</sup> Aurizon Network, sub. 1: 267.

<sup>16</sup> QCA 2017a.

<sup>17</sup> The estimate is based on interpolation of relevant Commonwealth Government bond yields to obtain a four-year rate.

<sup>18</sup> Aurizon Network, sub. 36: 2.

<sup>19</sup> QRC, sub 53: 13.

<sup>20</sup> QRC, sub 53: 14.

period of January 2016 to December 2017 there would have been seven other instances that would also have to be judged as ‘anomalous’—bond yields do fluctuate.<sup>21</sup> Further, the QRC noted that, to the extent bond yields were lower in June 2017, Aurizon Network achieved a lower actual cost of debt on its bonds issued in that month.<sup>22</sup>

Following our draft decision, Aurizon Network submitted that it would nominate a new averaging period to coincide immediately before the QCA makes its final decision.<sup>23</sup>

#### Aurizon Network's proposal to revise the averaging period

On 8 May 2018 and 20 September 2018, Aurizon Network requested the QCA consider a revised averaging period. The QCA's decision is to not accept Aurizon Network's proposal to change the averaging period.<sup>24</sup> The QCA considers that Aurizon Network has not been able to demonstrate that a revision to the averaging period is justifiable. The QCA also considers that allowing Aurizon Network to revise its averaging period after the event has the potential to introduce upward bias, to the extent that Aurizon Network is likely to seek a revision only where this is to its financial advantage.

#### Appropriateness of the proposed averaging period

Aurizon Network considered the averaging period it proposed was no longer appropriate given Aurizon Network's proposed averaging period occurred before the QCA's draft decision was published. Aurizon Network considered that it is essential that the averaging period occurs after the draft decision, in order for Aurizon Network to consider prudent steps to manage potential risks. Aurizon Network submitted that the draft decision signals the QCA's intended approach to significant matters including inflation and the return on debt—informing Aurizon Network's assessment of what, if any, financial risk management strategies would be prudent to implement during the averaging period.<sup>25</sup>

Aurizon Network stated that the averaging period plays a critical role in the setting of key rate of return and inflation parameters for the UT5 period. Aurizon Network considered that by providing a draft decision after the conclusion of the initially proposed averaging period and substantially after the commencement of the regulatory term, the QCA has not afforded Aurizon Network the opportunity to appropriately assess and manage potential financial risks over the regulatory term.<sup>26</sup>

The QRC considered that there is no reasonable basis for abandoning Aurizon Network's originally proposed averaging period. The QRC did not consider that it is “essential” that the approved averaging period occur after the draft decision. The QRC was unclear as to how:

- a draft decision would practically impact Aurizon Network's financial risk management strategies
- revising the averaging period would lead to a change in Aurizon Network's financial risk management strategies—noting that Aurizon Network has raised finance in its proposed averaging period.<sup>27</sup>

Additionally, the QRC submitted that any premise that a decision would be made prior to the start of the nominated period should have been clearly stated in Aurizon Network's initial averaging period proposal. The QRC noted that, despite the same circumstances arising in UT4, this issue was not raised in that process.

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<sup>21</sup> QRC, sub. 53: 13.

<sup>22</sup> QRC, sub. 53: 14.

<sup>23</sup> Aurizon Network, sub. 40: 100.

<sup>24</sup> On 30 July 2018, the QCA advised Aurizon Network that the QCA was not inclined to support Aurizon Network's proposal to change the averaging period.

<sup>25</sup> Aurizon Network 2018b: 2; sub. 68: 3–4; sub. 70.

<sup>26</sup> Aurizon Network sub. 70.

<sup>27</sup> QRC, sub. 69: 3–4.

In any case, the QRC considered that Aurizon Network should have raised this matter at a much earlier time.

The QCA is not convinced, based on the information submitted, that the averaging period must occur after a draft decision. Aurizon Network has not provided evidence in support of such an expectation being formed, or that this has restricted its application of financial risk management strategies.

The QCA notes that Aurizon Network's UT4 averaging period was set, and occurred, prior to a draft decision—and was set based on the reliance of the notion that the QCA was “favourably disposed”.

Aurizon Network did not indicate it would seek to revise its choice of averaging period in the event a draft decision was not available until it responded to the draft decision (well after the averaging period had passed). Aurizon Network could have proposed a new (forward-looking) averaging period any time before June 2017, when it was clear that a final decision (or indeed a draft) would not be forthcoming. Between March and June 2017, Aurizon Network was aware that the QCA was still actively gathering information and was not expected to release a draft decision before 30 June 2017.

Nevertheless, while Aurizon Network stated that it cannot rely on the notion the QCA is “favourably disposed” to a particular averaging period, its proposal requested that the QCA indicate whether it was favourably disposed to the revised averaging period prior to a final decision being made.

Aurizon Network also submitted the proposed averaging period is no longer appropriate given that 12 months will have passed between the proposed averaging period and QCA's final decision. Aurizon Network considered that an averaging period closer to the final decision should be used as it will, all else being equal, contain better or more up-to-date information as to the conditions expected to prevail over the regulatory period.<sup>28</sup>

Aurizon Network said that the proposed averaging period does not provide a good indication of the market conditions likely to be experienced over the regulatory period, noting the:

- reduction in BBB spreads over the 10 year CGS as evident in RBA published statistics
- increase in the nominal risk free rate with a corresponding increase in the break-even inflation rates
- increase in the nominal government bond yield from June 2017 to February 2018.<sup>29</sup>

In September 2018, Aurizon Network said that it was possible to assess the appropriateness of the proposed averaging period relative to the first 291 business days of the UT5 regulatory term. Referring to updated market data,<sup>30</sup> Aurizon Network considered that it is clear the proposed averaging period is a poor indicator of the market conditions that have been experienced since the conclusion of that averaging period and is unlikely to be reflective of the conditions that are likely to be experienced over the remainder of the regulatory period.<sup>31</sup>

Aurizon Network stated that the adoption of an averaging period prior to Aurizon Network understanding how the QCA is likely to approach the issue of inflation in the regulatory framework materially raises the risks of any financial hedging. Aurizon Network considered that in order to be able to manage inflation risk it must know what inflation risk it is likely to be exposed to over the regulatory period. Aurizon Network said that at the time of the proposed averaging period Aurizon Network did not know:

- how the QCA would approach the measurement of inflation

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<sup>28</sup> Aurizon Network 2018b: 2; sub. 68: 3–4.

<sup>29</sup> Aurizon Network 2018b: 2–3; sub. 68: 4.

<sup>30</sup> Aurizon Network, sub. 70; sub. 71.

<sup>31</sup> Aurizon Network, sub. 70.

- how the QCA proposes to approach the role of inflation—that is, whether it should be applied to target a real rate of return or a nominal rate of return.<sup>32</sup>

Aurizon Network considered that efficient management of inflation risk requires the use of an averaging period that is proximate to the making of the final decision and, at a minimum, after the draft decision. As the time elapsing between the commencement of the UT5 regulatory term and the making of any final decision becomes even greater, so too does the impact on Aurizon Network's ability to manage its risks.<sup>33</sup>

Aurizon Network considered that measuring parameters during a period that is likely to be more reflective of the market conditions that will be experienced over the regulatory period promotes the object of the QCA Act and is appropriate having regard to the factors set out in s. 138 of the QCA Act.<sup>34</sup>

The QRC disagreed with the fundamental premise of setting the averaging period with reference to the QCA's final decision. Rather, the QRC considered that the averaging period should broadly reflect market conditions expected (*ex ante*) to prevail over the period for which allowed revenues are to be determined. The QRC considered that the averaging period should be reasonably close to the beginning of the period for which allowable revenue is being determined—an averaging period in June 2017 is entirely appropriate and consistent with the statutory objects and pricing principles.<sup>35</sup>

Aurizon Network's 2017 DAU submission proposed a forward-looking, 'on-the-day' approach for setting the time-variant WACC parameters for the 2017 DAU. The averaging period is chosen to broadly reflect market conditions expected to prevail over the regulatory pricing period.

As proposed by Aurizon Network, the relevant pricing period for UT5 is from 1 July 2017 to 30 June 2021, with the averaging period initially proposed by Aurizon Network being immediately prior to the start of this period. This is consistent with implementing an 'on the-day' approach for setting the time-variant WACC parameters for the 2017 DAU.

In relation to inflation risk, the QCA's decision is to adopt the Forecast-Actual approach to the treatment of inflation. This approach means that Aurizon Network's RAB will be rolled forward over time at an outturn rate of inflation, providing Aurizon Network with a regulated revenue stream that is fixed in real terms.

The QCA notes that it is inherently difficult to estimate the future movements in the market—changes in market conditions may be unpredictable and also counteracted by different conditions arising at a later date in the regulatory period. As such, it cannot be concluded that the market conditions experienced since the conclusion of the proposed averaging period are reflective of those market conditions likely to be experienced over the remainder of the regulatory period. There is no single right-time to revisit the market parameters to ensure that the averaging period provides a good indication of the market conditions likely to be experienced over the regulatory period.

Accordingly, in considering Aurizon Network's proposal, an important consideration is that the averaging period should be nominated in advance of its occurrence and not be revised with the benefit of hindsight. Permitting the revision of a proposed averaging period with the benefit of hindsight gives rise to opportunistic behaviour that seeks windfall financial gain. The QCA considers that this is not in the interests of access seekers and access holders (s. 138(2)(e) and (h)). Allowing a revision of an averaging period after it has occurred could also undermine confidence in the regulatory process. The QCA considers this a relevant factor it may have regard to under s. 138(2)(h).

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<sup>32</sup> Aurizon Network, sub. 70.

<sup>33</sup> Aurizon Network, sub. 70.

<sup>34</sup> Aurizon Network 2018b: 2–3; sub. 68: 4; sub. 70.

<sup>35</sup> QRC, sub. 69.

Aurizon Network rejected that it is acting opportunistically in order to seek 'windfall financial gain' as Aurizon Network's proposal to revise the averaging period exposes Aurizon Network to both favourable and unfavourable movements in market parameters.<sup>36</sup> While the QCA acknowledges that using an averaging period closer to the final decision is not necessarily unreasonable or inappropriate depending on the circumstances, allowing Aurizon Network to revise its averaging period after the event introduces the potential for upward bias, to the extent that Aurizon Network would only seek a revision where this revision is to its financial advantage.

#### Regulatory best practice

Aurizon Network submitted that regulatory best practice requires a final decision prior to the commencement of the regulatory period and for that final decision to reflect the most reliable and recent information relevant at the time of that decision. Additionally, Aurizon Network said literature supports the use of an averaging period occurring as close as practically possible to the commencement of the regulatory period—assuming a final decision or determination is made prior to the commencement period starting.<sup>37</sup>

Aurizon Network contended that, in the absence of a final decision (or draft decision) prior to the commencement of the regulatory period, best practice would require the averaging period set to reflect all relevant information available at the time when the final decision is made. This is consistent with the QCA's approach to assessment of other aspects of the UT5 proposal, such as maintenance practices, where the QCA has sought the most up-to-date information as part of the overall assessment.<sup>38</sup>

Aurizon Network said that a revised averaging period:

- is consistent with the expected statutory timeframes for the making of a UT5 final decision
- would expose Aurizon Network to both favourable and unfavourable movements in market parameters and, in this regard, should not give rise to concerns as to bias.<sup>39</sup>

The QRC considered that if Aurizon Network is allowed to revise its averaging period, this would set a dangerous regulatory precedent—creating an option for service providers to revisit averaging period proposals whenever there is delay in a regulatory process. The QRC considered that such an option would only be exercised where it is likely to benefit the service provider, and so would give rise to biased outcomes.<sup>40</sup>

The QCA agrees with Aurizon Network that ideally a final decision should be made before the commencement of the regulatory period and reflects the most reliable and recent information available at that time. The QCA's 2017 DAU assessment has not been finalised prior to the commencement of the UT5 regulatory period.

However, the QCA does not agree with Aurizon Network that in the absence of a final (or draft) decision before the start of the regulatory period, the averaging period should be revised and set by reference to the final decision. As noted above, the averaging period initially proposed by Aurizon Network is consistent with implementing an 'on-the-day' approach for setting the time-variant WACC parameters to apply for the 2017 DAU regulatory period.

The QCA reiterates that although using an averaging period closer to the final decision is not necessarily unreasonable or inappropriate depending on the circumstances, allowing Aurizon Network to revise its averaging period after the event introduces the potential for upward bias, to the extent that Aurizon

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<sup>36</sup> Aurizon Network, sub. 70.

<sup>37</sup> Aurizon Network, sub. 68: 4–5.

<sup>38</sup> Aurizon Network, sub. 68: 5; sub. 70.

<sup>39</sup> Aurizon Network, sub. 68: 3 and 6; sub. 70.

<sup>40</sup> QRC, sub. 69: 5.

Network would only seek a revision where this revision is to its financial advantage. The QCA notes that Aurizon Network did not seek to revise the averaging period in the UT4 process despite similar delays, but in a period of declining yields.

Aurizon Network submitted that, where a regulator has not made a final decision prior to the commencement of the relevant regulatory period, the averaging period is often selected to be a period prior to the date of the final decision. Aurizon Network provided a number of examples where the ERA and AER have set the averaging period after the commencement of the regulatory period and closer to the date of the final decision.<sup>41</sup>

The QCA does not consider that these examples support Aurizon Network's proposal to revise the averaging period, noting:

- The AER's rate of return guideline outlines that the averaging period should be specified prior to the commencement of the regulatory control period. Aurizon Network's proposed revision to the averaging period would not satisfy this condition.
- The ERA's determination to revise the averaging period for the South West Interconnected Network access arrangements for the period 2009–12 was due to Western Power's application seeking an averaging period that the ERA did not accept. The QCA has not proposed to reject the averaging period initially proposed by Aurizon Network.
- The ERA's investigation for the South West Interconnected Network access arrangements for the period 2017–22 commenced following the start of regulatory period—Western Power's proposed access arrangement was submitted 2 October 2017. This situation does not apply to Aurizon Network.

The QCA is not aware of averaging periods being subsequently revised after the initial period has passed in the manner proposed by Aurizon Network.

Aurizon Network also noted that the QCA has previously accepted an averaging period after the publication of a draft decision—in its assessment of the Dalrymple Bay Coal Terminal (DBCT) 2015 Draft Access Undertaking.<sup>42</sup> The QCA notes that Aurizon Network was afforded the same opportunity as DBCTM to propose an averaging period in order to implement effective hedging activities, although ultimately DBCTM's averaging period occurred after the draft decision and Aurizon Network's occurred prior to the draft decision. Relevantly, DBCTM did not propose its averaging period after the event.

For all of these reasons, the QCA does not consider it appropriate to allow Aurizon Network to revise its averaging period and the QCA considers it appropriate to approve the averaging period originally proposed by Aurizon Network, being the 20 business days prior to 1 July 2017.

Allowing Aurizon Network to revise its averaging period after it has occurred is not in the interests of access seekers or access holders (s. 138(2)(e) and (h)). It also has the potential to undermine regulatory certainty, stability and confidence in the regulatory process, which in turn could undermine the achievement of the objects of Part 5 of the Act (s. 138(2)(a) and (h)). Approval of the original averaging period, in the circumstances discussed above, appropriately balances the interest of Aurizon Network (s. 138(2)(b) and the interests of access seekers and holders (s. 138(2)(e)), as well as ensuring confidence in the process is not affected by allowing an *ex post* review of the averaging period. As discussed above, the QCA does not accept that the averaging period originally nominated by Aurizon Network is so "anomalous" that it will not result in a return that is commensurate with the regulatory and commercial risks involved in providing the services (s. 138(2)(g)). In any event, the pricing principles are only one factor to be weighed up by the QCA

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<sup>41</sup> Aurizon Network, sub. 68: 5–7; sub. 70.

<sup>42</sup> Aurizon Network, sub: 7.

under s. 138(2). The QCA considers the other factors noted above would outweigh the pricing principles in any event.

### The term of the risk-free rate

Arguments have been presented by stakeholders supporting a 10-year bond term (for example, Aurizon Network) and alternatively, stakeholders supporting a 'term-matching' approach (for example, the QRC).<sup>43</sup> The debate about the appropriate term of the risk-free rate is complex, with qualified experts on both sides arriving at opposing views. An important reason for this divergence of views is that the framework for this debate necessarily involves the CAPM itself. While the CAPM is central to the cost of capital estimation methodology, it is a model with significant limitations in its ability to characterise the real world. Given these limitations, resolving the term of the risk-free rate has involved experts either adapting features of the model to address these limitations or introducing other considerations (for example, 'real world' evidence).

Given this context, the QCA acknowledges that there are plausible arguments supporting both 'term-matching' and the 10-year bond approach. The QCA further notes that regulators in Australia have long deliberated on this matter but have yet to reach a consensus, although a 10-year bond approach is currently used by most regulators. Nonetheless, the QCA is required to form a view on this aspect of Aurizon Network's proposal, taking into account the differing views of stakeholders.

After taking into consideration matters raised by Aurizon Network and other stakeholders, as well as the expert advice of our consultant, Capital Financial Consultants (CFC), the QCA's view is that the four-year bond rate, based on the term of Aurizon Network's proposed pricing period, is a useful starting point to estimate whether a risk-free rate is sufficient to promote economically efficient investment. In forming this view, the QCA notes that, in current market conditions, the difference between risk-free rates under the two different approaches is material. Specifically, Frontier Economics (Frontier) noted that the difference between four-year and 10-year government bond yields has varied in the 50 to 70 basis point range throughout 2017.<sup>44</sup>

Aurizon Network summarised its proposal as follows:

Aurizon Network has applied a ten year maturity for the term of the risk free rate. This is supported by the accompanying report by Brattle (refer Brattle WACC Report). Ten years is the longest liquid proxy for the risk free rate available in Australia and is consistent with the long-term horizon of investors in infrastructure that has a long life.

As highlighted by Brattle, a long-term horizon is consistently adopted by all other Australian regulators (the only exception being the ERA) as well as North American regulators and Ofgem. The Australian Competition Tribunal has also observed that the use of ten year term to maturity "is not contentious". It is also commonly applied by practitioners. Ernst & Young also finds the overwhelming majority (~98%) of valuation experts use a long-term (10 year) risk free rate in independent expert reports.

The reasons Brattle cites for other regulators relying on the long-term Government bond yield as the risk free rate (which is ten years in Australia and longer in North America) is that:

- "long-term government rates, which are commonly used to measure the risk free rate, are less influenced by monetary policy than are short-term rates;
- regulated assets are long-lived;

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<sup>43</sup> Aurizon Network, sub. 1: 282–285; Aurizon Network, sub. 4; QRC, sub. 21: 15–16; Anglo American, sub. 18: 13; Fitzroy Australia Resources, sub. 22: 2; BMA, sub. 24: 2.

<sup>44</sup> Aurizon Network, sub. 37: 4.



- equity investments have a perpetual horizon, representing a claim on cashflows generated by the company's assets in perpetuity;
- the Market Risk Premium (MRP) is often measured relative to a long-term government bond.”

Aurizon Network does not consider that the term to maturity should be aligned with the length of the regulatory period, as was applied for UT4.<sup>45</sup>

In estimating the term of risk-free rate, the QCA notes that other regulators have generally accepted the argument that the term of the bond should proxy the life of the regulated asset. For the purpose of a bottom-up assessment of individual parameters, after considering all of the submissions and evidence, the QCA has matched the term of the risk-free rate to the term of the regulatory pricing period.

However, in making its decision that a WACC of 5.7 per cent is appropriate, amongst other things, the QCA has also given consideration to, and taken into account, the estimate based on a 10-year government bond yield. In making this decision, the QCA has considered alternative approaches for estimating time-variant WACC parameters adopted in other Australian regulatory decisions (see Chapter 5).

The QCA notes that setting the term of the risk-free rate with reference to the length of the regulatory term satisfies the condition that the net present value (NPV) of the expected future cash flows of the access provider should equal its initial investment (that is, the 'NPV=0 principle'). In particular, that:

- Term-matching satisfies the NPV=0 principle regardless of the term structure of interest rates, while the 10-year rate, in general, will not satisfy this principle.
- If the term of the risk-free rate is longer than the term of the regulatory period and there is a positive yield curve, Aurizon Network will be compensated for interest rate risk that it does not bear. Conversely, if there is an inverted yield curve, Aurizon Network will be undercompensated.

Aurizon Network and its consultants (Frontier and The Brattle Group) raised a number of concerns with term-matching. By way of background, Aurizon Network said that the NPV=0 principle requires the term of the discount rate to reflect the period over which there is cash flow uncertainty. Accordingly, if the cash flow uncertainty lasts for only five years, a five-year discount rate would be consistent with the NPV=0 principle. However, if the cash flow uncertainty lasts for the life of the asset, a long-term discount rate would be consistent with the NPV=0 principle.<sup>46</sup>

Given this, Aurizon Network's first point is that the NPV=0 principle only implies the term of the risk-free rate should match the term of the regulatory period if the end-of-period asset value is certain.<sup>47</sup> Accordingly, the firm's uncertain asset value at the end of the regulatory period means that the NPV=0 principle is violated under term-matching. Aurizon Network considered that its end-of-period asset value is uncertain because, as an asset servicing a single commodity that trades in a highly competitive global market, there is no certainty its RAB will be fully recovered over the long capital recovery period.<sup>48</sup>

In its later September 2017 submission, Frontier said that there are two separate issues with regard to uncertainty:

- The horizon of the cash flows, which is determined by the time over which the future cash flows are uncertain.

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<sup>45</sup> Aurizon Network, sub. 1: 266.

<sup>46</sup> Aurizon Network, sub. 1: 282.

<sup>47</sup> Aurizon Network, sub. 40: 95–96; sub. 42: 13–18.

<sup>48</sup> Aurizon Network, sub. 1: 282.

- The risk of the cash flows, which is determined by the extent to which those cash flows are uncertain; that is, the quantum of the uncertainty.

Frontier added that for regulated assets, there are long-term, uncertain cash flows and these are what determine the horizon of the risk-free rate. The quantum of the uncertainty determines the amount of the risk premium. Therefore, adding a premium for risk has no bearing on the horizon over which there are uncertain cash flows.<sup>49</sup> In support of this view, Frontier said there are two ways to highlight the time over which cash flows are uncertain and the quantum of that uncertainty:

- If it is correct to 'cut off' a series of long-run risky cash flows on the basis that uncertainty, after a certain subset of the period (for example, four years), is picked up in beta, that approach could be applied to any series of long-term risky cash flows—on the basis that the beta somehow makes up for the use of the 'wrong' risk-free rate. However, there is no way of knowing whether the adjustment to the beta is sufficient to offset the use of a risk-free rate that does not match the horizon of the risky cash flows.
- The QCA's process for estimating beta is independent of its choice of the term of the risk-free rate. If there was a 10-year or one-year risk-free rate, there would be no change to its beta estimate. Therefore, the QCA does not consider that beta somehow makes up for the use of the 'wrong' risk-free rate (that is, a short-term risk-free rate has been applied to cash flows that are uncertain and risky over the long term).<sup>50</sup>

Aurizon Network's second concern is that term-matching represents a departure from commercial practice. Aurizon Network and Frontier said that, when assessing the required return on investments in infrastructure assets, the standard approach applied by independent valuation experts and other market participants in Australia is to set the risk-free rate equal to the yield on 10-year government bonds. Frontier supported this claim by citing reports by: Grant Samuel for Prime Infrastructure (2010) and Envestra Ltd (2014); KPMG for DUET Ltd (2017); and Deloitte for Energy Developments Ltd (2015). In addition, Frontier and Aurizon Network noted that both the KPMG 2017 Valuation Practices Survey and the Fernandez 2017 survey report that respondents predominantly rely on the 10-year (or longer) government bond yield.<sup>51</sup> In this context, Aurizon Network said that the QCA's practice is a purely theoretical approach that has no regard to how investors approach WACC in practice.<sup>52</sup>

On a related point, Frontier said that the QCA's term-matching approach is not consistent with a workably competitive market benchmark, and therefore it is not consistent with the Australian Competition Tribunal's (Tribunal's) and Full Federal Court of Australia's (Federal Court's) recent decisions and IPART's views. In particular, Frontier said the Tribunal and Federal Court established that the allowed rate of return must be gauged by the disciplines of a workably competitive market; that is, an unregulated market.<sup>53</sup>

Frontier further stated that, under such an approach, evidence on required returns of otherwise similar, but unregulated, firms that operate in competitive markets would be relevant. Frontier concluded that, as the QCA's previous approach has involved adopting the perspective that regulated firms require a different return than firms operating in a competitive market—due to the former being subject to a regulatory reset process—the QCA's approach is inconsistent with the Tribunal's and Federal Court's findings.<sup>54</sup>

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<sup>49</sup> Aurizon Network, sub. 37: 6, 18, 24.

<sup>50</sup> Aurizon Network, sub. 37: 24–25.

<sup>51</sup> Aurizon Network, sub. 40: 93; sub. 42: 7–8.

<sup>52</sup> Aurizon Network, sub. 1: 284.

<sup>53</sup> Aurizon Network, sub. 37: 13.

<sup>54</sup> Aurizon Network, sub. 37: 15.

Aurizon Network's third concern is that the application of term-matching makes the QCA an outlier in regulatory practice, with the exception of the Economic Regulation Authority of Western Australia (ERA) in energy—Aurizon Network questioned why the QCA's regulatory task is different to that of other Australian regulators, which rely on similar legislative frameworks (all originating from the Competition Principles Agreement).<sup>55 56</sup>

They also noted that typical UK regulatory practice is to allow a risk-free rate that is usually above the 10-year yield and that the Federal Energy Regulatory Commission in the US uses a 30-year bond yield and the US Surface Transportation Board uses a 20-year bond yield.<sup>57</sup> Given these practices, Aurizon Network concluded that the QCA's approach introduces a 'funding premium' for investment in regulated infrastructure in Queensland to ensure equity returns are comparable to alternative investments in Australia and globally.<sup>58</sup>

Finally, Aurizon Network and Frontier said that if the QCA insists on applying term-matching in setting the risk-free rate, then for consistency the QCA should also use a risk-free rate of the same term (that is, four years) in estimating the MRP.<sup>59 60</sup>

Aurizon Network's consultant, The Brattle Group, also presented a number of detailed arguments relating to the appropriate term for the risk-free rate (see Table 24 below).

In contrast, the QRC supported term-matching, noting it is preferable to Aurizon Network's proposed 10-year bond approach because:

- the outcome of using 10-year bond rates does not satisfy the NPV=0 principle when a regulatory reset of the risk-free rate occurs after four years
- any systematic risk should be compensated through the beta parameter in the CAPM, not by extending the term of the risk-free rate to a longer term
- the fact that some regulators apply different approaches is not determinative, as the QCA's approach should be assessed on its inherent merits<sup>61</sup>
- if a different term is used for the risk-free rate, the service provider will be either over or under-compensated, relative to its efficient costs.<sup>62</sup>

Anglo American supported the QRC's position on WACC matters.<sup>63</sup> Fitzroy Australia Resources (Fitzroy) considered that no market or environmental changes have occurred since the UT4 process to justify any changes to WACC, with the exception of updating the time-variant parameters.<sup>64</sup>

The reasons for our position with respect to Aurizon Network and its consultants concerns are set out in the following subsections.

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<sup>55</sup> Aurizon Network, sub. 1: 285.

<sup>56</sup> Aurizon Network, sub. 40: 94.

<sup>57</sup> Aurizon Network, sub. 40: 94; sub. 42: 10–12.

<sup>58</sup> Aurizon Network, sub. 40: 94.

<sup>59</sup> Aurizon Network, sub. 1: 292–293; sub. 37: 7.

<sup>60</sup> Aurizon Network, sub. 40: 102–104.

<sup>61</sup> QRC, sub. 21: 15–16.

<sup>62</sup> QRC, sub. 53: 13.

<sup>63</sup> Anglo American, sub. 18: 13.

<sup>64</sup> Fitzroy, sub. 18: 2.

## The NPV=0 principle and end-of-period uncertainty

A key point raised by Aurizon Network and Frontier is that our position on term-matching, is based on the assumption that the end-of-period value of the regulatory assets is known with certainty at the outset. In particular, Frontier said that the QCA no longer proposes to rely on the certainty assumption set out in our Market Parameters decision to support limiting the term of the risk-free rate to the term of the regulatory period.<sup>65</sup> Frontier maintained that, if the firm's asset value at the end of the regulatory period is uncertain, then term-matching will violate the NPV=0 principle.<sup>66</sup>

The QCA notes Frontier's point on the end-of-period uncertainty,<sup>67</sup> although the 'term-matching proposition' is made with reference to simplifying assumptions. However, the 'certainty' assumption does not underlie the validity of the result.<sup>68</sup> Fundamentally, the issue of end-of-period uncertainty is addressed in Lally (2004). Frontier has not demonstrated any flaw in that analysis.

Term-matching will satisfy the NPV=0 principle even if there is *ex ante* uncertainty about the value of the regulatory assets at the end of the regulatory period. CFC's analysis shows that, when the end-of-period asset value is uncertain at the beginning of the regulatory period, the appropriate discount rate that satisfies the NPV=0 principle is one that involves a risk-free rate with a term that matches the term of the regulatory period.<sup>69</sup>

CFC (2017b) analyses a particular source of *ex ante* uncertainty by considering a random change to the value of the regulatory asset base at the end of the regulatory period and shows that the risk-free rate that satisfies the NPV=0 principle has a term matching the term of the regulatory period.<sup>70</sup>

In response to our draft decision, Frontier raised two principal issues with this example:

- Simply because the regulatory framework can accommodate this form of uncertainty does not mean that the framework can accommodate all forms of uncertainty about the end-of-period asset value.
- The example assumes the result that it seeks to prove—that is, it assumes that the regulator's allowed return is equal to the market's required return.<sup>71</sup>

Lally's analysis demonstrates that the regulatory framework addresses one type of uncertainty. Frontier has not sought to demonstrate that Lally's result does not hold for other types of uncertainties. Further, Lally (2004) provides a more general analysis, and in the context of the term-matching result, Lally states, 'This holds even in the presence of cost and volume risks, and risks arising from asset valuation methodologies'.<sup>72</sup> Moreover, a relevant point here is that any end-of-period uncertainty associated with the asset is not addressed by augmenting the term of the risk-free rate.

Frontier suggests that the discount rate must be the 10-year rate because this rate is used by investors.<sup>73</sup> The QCA agrees with Frontier's claim that the appropriate risk-free rate should match the horizon of the cash flows in some situations.

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<sup>65</sup> Aurizon Network, sub. 42: 15.

<sup>66</sup> Aurizon Network, sub. 42: 15–18.

<sup>67</sup> The analysis of the arguments related to this topic involve considering the views in a series of related papers over time. For instance, see Lally 2007a, Hall 2007 and Lally 2007b.

<sup>68</sup> QCA 2014c: 13, 47.

<sup>69</sup> CFC 2017b: 5–8.

<sup>70</sup> In this example, the change in regulatory asset value has an expected value of zero and is uncorrelated with market returns (CFC 2017b: 5–7).

<sup>71</sup> Aurizon Network, sub. 42: 15–17.

<sup>72</sup> Lally 2004: 18.

<sup>73</sup> Aurizon Network, sub. 42: 16.

This situation reflects a standard valuation scenario. The QCA notes that the regulatory situation differs from this standard scenario given the intermittent reset of the risk-free rate. If the uncertainty in the future regulatory cash flows is determined, at least in part, by an observable risk-free rate at intervals then the analytical process applied differs from the standard valuation process.<sup>74</sup>

As a general principle, valuation uncertainties are allowed for by adding a premium to the discount rate used to value the cash flows, not by altering the term of the risk-free rate. The QCA notes Frontier's point that an approach that 'cuts off' a series of long-run risky cash flows could be applied to any series of long-run risky cash flows.

The QCA does not accept Frontier's related argument that, given our beta estimation process is independent of the choice of the term for the risk-free rate, it cannot be the case that beta somehow makes up for the fact that the 'wrong' risk-free rate has been applied. In principle, uncertainty during the regulatory period will be captured in the returns of relevant comparators (by definition). To the extent this uncertainty has a systematic effect on returns, that effect will be reflected in the beta estimates of these comparators. Accordingly, we have not made an adjustment to beta based on the term of the risk free rate.

Moreover, to the extent any uncertainty is non-systematic, such risks could be addressed (if appropriate) through other mechanisms. The QCA notes that this decision has been made with reference to a range of mechanisms that materially reduce such uncertainty (see Chapter 2).

It does not necessarily follow that the existence of end-of-period asset value uncertainty requires the use of a long-term risk-free rate (in the presence of a shorter regulatory period). Specifically, Aurizon Network suggests that investors face uncertainty over the life of the asset and that a long-term risk-free rate would be appropriate given this long-term investor view.<sup>75</sup> The implication is that the difference between the 10-year and four-year bond rate is related to compensation for long-term uncertainty. This argument is problematic because the difference between these rates is determined principally by factors that relate to risk-free rates, such as expected future rates and compensation for holding long-term bonds.

In any case, in making its decision that a WACC of 5.7 per cent is appropriate, amongst other things, the QCA has also given consideration to, and taken into account, the estimate of using 10-year government bond yields (see Chapter 5).

### Commercial practice and the workably competitive market benchmark

The QCA acknowledges that commercial practice frequently involves using a 10-year (or longer) government bond rate. This practice involves valuation practices and differs from the regulatory task of setting an allowed rate of return for a regulatory period, and what is appropriate in one case is not necessarily appropriate in the other. While commercial valuation practice is a consideration, it is not necessarily applicable to determining the appropriate term of the risk-free rate for regulatory purposes. For the purposes of estimating a WACC on an individual parameter basis, the QCA has used a term of the risk-free rate that matches the term of the regulatory period. This is a useful starting point to consider if the estimated WACC achieves an appropriate return on investment over the regulatory period.

The QCA has also considered Frontier's suggestion that the relevant benchmark is an unregulated firm in a competitive market and that the QCA should seek to replicate workably competitive market outcomes. The QCA notes the Tribunal's and Federal Court's decisions, notwithstanding that they relate to a different regulatory regime, that conclude the benchmark firm should have a similar degree of risk to the regulated firm (and there is no need to characterise the benchmark firm as either a regulated or unregulated firm)

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<sup>74</sup> In particular, the analytical process requires recursive valuation.

<sup>75</sup> Aurizon Network, sub. 1: 282.

and that when benchmarking efficient outcomes, regulation should reference a workably competitive market (that is, an unregulated market).<sup>76</sup>

The QCA's approach is consistent with the workably competitive benchmark.

The QCA considers that the benchmark firm is likely to be a regulated firm. The QCA's view is that the presence of regulation affects risk. This effect is a consistent finding in the economics literature, and it is also consistent with views in commercial valuation practice.<sup>77 78</sup> As (systematic) risk affects beta, regulation should therefore affect beta. Therefore, our view is that it is unlikely that one would find an unregulated firm with risk that is comparable to the risk of a regulated firm.

The QCA considers that regulation should seek to mimic competitive market outcomes in the sense that (unregulated) firms in competitive markets charge prices that just cover their efficient costs, including the cost of capital—regulation should seek to do likewise. The Tribunal has noted that the NPV=0 principle is a relevant criterion to determining the cost of capital that is commensurate with efficient financing costs.<sup>79</sup>

However, the QCA does not consider that the regulator should attempt to 'match' the regulated firm to an unregulated, competitive firm in all respects, to the extent that the two firms are different. Regulated firms, by definition, are subject to regulation, which implies that they face circumstances that differ from circumstances that unregulated firms in competitive markets face. For example, regulated firms face periodic resets of their allowed revenues, while unregulated firms do not. There are a range of models applied to regulated firms; these models include revenue caps and price caps, for example. These models also contain other mechanisms, like cost pass-throughs, which affect the risk and, in turn, the cost of capital of the regulated firm. This is not the case for unregulated firms in competitive markets.

The QCA notes the Tribunal's and Federal Court's rulings and does not find any arguments that suggest that term-matching is not appropriate or not aligned with relevant competitive market benchmarks.

In any case, the QCA's view is that term-matching is a useful starting point for estimating efficient costs, and is therefore consistent with the comparable competitive benchmark. Notwithstanding this, the QCA's assessment of Aurizon Network's proposal includes a consideration of, amongst other things, the overall WACC estimate based on using 10-year government bond yields.

### The practice of other regulators

The QCA notes Frontier's survey on the term of bonds applied by regulators in Australia and internationally when setting the risk-free rate. Frontier suggested that the QCA is an outlier among regulators (along with the ERA and NZCC) and implies it is among the least 'generous' with respect to risk-free rate compensation.

A primary implication of this survey is that regulators rely on different bond yields for regulatory purposes. In the case of this decision, the QCA considers that applying a four-year risk-free rate is a useful starting point for assessing efficient costs and promoting economically efficient investment.

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<sup>76</sup> *Federal Court of Australia 2017a, Australian Energy Regulator v Australian Competition Tribunal (No 2) [2017] FCAFC 79 [536]–[537].*

<sup>77</sup> Rosenberg and Guy (1976) find that regulated industries have among the lowest betas after allowing for various firm-specific variables. Binder and Norton (1999) and Davidson, Rangan and Rostenstein (1997) show that systematic risk is inversely related to the intensity of regulation.

<sup>78</sup> For example, in the context of a systematic risk assessment of DBCT, Grant Samuel states: 'A beta in the range 0.7–0.8 has also been adopted for DBCT. While this appears low, none of the other listed ports are regulated and in Grant Samuel's view, the regulated nature of the asset (and the certainty of its cash flows) warrants a lower beta.' See Grant Samuel 2010, Appendix 1—Selection of Discount Rates: 10.

<sup>79</sup> *Application by ActewAGL Distribution [2017] ACompT 2 at [155]; QRC, sub. 53: 13.*

The QCA notes that IPART has adopted a 10-year term on the basis that this term is more consistent with long-term averages applied in setting a WACC. IPART also considered achieving NPV neutrality is not its most important regulatory objective.<sup>80</sup> Similarly, the ERA adopts a 10-year term for setting the risk-free rate for railway networks, even though it applied term-matching in its gas decisions.<sup>81</sup>

In making this decision, the QCA has also taken into account overall WACC outcomes achieved from alternative approaches/methodologies adopted in other Australian regulatory decisions with relevant comparators. In particular, the QCA has considered alternative approaches for estimating time-variant WACC parameters adopted in other Australian regulatory decisions.

The QCA has given due regard to Aurizon Network's proposal that, in the event of forming a view on term-matching when considering the risk-free rate, the QCA should also use a risk-free rate of the same term (four years) in estimating the MRP (see below).

### Additional arguments on the risk-free rate

The table below details our consideration of the detailed arguments from stakeholders in relation to the risk-free rate.

**Table 24 QCA consideration of stakeholders' comments relating to the risk-free rate**

<i>Issue</i>	<i>QCA analysis</i>
The Brattle Group said one common reason to use the long-term government bond rate, as cited by regulators, is that monetary policy influences long-term rates less, relative to short-term rates. <sup>82</sup>	The QCA does not consider the effects of monetary policy to be relevant to setting the term of the risk-free rate. The cost of capital for an asset with a life of one year and no risk would be the one-year risk-free rate, because the latter is the alternative investment with exactly the same risk. Accordingly, this would hold true even if that risk-free rate was significantly influenced by monetary policy. This is consistent with the CAPM.
The Brattle Group said the fact that Aurizon Network's assets are long-lived is inconsistent with Schmalensee's extension of the NPV=0 principle for shorter periods (rather than over the life of the project), which requires the firm to face no cash flow and asset value risks and to be solely financed by equity. <sup>83</sup>  Even accounting for Lally's previous work, The Brattle Group viewed the NPV=0 principle over a four-year horizon as only truly feasible if the risk of stranded assets or significant asset revaluations is minimal, and if the regulated price continues to be reset periodically.	The QCA considers that matching the term of the risk-free rate with the term of the regulatory cycle is not inconsistent with the NPV=0 principle. <sup>84</sup>  The QCA has taken into consideration Aurizon Network's risk in the context of the regulatory framework (see Chapter 2). The risks of asset stranding and revaluation are not relevant to the choice of the appropriate term for the risk-free rate. <sup>85</sup>
The Brattle Group pointed out that infrastructure companies, such as Aurizon, rely primarily on long-term financing. <sup>86</sup> Moreover, The Brattle Group said that equity is inherently infinite and the magnitude of long-term debt by far outweighs the short-term debt of infrastructure companies.	The QCA notes that Aurizon Network is provided with benchmark allowances for the costs of implementing the relevant swap contracts.  The QCA considers there is no inconsistency between firms using long-term debt and a regulator resetting the risk-free rate component of the cost of debt every four years using the prevailing four-year rate because firms

<sup>80</sup> IPART 2013: 9, 13. IPART is currently in the process of reviewing its WACC methodology.

<sup>81</sup> ERA 2015: 55.

<sup>82</sup> Aurizon Network, sub. 4: 6.

<sup>83</sup> Aurizon Network, sub. 4: 9.

<sup>84</sup> This position is supported by Lally's research and that of other academics.

<sup>85</sup> CFC 2017a: 15; Lally 2004: 21.

<sup>86</sup> Aurizon Network, sub. 4: 11.

<i>Issue</i>	<i>QCA analysis</i>
	can match their costs to the regulatory allowance via the use of swap contracts. <sup>87</sup>
<p>The Brattle Group said that the difference between government and corporate bond yields has widened since the financial crisis of 2008–09.<sup>88</sup> It said this indicates that either monetary policy is suppressing the risk-free rate, and/or investors now require a higher risk premium to invest in assets other than government bonds.</p> <p>In The Brattle Group's view, the implications are that the risk-free rate is too low relative to a normal benchmark and/or the MRP is too low.<sup>89</sup> As a result, in estimating the cost of equity, one should apply an upward adjustment to either the risk-free rate or the MRP.</p>	<p>The QCA considers The Brattle Group's analysis is not well-founded. As pointed out by CFC, The Brattle Group treats the debt risk premiums observed in the 2005–07 period (prior to the financial crisis) as the historical norm but supplies no evidence in support of such a claim.<sup>90</sup></p> <p>Also, it appears that The Brattle Group attributes all of the increase in the debt risk premiums to systematic risk. Importantly, The Brattle Group omitted an allowance for the inferior liquidity of corporate bonds relative to government bonds, and this allowance has risen because of the global financial crisis.<sup>91</sup> Relevant research supports taking into account an allowance for inferior liquidity.<sup>92</sup></p>
<p>EY said that independent experts do not apply a mechanistic approach in their application of the CAPM to estimate the cost of equity, especially after the global financial crisis.<sup>93</sup> For example, in its sample, EY found that 23 of the 24 expert reports in 2015 adjusted the calculated weighted average cost of capital.<sup>94</sup> Of the 23 reports, EY found 12 reports where a higher risk-free rate was adopted than the prevailing spot risk-free rate at the time.<sup>95</sup> EY also observed that some experts used long-term averages of the government bond yield for the risk-free rate as opposed to a short-term spot rate.<sup>96</sup></p>	<p>The QCA does not consider it directly relevant that, in estimating the risk-free rate, independent experts relied on long-term rates, or adopted a risk-free rate higher than the prevailing rate in their reports.</p> <p>The QCA notes that independent expert reports are concerned with valuing equities involving cash flows out to infinity.<sup>97</sup> Given the term structure of risk-free rates is upward-sloping at present, it is appropriate for the experts to use a risk-free rate in excess of even the prevailing 10-year rate in these situations. CFC noted that this practice has no implications for the QCA, as the risk-free rate in the regulatory context is revised periodically.</p>
<p>Castalia suggested that the use of a 10-year risk-free rate might be warranted if Aurizon Network was facing financeability issues.<sup>98</sup></p>	<p>The QCA notes that if the term structure of interest rates is downward-sloping, then this proposal would not help alleviate financeability concerns in any case.</p> <p>Further, as pointed out by CFC, the appropriate compensation for a regulated entity could not be provided by using a 10-year rate, as the margin between a 10-year rate and those of shorter terms bears no connection to any financeability issues.<sup>99</sup></p>
<p>Aurizon Network said that, as the equity betas of comparators are based on prices from investor valuations using a 10-year CAPM, the QCA's term-matching</p>	<p>The derivation of beta has no implication for setting the risk-free rate for regulatory purposes.</p>

<sup>87</sup> CFC 2017a: 16.

<sup>88</sup> Aurizon Network, sub. 4: 13.

<sup>89</sup> Aurizon Network, sub. 4: 13–15.

<sup>90</sup> CFC 2017a: 34–35.

<sup>91</sup> CFC 2017a: 35.

<sup>92</sup> Relevantly, Dick-Nielsen et al. 2012 conclude that the illiquidity element of the debt risk premium on United States' A-rated corporate bonds rose from 0.02% in the 2005–2007 (pre-GFC) period to 0.5% in the 2007–2009 (intra-GFC) period.

<sup>93</sup> Aurizon Network, sub. 8: 2.

<sup>94</sup> Aurizon Network, sub. 8: 2.

<sup>95</sup> Aurizon Network, sub. 8: 22.

<sup>96</sup> Aurizon Network, sub. 8: 21.

<sup>97</sup> CFC 2017a: 16.

<sup>98</sup> QRC sub. 21, Annexure 1: 11.

<sup>99</sup> CFC 2017a: 17.



<i>Issue</i>	<i>QCA analysis</i>
approach is likely to undercompensate Aurizon Network. <sup>100</sup>	
Aurizon Network considered there may be a case for a premium for systematic risk where uncertainty at the end of the regulatory period is correlated with market returns, given that such an effect is not presently accommodated within the QCA's WACC model. <sup>101</sup>	An explicit adjustment mechanism in the QCA's model for any end-of-period systematic risk would amount to double counting. This is because such risk is already empirically reflected (along with other sources of systematic risk) in the estimated equity beta of comparable firms. That is, to the extent such systematic risk is present, it is impounded in the beta estimate.
Frontier, on behalf of Aurizon Network, observed that the four-year risk-free rate is more volatile than the 10-year rate. This volatility results in a greater volatility in the prices faced by customers, and returns faced by investors, the latter of which inhibits investment. <sup>102</sup> Aurizon Network considered the effect of 'combining stable MRP and volatile risk-free rate estimates' is a volatility which is inconsistent with the QCA Act's Part 5 objective.	The QCA notes that a four-year risk-free rate (matched to the regulatory cycle) is generally more volatile than the 10-year rate. However, the QCA has, amongst other things, considered alternative approaches for estimating time variant WACC parameters when assessing the WACC proposed by Aurizon Network and approving an overall WACC of 5.7 per cent.  The QCA considers an overall WACC of 5.7 per cent will not inhibit investment.
Frontier, on behalf of Aurizon Network, argued that there is an inconsistency between the real risk-free rate used by the QCA's RAB roll-forward and the Siegel estimate of the MRP. <sup>103</sup> Aurizon Network stated that the difference in underlying methodologies and resulting inconsistency worked to its financial disadvantage. <sup>104</sup>	The QCA acknowledges that there is a difference in methodologies, but consider that there are legitimate reasons for this difference in approaches. <sup>105</sup> The QCA's approach of using RBA inflation forecasts for the RAB roll-forward is justified on the basis of biases arising from the use of the 'break-even' approach to inflation. Consistency with this approach suggests also applying RBA inflation forecasts in determining the Siegel estimator for the MRP. However, the use of RBA forecasts over the period in which the Siegel estimator is determined (1958–2017) would be problematic because, for most of the period, there are no such forecasts to implement that approach.  This difficulty leaves two possibilities. The first is to average over inflation-indexed government bond yields for the period in which they are available (from 1987). The other possibility is to average over <i>ex post</i> real returns on nominal bonds over long periods of stable inflation. The QCA considers evidence from both approaches, and the results are similar.

In conclusion, the QCA considers a risk-free rate of 1.90 per cent per annum, based on a four-year bond term and an averaging period of the 20 business days up to, and including, 30 June 2017 (using Commonwealth Government bonds as the proxy for the risk-free asset), is an appropriate starting point for assessing Aurizon Network's proposed WACC.

Notwithstanding this, in assessing Aurizon Network's proposed WACC the QCA has given consideration to the overall WACC estimate based on using 10-year government bond yields.

<sup>100</sup> Aurizon Network, sub. 40: 93–94.

<sup>101</sup> Aurizon Network, sub. 40: 95–96; sub. 42: 17–18.

<sup>102</sup> Aurizon Network, sub. 40: 98–99; sub. 42: 21–22.

<sup>103</sup> Aurizon Network, sub. 42: 19–20.

<sup>104</sup> Aurizon Network, sub.40: 96–98.

<sup>105</sup> CFC 2018: 13–14.

## Market risk premium

### Aurizon Network's proposal

In its 2017 DAU, Aurizon Network proposed an MRP estimate of 7.0 per cent per annum. Aurizon Network said this estimate is based on applying Frontier's proposed decision-making framework (described in more detail later) to the QCA's preferred set of MRP estimates (from the QCA's estimation methods) in its DBCT draft decision.<sup>106</sup> Aurizon Network further said that its proposed estimate is conservative, noting that its consultants, Frontier and The Brattle Group, proposed estimates of 7.55 per cent and 7.7 per cent respectively.<sup>107</sup> The basis of Aurizon Network's estimate is described in Table 25.

**Table 25 The MRP proposed in the 2017 DAU (Frontier's framework with QCA's DBCT draft decision estimates)**

<i>Method</i>	<i>MRP (%) Nov 2016<sup>a</sup></i>
<b><i>What would the MRP estimate be, based upon past return information?</i></b>	
Historical excess returns (Ibbotson)	6.40
Historical excess returns adjusted for inflation (Siegel)	5.40
Historical real returns (Wright)	8.87 <sup>b</sup>
Average historical estimates	6.89
<b><i>What would the MRP estimate be, based upon contemporaneous information?</i></b>	
Dividend discount model (Cornell)	8.17 <sup>b</sup>
Market indicator approach	No specific estimate
Survey evidence	6.00
Average contemporaneous estimates	7.09
<b><i>What is the overall MRP estimate?</i></b>	6.99 <sup>c</sup>

*a* Aurizon Network's 2017 DAU was submitted in November 2016, but the relevant time period for the estimates in the table is October 2015, which was the indicative averaging period for the DBCT draft decision.

*b* Aurizon Network apparently adopts the estimate from Frontier's report. Frontier explains it adjusts the QCA estimate from the DBCT draft decision by subtracting the difference in risk-free rates. Frontier uses a risk-free rate of 2.13%, while the draft decision uses a risk-free rate of 2.1% (Aurizon Network, sub. 9: 38).

*c* To obtain an overall estimate, Aurizon Network averages the 'average historical estimate' and 'average contemporaneous estimate' (Aurizon Network, sub. 1: 269–70).

In its subsequent September 2017 submission, Aurizon Network revised its estimate to 7.5 per cent.<sup>108</sup> This estimate is based on setting aside the QCA's preferred estimates in the DBCT draft decision and applying the decision-making framework to Frontier's updated estimates corresponding to Frontier's methodological approach.

In particular, Frontier excluded the Siegel method and the survey method but included an estimate for 'market indicators'. Frontier averaged the Ibbotson and Wright estimates to obtain an historical estimate and then averaged the Cornell dividend growth model (DGM) estimate and 'market indicators' estimate to obtain an estimate from prevailing market data. Frontier took an equally weighted average of these two

<sup>106</sup> Aurizon Network, sub. 1: 269–270.

<sup>107</sup> Aurizon Network, sub. 1: 270–271.

<sup>108</sup> Aurizon Network, sub. 36: 3.

results to obtain an overall estimate. These are set out in Table 26, which reproduces Frontier's summary of MRP estimates.<sup>109</sup>

**Table 26 Summary of Frontier MRP estimates**

<i>Method</i>	<i>November 2016 report</i>	<i>Data at June 2017</i>
Ibbotson	6.4	6.5
Wright	8.9	8.9
<b>Historical data (avg)</b>	<b>7.6</b>	<b>7.7</b>
Cornell DGM	8.1	7.5
Market indicators	6.9	7.3
<b>Prevailing market data (avg)</b>	<b>7.5</b>	<b>7.4</b>
<b>Final estimate</b>	<b>7.5</b>	<b>7.6</b>

*Note: The November 2016 report refers to a report by Frontier Economics, The market risk premium.*

*Source: Aurizon Network, sub. 38: 39.*

Further, Aurizon Network said that retaining the QCA's methods, but applying Frontier's framework, results in an updated MRP of 7.5 per cent.<sup>110</sup> That is, if one includes (and updates from the DBCT draft decision) estimates from the Siegel method (5.7%), surveys (8.3%) and independent expert reports (7.9%) with the above—and takes a simple average across all estimates—the result would be 7.5 per cent.<sup>111</sup> However, Frontier considered 7.5 per cent to be downward-biased in current market conditions because the estimate gives weight to the Siegel estimate and it doubles the weight applied to historical excess returns (by relying on both the Ibbotson and Siegel methods). Frontier considered that the 2017 DAU proposal of 7.0 per cent was conservative and has become more conservative since the November 2016 proposal.<sup>112 113</sup>

### QCA analysis and decision

Assessing the appropriate estimate of the MRP requires the QCA to exercise its judgement, as the MRP is not observable and there is no single estimation technique that is capable of producing a 'correct' estimate of the MRP.<sup>114</sup> Consequently, the QCA must weigh the evidence from each estimation technique, having regard to its relative strengths and weaknesses. Relevantly, the QCA has also considered whether Aurizon Network's proposed MRP is appropriate.

Aurizon Network raised three fundamental concerns with our draft decision MRP estimate of 7.0 per cent:

- It is inconsistent with the evidence of an increase in the MRP in prevailing market conditions.
- The MRP is based on estimates from several methods, some of which have been computed relative to the 10-year risk-free rate, while others have been computed relative to a four-year risk-free rate—however, they should all use the four-year rate.

<sup>109</sup> Aurizon Network, sub. 38: 39.

<sup>110</sup> Aurizon Network, sub. 36: 3.

<sup>111</sup> For this calculation, Frontier excluded the 'market indicators' estimate, as the QCA considers market indicators qualitatively (Aurizon Network, sub. 38: 40).

<sup>112</sup> Aurizon Network, sub. 38: 39–40.

<sup>113</sup> Presumably, this remark is in reference to the increase in the overall MRP estimate from 7.5% to 7.6%.

<sup>114</sup> Australian Competition Tribunal 2016b, *Applications by Public Interest Advocacy Service Ltd and Ausgrid Distribution* [2016] ACompT 1 [800]; Australian Competition Tribunal 2012, *Application by WA Gas Networks Pty Ltd (No 3)* [2012] ACompT 12 [105]–[110].

- The QCA's exercise of regulatory discretion in determining the MRP disproportionately dampens the proposed MRP estimate.<sup>115</sup>

Aurizon Network supported the use of a four-year risk-free rate to estimate the MRP but said that our proposed MRP of 7.0 per cent does not equate to a determination that the MRP has increased since the UT4 decision. Rather, Aurizon Network considered that the MRP has increased solely due to implementing consistency in our methodological approach.

In support of this view, Frontier observed that, under our previous approach, the cost of equity for a firm of average risk would be 8.9 per cent, the sum of a 10-year risk-free rate of 2.4 per cent and an MRP of 6.5 per cent. As the current approach also produces a return on equity of 8.9 per cent, the sum of a risk-free rate of 1.9 per cent and an MRP of 7.0 per cent, Frontier said the UT5 decision does not increase the MRP.<sup>116</sup>

The QCA does not agree with Aurizon Network's and Frontier's claims. The increase in the MRP from 6.5 per cent to 7.0 per cent is the result of both implementing the four-year rate for some methods and exercising our judgment as to an appropriate estimate from within a reasonable range (the latter being informed by our preferred set of methods).

The QCA does not agree that Frontier's example demonstrates the point that the QCA has not increased the MRP. Indeed, Frontier's argument is a 'red herring' and focuses on the cost of equity when the relevant issue is the MRP. If the differential in risk-free rates was any other value than 0.5 per cent, the two costs of equity would not have been the same—such a difference would no more disprove Frontier's argument than the current difference proves it.

Aurizon Network's second major concern is that some of our methods use a four-year risk-free rate, while others use a 10-year rate. Aurizon Network said that taking a weighted average of estimates that reflect an amalgam of four-year and 10-year risk-free rates is an inconsistent basis for determining an MRP estimate. In particular, Aurizon Network said that adjusting the survey estimate to reflect the four-year risk-free rate would result in an MRP estimate of 7.5 per cent.<sup>117</sup>

The QCA notes Aurizon Network's concern—below is a detailed explanation of our reasons for the terms chosen for each estimation method. More generally, the QCA does not agree that it is necessary—for purposes of consistency—to use a four-year risk-free rate for computing the MRP under all methods. The choice depends on which risk-free rate provides the 'best' estimate of the MRP.<sup>118</sup>

That said, the QCA agrees with Aurizon Network's and Frontier's view that a 10-year rate should be applied for the surveys, but for different reasons. The QCA has re-calculated the MRP arising from that method. When combined with the experts' estimate, the overall range increases to 6.7 per cent excluding imputation credits and 7.6 per cent including imputation credits, and the midpoint is 7.2 per cent. While the midpoint increases from 7.0 per cent to 7.2 per cent, this change does not affect our decision that 7.0 per cent is an appropriate estimate of the MRP at this time.

Aurizon Network also expressed the concern that our exercise of regulatory discretion in determining the MRP disproportionately dampens the proposed estimate. In particular, the set of decisions made by us with respect to the choice of methods and weightings leads to an MRP estimate that is unreasonable. Specific instances where, in deciding the appropriate estimate, Aurizon Network questioned our discretion relate to: material weight given to the Siegel method; reduction in weight given to the Fernandez et al. survey;

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<sup>115</sup> Aurizon Network, sub. 40: 101.

<sup>116</sup> Aurizon Network, sub. 42: 6–7.

<sup>117</sup> Aurizon Network, sub. 40: 102.

<sup>118</sup> In this context, 'best' is normally understood to mean the estimate that minimises mean square error. See the section on the dividend growth model for an explanation of why a four-year risk-free is 'best' in estimating the MRP using that method.

weight assigned to the Ibbotson/Siegel methods relative to the Wright method; and the adjustments for the effects of imputation.<sup>119</sup>

The QCA addresses these specific instances and explain the reasons for our choices of methods and their implementation later in this appendix. In general, our choices are guided by methodological considerations, including the objective of obtaining the best estimate of the MRP from each method. Moreover, the QCA exercises judgment and regulatory discretion in choosing a final estimate based on the evidence from our preferred set of methods. Contrary to Aurizon Network's and Frontier's claims, the QCA does not simply apply a mechanical set of numerical weights in exercising that judgment.

It is also not the case that the QCA has exercised discretion in a manner that disproportionately dampens the MRP estimate to the disadvantage of Aurizon Network. In this respect, the QCA notes that there a number of instances where, in deciding the appropriate estimate, the QCA has exercised discretion, and the result has been an increase in an estimate from a particular method or to the weight placed on an estimate from that method.

For instance, in making the draft decision, the QCA increased its emphasis on the Wright estimate given the data does not admit a strong conclusion that the MRP is less variable over time than the cost of equity. The QCA also increased our dividend growth model estimate from 5.4 per cent to 6.4 per cent to reflect share buybacks. Both of these decisions were made after considering arguments from all stakeholders, and the conclusions were broadly consistent with Aurizon Network's and its consultants' submissions on these topics.<sup>120</sup> Finally, the QCA notes that this decision is that an MRP of 7.0 per cent is appropriate, which is consistent with Aurizon Network's original proposal.

In addition to these fundamental concerns, Aurizon Network also raised a number of methodological issues with our approach.

Aurizon Network said a key concern regarding our approach is that it presumes the MRP is stable through time, noting that the QCA's estimate has remained at 6.5 per cent since 2013.<sup>121</sup> Frontier said that the QCA's approach produces implausible results—that the QCA's MRP estimates are 'sticky' regardless of market circumstances, and as a result, the QCA's allowed return on equity always rises and falls one-for-one with changes in government bond yields.<sup>122</sup> Referring to the QCA's draft decision on DBCT's 2015 DAU, Frontier said it appears that the QCA did not allow current market information to impact upon its conclusion.<sup>123</sup>

For these reasons, Aurizon Network and Frontier both expressed a strong preference for a framework that groups methods into different categories, based on their historical or forward-looking perspectives, and then applies specific weights to the estimates in those categories. Frontier's view is that such a framework would allow current information to be better taken into account, and this is important as current conditions are materially different from the long-term average.<sup>124</sup>

The QCA has considered this submission and agree that it is important for our decision on the MRP to be informed by current market conditions. However, the QCA does not believe a decision on an appropriate MRP estimate is readily amenable to the mechanical procedure proposed by Aurizon Network and Frontier. The QCA considers this matter in more detail further below.

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<sup>119</sup> Aurizon Network, sub. 40: 101, 104–105.

<sup>120</sup> While listing several areas in which Aurizon Network says our decisions on MRP estimation disadvantage it, neither Aurizon Network nor Frontier acknowledges that the QCA has adjusted the dividend growth model estimate upward to reflect the impact of share buybacks.

<sup>121</sup> Aurizon Network, sub. 1: 285.

<sup>122</sup> Aurizon Network, sub. 9: 23–25.

<sup>123</sup> Aurizon Network, sub. 9: 24–25.

<sup>124</sup> Aurizon Network, sub. 9: 10–13.

In response to Aurizon Network's proposal, the QRC proposed that the QCA should return to the long-run MRP estimate:

The QRC continues to consider that the most appropriate estimate for the market risk premium (MRP) is 6%, and that the QCA's UT4 estimate of 6.5% is overly conservative and favourable to Aurizon Network ...

The QRC has never been convinced that, given that analysis, a move from 6% to 6.5% was justified. That is particularly the case given the upward bias present in the Cornell dividend growth model, as acknowledged by the QCA, and its higher sensitivity to input assumptions.<sup>125</sup>

In recognition of the unobservable nature of the MRP, the QRC also accepted that the QCA was required to exercise informed judgement in deciding on the appropriate MRP:

The QRC continues to accept the QCA's views that MRP is, by its nature, not observable and requires estimation, which in return requires regulatory judgement and an assessment of the strengths and weaknesses of available estimation techniques and examination of other information.<sup>126</sup>

The QRC expressed the concern that our draft estimate of 7.0 per cent for the MRP is highly conservative in favour of Aurizon Network. While the QRC supported us giving consideration to a range of evidence, it considered that the QCA had ascribed too much weight to estimates from surveys/independent expert reports and from the Wright approach. The QRC considered that the weight of current evidence indicates that the best point estimate of the prevailing MRP is 6.5 per cent.<sup>127</sup>

Given that the MRP is estimated for the regulatory term, it could be anticipated that short-term market fluctuations during the regulatory cycle result in the true MRP being either higher or lower than the MRP estimated at the previous regulatory reset. Further, it is likely that the MRP varies over time.<sup>128</sup> This point is relevant given the observably low risk-free rate and the plausible (negative) correlation between the risk-free rate and the MRP.

In making this decision, the QCA has considered all information before us and have undertaken our own analysis of these matters. The QCA has placed greater emphasis on current market conditions. By doing so, the QCA believes that our consideration of evidence from historical information and prevailing market conditions is evenly balanced.

First, the Cornell-type DGM, notwithstanding the volatility of estimates from that method, should be given more emphasis, as it is the only method that is fully forward-looking. In this context, the QCA observes that the Ibbotson and Cornell DGM are the only two methods that are completely distinct estimators (that is, the former being historical and the latter being forward-looking). Other methods are variants of these two principal methods.

Second, the Wright method, which assumes a constant (stable) real cost of equity, should receive greater emphasis than before. Even though available empirical evidence in the Australian context supports more stability in the MRP relative to the return on equity, this evidence is not determinative.<sup>129</sup>

The QCA considers that this approach gives appropriate emphasis to estimates from methods that reflect current market conditions, including both the Cornell DGM method and the Wright method. The QCA also notes our considerations are consistent with CFC's view that the 'best' estimate of the MRP at a particular

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<sup>125</sup> QRC, sub. 21: 17, 18.

<sup>126</sup> QRC, sub. 21: 18.

<sup>127</sup> QRC, sub. 53: 15–16.

<sup>128</sup> QCA 2014c: 87.

<sup>129</sup> See the subsection on the Wright method where the QCA elaborates on this point.

time is normally understood to be the estimate that minimises the mean square error (MSE).<sup>130</sup> Importantly, the MSE is likely to be minimised by having regard to estimates from valid methods using estimators that are less than perfectly correlated.

The QCA has considered Aurizon Network's concern regarding the perceived inconsistency between using a four-year risk-free rate in the first term of the cost of equity and a 10-year risk-free rate to estimate the MRP. As a result, the QCA has made an explicit adjustment to most of the MRP estimates to address this matter (discussed in detail further below).<sup>131</sup>

Taking this factor into account, the updated estimates are the following:<sup>132</sup>

- The Ibbotson estimate is 6.6 per cent for the preferred sampling period of 1958–2017.
- The Siegel estimate is 5.9 per cent for the preferred sampling period of 1958–2017.
- Survey and independent expert report evidence supports an estimate of 6.7 per cent excluding imputation credits, and 7.6 per cent including imputation credits—the midpoint is 7.2 per cent.
- Cornell dividend growth estimates range from 5.6 per cent to 7.5 per cent, with a median estimate of 6.4 per cent.
- The Wright estimate is 9.5 per cent for the preferred sampling period of 1958–2017.

These estimates of the MRP range from 5.9 to 9.5 per cent. In examining the estimates, the QCA notes the central estimate is the Ibbotson historical estimate of 6.6 per cent. Of the three methods that convey information about current market conditions, the QCA observes the Cornell DGM estimate of 6.4 per cent sits marginally below the central estimate of 6.6 per cent, while both the survey estimate of 7.2 per cent and the Wright estimate of 9.5 per cent sit materially above 6.6 per cent.<sup>133</sup>

The selection of a point estimate from within this range ultimately involves applying a degree of regulatory discretion, given that the current MRP is unobservable and there are difficulties with identifying a single set of objective weights and with deterministically applying such weights to obtain a final MRP estimate.

That said, summary statistics, such as the mean and median, serve as useful reference points to inform our judgement. However, the QCA emphasises again that such statistics are not determinative. With these considerations in mind, the QCA notes that a simple average of the five estimates gives an MRP estimate of 7.1 per cent, while the median is 6.6 per cent. A weighted mean, based on a credible set of weights consistent with our assessment of the relative strengths and weaknesses of the methods, is 7.0 per cent.<sup>134 135</sup>

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<sup>130</sup> The mean square error (MSE) is the sum of the variance and the square of the bias.

<sup>131</sup> Specifically, the historical bond yield difference applies to the Ibbotson estimate, Siegel estimate and to the survey/independent experts' estimates. A current difference applies to the Wright estimate. However, there is no basis for any adjustment to the Cornell DGM estimate.

<sup>132</sup> These results were estimated with respect to the 20 business days immediately preceding 1 July 2017 in order to maintain consistency with Aurizon Network's proposed averaging period. All estimates are based on a utilisation rate of imputation credits of 0.55.

<sup>133</sup> The Wright method is a hybrid because it is based on the historical real return on equity and a current expected rate of inflation and a current risk-free rate.

<sup>134</sup> For example, one such credible set of weights is: Ibbotson (25%); Cornell DGM (25%); Siegel (15%); Wright (15%); and surveys (20%).

<sup>135</sup> While the midpoint of the survey/experts' estimates has increased from 7.0% to 7.2% since the draft decision, the weighted mean, simple mean, and median presented here do not change given the degree of rounding of the numbers for presentation purposes.

The simple mean, weighted mean and median all lie within a relatively narrow range of 6.6 per cent to 7.1 per cent. Applying our judgment to the various information before us and having regard to this range, the QCA considers that an appropriate estimate of the MRP is 7.0 per cent at this time.<sup>136</sup> Based on this analysis, the QCA considers that an MRP of 7.5 per cent is too high and above the range supported by this analysis. An MRP which is higher than the evidence suggests would not be in the interests of access seekers or access holders. A WACC based on an MRP that is too high will overcompensate Aurizon Network for the commercial and regulatory risks associated with providing access to the CQCN and will not promote the objects of Part 5 of the QCA Act (s. 138(2)(a)). An MRP of 7 per cent is supported by the evidence and provides an appropriate balance between the interests of Aurizon Network (s. 138(2)(b)), access holders (s. 138(2)(h)) and access seekers (s. 138(2)(e)) and will produce a return commensurate with the regulatory and commercial risks involved in providing the service (s. 138(2)(g)).

In forming this view, the QCA has placed greater emphasis on the Cornell DGM and Wright estimates than in previous decisions.<sup>137</sup> In addition, the QCA notes that a component of the survey estimate (that is, the Fernandez et al. 2017 survey result) has materially increased, from 6.0 per cent to 7.6 per cent (7.9 per cent including the adjustment for the risk-free rate differential), since our previous assessment. Finally, estimates from four of the five methods have increased, in some cases materially, since the DBCT final decision—our most recent assessment of the MRP, which applied an MRP of 6.5 per cent.

However, the QCA does not consider that the MRP is higher than 7.0 per cent at this time. Both the Ibbotson estimate of 6.6 per cent and the Siegel estimate of 5.9 per cent sit below 7.0 per cent, and it is important to have appropriate regard to these historical estimates when properly taking into account both the bias and variance of the estimates from all of the methods (and the historical methods tend to have lower variances than the estimates produced by the other methods).

Therefore, having taken into account the circumstances before the QCA—including, but not limited to, the level and term of risk-free rates, the robustness of the data available, the range of MRP estimates and the overall return on equity proposed by the QCA's decision—the QCA's decision is to adopt an MRP of 7.0 per cent. Nevertheless, the QCA does not accept the underlying methodology used by Aurizon Network to reach its proposed estimate.

***Estimating a MRP for a 10-year risk free rate***

To the extent that a 10-year MRP was to be estimated, the QCA considers 6.5 per cent would be appropriate.

- The Ibbotson estimate is 6.3 per cent for the preferred sampling period of 1958–2017.
- The Siegel estimate is 5.6 per cent for the preferred sampling period of 1958–2017.
- Survey and independent expert report evidence supports an estimate of 6.4 per cent excluding imputation credits, and 7.2 per cent including imputation credits—the midpoint is 6.8 per cent.
- Cornell dividend growth estimates range from 5.6 per cent to 7.5 per cent, with a median estimate of 6.4 per cent.
- The Wright estimate is 9.0 per cent for the preferred sampling period of 1958–2017.

These estimates of the MRP range from 5.6 to 9.0 per cent. In examining the estimates, we note the three central estimates average 6.5 per cent (being the Cornell DGM at 6.4 per cent, Ibbotson historical estimate of 6.3 per cent, and survey estimate 6.8 per cent). Of the three methods that convey information about current market conditions, we observe the Cornell DGM estimate of 6.4 per cent sits marginally below the central estimate of 6.5 per cent, while the survey estimate of 6.8 per cent is marginally above and the Wright estimate of 9.0 per cent is materially above 6.5 per cent.

<sup>136</sup> While our preferred estimate of 7.0% corresponds to the weighted average, the QCA did not mechanically compute a statistic to arrive at our preferred estimate.

<sup>137</sup> See the discussion of the Wright method below.



The selection of a point estimate from within this range ultimately involves applying a degree of regulatory discretion, given that the current MRP is unobservable and there are difficulties with identifying a single set of objective weights and with deterministically applying such weights to obtain a final MRP estimate.

That said, summary statistics, such as the mean and median, serve as useful reference points to inform our judgement. However, we emphasise again that such statistics are not determinative. With these considerations in mind, we note that a simple average of the five estimates gives an MRP estimate of 6.8 per cent, while the median is 6.4 per cent. A weighted mean, based on a credible set of weights consistent with our assessment of the relative strengths and weaknesses of the methods, is 6.7 per cent.

Therefore, having taken into account the circumstances before the QCA—including, but not limited to, the level and term of risk-free rates, the robustness of the data available, the range of MRP estimates and the overall return on equity proposed by the QCA's decision—the QCA considers that an MRP of 6.5 per cent would apply for a 10-year term.

Given the true MRP changes over time and historical averages may adjust slowly to changes in current market conditions, the QCA emphasises that the decision to adopt an MRP of 7.0 per cent does not establish a new benchmark MRP of 7.0 per cent to apply for future reviews. Rather, the QCA will consider the relevant information and evidence before it at the time of each future decision.

The QCA's approach reflects the fact that there is no single analytical methodology capable of determining the 'right' estimate for the MRP; hence, it is necessary to assess the strengths and weaknesses of the available techniques, as well as to examine other relevant information, to determine an overall value for the MRP that is considered to be appropriate having regard to the statutory criteria. In our view, this is consistent with the requirement for us to have regard to the relevant factors set out in the QCA Act for assessing Aurizon Network's 2017 DAU, thereby achieving an appropriate balance between the competing interests of stakeholders. The QCA Act contains no requirements for the QCA to adopt a mechanistic methodology for determining a value for the MRP.

The QCA also notes that an estimate of 7.0 per cent per annum is consistent with the range of recent estimates from other regulators.

### Market risk premium estimates from various regulators' decisions

The QCA notes estimates of the MRP from other Australian regulatory decisions (dated between June 2015 and May 2018) generally range between 6.0 to 7.75 per cent. Our estimate of 7.0 per cent for the MRP is within the range of estimates by other regulators, over time.

The QCA notes that the AER recently released its draft Rate of Return Guidelines (July 2018), which recommended an MRP of 6.0 per cent be adopted as part of its WACC methodology. The QCA has not given any weight to the AER's review of its rate of return guideline at this time.

In addition, the QCA notes that the combination of an MRP of 7.0 per cent and an equity beta of 0.73 produces a margin of 509 basis points above the risk-free rate, which provides Aurizon Network with an appropriate return on equity, when taken with the most appropriate empirical estimate of Aurizon Network's systematic risk (having regard to the overall systematic risk that arises under the regulatory framework)<sup>138</sup> and which is commensurate with the regulatory and commercial risks involved in providing the service. See below for the QCA's consideration of the overall return on equity.

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<sup>138</sup> The 509 basis points is less than the product of 0.73 and 7.0% (511 basis points) because the equity beta is rounded up to 0.73 for presentation purposes.

## Frontier's proposed decision-making framework

Aurizon Network has applied Frontier's proposed decision-making framework for determining an MRP estimate. In Aurizon Network's and Frontier's view, the MRP estimation process should be more objective, transparent and responsive to timely market information.<sup>139</sup>

As seen in Table 25, Frontier's framework assigns individual estimation methods to separate categories and then assigns weights at two different levels (at the method level and then at the category level) to calculate the MRP estimate. Frontier considered this framework reflects the fact that not all estimation methods relate to the same thing—some address the question of what the MRP estimate would be, on average, and others address the question of what the MRP estimate is today, given current market circumstances (that is, stock prices, government bond yields, etc.).<sup>140</sup>

The QCA does not consider Frontier's framework for arriving at an estimate of the MRP is appropriate.<sup>141</sup> The QCA considers that it has appropriately considered past information as well as contemporaneous market information. As mentioned above, there is no single analytical methodology capable of determining the 'right' estimate for the MRP; hence, it is necessary to assess the strengths and weaknesses of valid techniques, as well as examine other relevant information, to determine what an appropriate overall value for the MRP is. With respect to the concerns about transparency, the QCA considers that substantial detail has been made available to inform stakeholders on the approach used by the QCA.

Further, the QCA does not see any clear incremental benefit in separating the individual methods into categories and then assigning weights at two separate levels. Our methodology involves assessing the relative strengths and weaknesses of the individual methods, and this analysis serves as a basis for informing our overall judgement on an appropriate MRP for Aurizon Network's declared service. As pointed out by CFC, the attempt to classify the MRP estimation methods into categories is itself problematic.<sup>142</sup>

In particular, our view is that such an approach conveys a false sense of methodological rigour. As an example, Frontier estimates an MRP of 7.5 per cent based on applying 50 per cent weight to estimates from historical methods and 50 per cent weight to estimates from prevailing market data.<sup>143</sup> In doing so, Frontier categorises the Wright method as historical.

However, the Wright method is a hybrid method, because it relies on both historical and contemporaneous data. Specifically, it uses an (average) historical real return on equity but combines it with a current expected inflation rate and then deducts a current risk-free rate. On the basis that the latter two components reflect prevailing market conditions, the method could be categorised as an estimate based on prevailing market data. Categorising the Wright method in this way would decrease Frontier's MRP estimate from 7.5 per cent to 7.125 per cent. It is not clear that such an approach brings clarity and objectivity to the estimation and decision-making process.

## Further MRP considerations

Aurizon Network said that applying Frontier's framework to estimates from the QCA's methods results in an MRP of 7.5 per cent.<sup>144</sup> Frontier considered the 7.5 per cent updated estimate to be biased downward,

<sup>139</sup> Aurizon Network, sub. 1: 286; sub. 9: 1–3.

<sup>140</sup> Aurizon Network, sub. 9: 39.

<sup>141</sup> The QCA notes that Frontier's framework contradicts Aurizon Network's argument that our pre-2013 MRP methodology was too 'mechanistic' (see Aurizon Network 2013: 117).

<sup>142</sup> CFC 2017a: 29.

<sup>143</sup> In the former category, Frontier includes the following methods: Ibbotson (6.5%), Siegel (5.7%) and Wright (8.9%)—the average is 7.0%. For the latter category, Frontier includes Cornell DGM (7.5%), surveys (8.3%) and independent expert reports (7.9%)—the average is 7.9% (Aurizon Network, sub. 38: 40).

<sup>144</sup> Aurizon Network, sub. 36: 3.

as it gives weight to the Siegel method and double-counts the weight given to historical excess returns (that is, by including estimates from both the Ibbotson and Siegel historical methods).<sup>145</sup>

The QCA does not agree with Aurizon Network's and Frontier's conclusions. While Frontier produces an estimate of 7.5 per cent from the set of methods the QCA relies upon, Frontier's implementation of them involves Frontier's methodological assumptions and choices, some of which are not consistent with our approaches. In particular, the QCA's view is that Frontier does not implement the Cornell DGM in an appropriate manner.<sup>146</sup> In addition, in deducing 'effective MRPs' from independent expert reports, Frontier adds each valuer's risk-free rate to the baseline MRP and then deducts a (typically lower) contemporaneous risk-free rate. By doing so, Frontier attributes all uplifts (above the contemporaneous risk-free rate) to the MRP. The QCA does not agree with this practice—there are a number of reasons why valuers apply uplifts, and such reasons, in general, are not relevant to the regulatory situation.

Further, for the reasons set out below, the QCA maintains that the Siegel method is a valid approach for estimating the MRP. While there is substantial correlation between the Ibbotson method and the Siegel method, they both contain different, relevant information. Relevantly, the QCA also notes that the Ibbotson and Wright methods involve substantial correlation. Therefore, it is not consistent for Frontier to claim that the MRP estimate of 7.5 per cent is biased downward from 'double-counting', due to us considering both Ibbotson and Siegel estimates, while at the same time Frontier ignores the substantial correlation between the Ibbotson and Wright estimates.<sup>147</sup>

On a related matter, the QCA also notes that Frontier considered that the QCA gives disproportionate weight to the Ibbotson/Siegel approach in comparison to the Wright approach. Specifically, Frontier said the combined weight the QCA applies to the Ibbotson and Siegel estimate is 40 per cent, while the Wright estimate receives only 15 per cent weight. Frontier disagreed with this relativity because both the Ibbotson and Siegel methods are based on the assumption that the MRP is constant in all market conditions, while the Wright method is based on the assumption that the MRP varies over time with changes in the risk-free rate. Further, Frontier said that our own empirical testing led us to conclude there is no significant difference between the two.<sup>148</sup>

The QCA does not simply apply a set of deterministic weights and calculate an MRP. That said, the QCA considers that Frontier has misrepresented our previous comments on this matter.<sup>149</sup> The QCA previously explained that the empirical evidence—which Frontier did not contest—supports the Ibbotson/Siegel assumption over the Wright assumption and therefore, supports giving greater emphasis to the Ibbotson/Siegel estimates. However, the QCA also noted that testing statistical significance of the difference is problematic. Given that limitation, the QCA revised its position to give more emphasis to the Wright estimate. The analysis does not support giving equal weight to the Wright estimate.

Finally, the QCA notes Frontier highlights a research paper, which, according to Frontier, indicates that, in Australia price-earnings (P/E) ratios have generally fallen with the recent decline in government bond yields.<sup>150</sup> Frontier said this evidence suggests that equity investors have offset the decline in government

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<sup>145</sup> Aurizon Network, sub. 38: 39–40.

<sup>146</sup> Given the technical nature of these issues, the QCA's views are outlined below.

<sup>147</sup> The largest source of variation, the real equity return, is common across the Ibbotson, Siegel and Wright methods.

<sup>148</sup> Aurizon Network, sub. 43: 19.

<sup>149</sup> Frontier stated that "...the QCA notes it has attempted to test the Ibbotson/Siegel and Wright assumptions and concludes that there is no significant difference between the two" (Aurizon Network, sub. 43: 19). This statement is not correct. The empirical evidence supports the Ibbotson method over the Wright method but the QCA is unable to test the statistical significance of the difference. The QCA did not conclude, as suggested by Frontier, that there is no significant difference between the two.

<sup>150</sup> Aurizon Network, sub. 9: 16–19.

bond yields by adopting a higher MRP, leaving the required return on equity largely unchanged.<sup>151</sup> However, as pointed out by CFC, the P/E ratios, and the inverse earnings (E/P) yields, are also affected by other factors, such as growth forecasts for cash flows and short-term fluctuations in earnings.<sup>152</sup> For that reason, the QCA does not consider that one can deduce anything conclusive about changes in the market cost of equity from changes in P/E ratios and earnings yields.

### QCA MRP estimation methodologies and comments

Stakeholders also made comments regarding aspects of the individual estimation methods and how the QCA applies them.<sup>153</sup>

#### Terms of the risk-free rate and the MRP

The Brattle Group said that the risk-free rate used in the CAPM should be consistent with the one used in measuring the MRP; otherwise, the cost of equity and the WACC would be biased due to a maturity premium. The Brattle Group noted Lally's suggestion that there could be a term structure for market return, so that the expected market return would be higher if defined over a 10-year horizon rather than a four-year horizon. The Brattle Group said even if Lally's claim was true, it would only apply to a forecast MRP, not to the MRP based on historical data.<sup>154</sup>

Aurizon Network also said that the QCA should ensure that the MRP is consistently estimated using a risk-free rate for the same term. It said that SFG estimated a difference of 0.27 per cent between five-year and 10-year risk-free rates between 1995 and 2014, and the average difference in the 20-day period to 31 October 2013 was 0.85 per cent. Aurizon Network said a difference of this magnitude must be corrected.<sup>155</sup>

In response to our draft decision, Aurizon Network reiterated that, if the QCA is to adopt its term-matching approach then all MRP estimation methods used by the QCA should calculate a four-year MRP.<sup>156</sup> Aurizon Network and Frontier identified the QCA's survey estimates (based on the Fernandez et al. and KPMG surveys) and the Cornell DGM estimates as specific methods in which a 10-year risk free rate was used.<sup>157</sup>

In the UT5 context, as well as in other recent undertaking considerations, some stakeholders have raised the concern that the QCA uses a risk-free rate matching the term of the regulatory cycle in the first term in the cost of equity but a 10-year rate in estimating the MRP. As indicated in decisions to date, there are only imperfect options for applying the CAPM, and inconsistency is unavoidable.<sup>158</sup>

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<sup>151</sup> Aurizon Network, sub. 9: 18.

<sup>152</sup> CFC 2017a: 26.

<sup>153</sup> The QCA notes that Frontier (Aurizon Network's consultant) has proposed to use a set of market indicators (that is, earning yields, corporate bond spreads, etc.) to provide a point estimate of the MRP. This point estimate is included in Frontier's framework as one of the contemporaneous estimates. Given that Aurizon Network has not used such an estimate in arriving at its MRP estimate of 7.0%, the QCA has not considered Frontier's estimate based on the set of market indicators.

<sup>154</sup> Aurizon Network, sub. 4: 27–28.

<sup>155</sup> Aurizon Network, sub. 1: 292–293.

<sup>156</sup> Aurizon Network, sub. 40: 102.

<sup>157</sup> Aurizon Network, sub. 40: 102–104; sub. 43: 11–14.

<sup>158</sup> Aurizon Network's and Frontier's preferred approach of applying a 10-year risk-free rate throughout the CAPM and applying this model to all regulatory problems (even those with a four or five-year regulatory cycle) is particularly inconsistent. This is because the CAPM would only be applicable to regulatory situations with cycles matching the fixed period to which the CAPM applied, and it would also violate the NPV=0 principle whenever the regulatory cycle differs from this fixed period.

The QCA has undertaken further analysis of historical bond rates for the purpose of estimating a four-year risk free rate for the MRP.<sup>159</sup> Specifically, the QCA constructed a synthetic four-year government bond yield series spanning 1958–2017 based on the linear interpolation of RBA data. For 1958–1975, the relevant data was sourced directly from the RBA's Statistical Bulletin. For 1976–2017, the relevant data was sourced from the RBA's web site.

The average differential over the entire 1958–2017 period is approximately 34 basis points (0.34%) per annum. However, in investigating this matter, it became apparent that none of the relevant RBA bond data in the source material is annualised (but it should be).<sup>160</sup> Annualising the bond yield data over the entire 1958–2017 period results in bond yields increasing on average by about 17 basis points and the average MRP decreasing by the same amount. Therefore, the net impact of both of these factors is approximately 17 basis points.

The QCA has taken both factors into account. In estimating the Ibbotson and Siegel MRPs, the QCA has applied the average, historical 10-to-four year bond differential of 0.34 per cent (and annualised the historical bond data).

The QCA has also applied this differential to the independent experts' estimate (that is, a component of the 'survey method') as experts' reports presumably define the MRP relative to the 10-year risk-free rate. However, our view is that the adjustment should reflect the historical, not current, bond differential. This is because, when independent experts provide an explicit estimate, that estimate is typically 6.0 per cent. Therefore, such estimates are highly likely to be based on historical (that is, Ibbotson) estimates, rather than DGM estimates (for example).

The QCA initially held the view that survey respondents do not necessarily define the MRP relative to the 10-year risk-free rate and that some respondents might provide responses to short-term rates. Accordingly, the QCA previously made no adjustment to this component of the survey method. Aurizon Network and Frontier disagreed with our assumption and said that information in the KPMG and Fernandez surveys supports the view that survey respondents adopt a 10-year risk-free rate or higher.<sup>161</sup>

The QCA have reconsidered this matter in light of submissions and advice from CFC. While the QCA does not agree with all aspects of Aurizon Network's and Frontier's analysis in support of a 10-year term assumption, the QCA does agree with making an adjustment to the survey estimates. In particular, the QCA notes that the majority of respondents to the KPMG survey use the 10-year rate and that the majority apply an MRP of 6.0 per cent.

Given the similar set of circumstances in the KPMG and experts' reports, it would be appropriate to adjust the KPMG estimate to ensure consistency with our experts' MRP estimates. While the case for adjusting the Fernandez et al. 2017 estimate is not as strong—as most of the Fernandez et al. respondents are not using an MRP of 6.0 per cent—the QCA has also adjusted this estimate for consistency. As with our adjustment for the experts' estimates, the QCA considers that the relevant differential is the historical bond differential.

The adjustment to the Wright estimate reflects the June 2017 difference, about 0.53 per cent, as the Wright estimate is estimated with respect to a current, not historical, risk-free rate.

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<sup>159</sup> Our previous analysis of this issue in our Market Parameters decision was constrained by the availability of data on the RBA's web site.

<sup>160</sup> Standard regulatory applications typically rely on the methodology set out in Brailsford et al. 2008 and the dataset in Brailsford et al. 2012. The historical bond data in the latter source is not annualised either.

<sup>161</sup> Aurizon Network, sub. 40: 102–103; sub. 43: 11–12.

Finally, the Cornell estimate has not been adjusted to reflect a four-year risk-free rate because the combination of the DGM perpetuity framework with a four-year (or five-year) risk-free rate will bias the estimate of the Cornell MRP relative to an estimate based on a 10-year risk-free rate.

### Ibbotson method

The Ibbotson method is an historical averaging method that measures the nominal historical (excess) market rate of return above the risk-free rate, including applicable adjustments for dividend imputation credits. In general, the Ibbotson method has relatively broad support from stakeholders as a basis for estimating the MRP.<sup>162</sup>

The QCA's Ibbotson estimate is 6.6 per cent for the preferred sampling period of 1958–2017.<sup>163 164</sup> This estimate takes into account a four-year risk-free rate and annualisation of the relevant historical data (as described previously).

The Brattle Group calculated an historical, average MRP for Australia of 6.6 per cent without accounting for imputation credits, and 6.8 per cent adjusting for imputation credits. Its estimates drew from the work of Dimson et al 2016, published by Credit Suisse.<sup>165</sup>

While the QCA notes The Brattle Group's resulting estimate is close to our estimate, the QCA does not accept The Brattle Group's method, particularly:

- The Brattle Group's estimate is based on the expected geometric difference between the return on equity and the return on 10-year government bonds.<sup>166</sup> This is inconsistent with the mathematical expectation for return in the CAPM. On the other hand, our estimates are based on the arithmetic mean of the annual return on equities net of the contemporaneous yield on four-year government bonds.
- The Brattle Group's estimate is based on Australian data from 1900 and equally weighting all data points, despite implicitly acknowledging the superiority of the post–1958 data. By contrast, our estimate arises from an assessment of the quality of all available data for Australia (from 1883), with our preferred times series being the post–1958 data.<sup>167</sup>
- The Brattle Group's adjustment for imputation credits is based on a formula in Officer, which is a special case of the more general formula applied by the QCA.<sup>168</sup> As the former is a special case of the latter, it only holds under a set of restrictive conditions. The most restrictive of these are that there is no inflation and that the firm distributes all net cash flows as dividends rather than retaining these cash flows.<sup>169</sup>

In Aurizon Network's September 2017 submission, Frontier considered that the Ibbotson approach should be regarded as a conservative estimate of the MRP on the basis that:

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<sup>162</sup> Aurizon Network, sub. 4: 16–18; sub. 9: 26.

<sup>163</sup> This period represents the longest period of continuous, high quality data that is available (QCA 2014a: 56–59).

<sup>164</sup> The QCA's MRP estimates are rounded to one decimal point for presentation purposes.

<sup>165</sup> Aurizon Network, sub. 4: 18.

<sup>166</sup> The Dimson et al. 2016 method estimates the MRP by arithmetic averaging over the annual geometric difference between the return on equity and the return on 10-year government bonds (CFC 2017a: 30).

<sup>167</sup> CFC 2017a: 30–31.

<sup>168</sup> See Officer 1994. For a detailed discussion of this point, see the Market Parameters decision (QCA 2014a: 83–85).

<sup>169</sup> In applying an empirical estimate of gamma of 0.25, The Brattle Group is also applying an empirical estimate of the distribution rate of credits of 0.7, and this assumption alone means The Brattle Group's adjustment is incorrect.

- It can only produce an estimate that is consistent with average market conditions.
- Current market conditions differ from the historical average market conditions as reflected in government bond yields that have been at historical lows since 2014.
- There can be a negative relationship between the risk free rate and the MRP in certain market conditions. Thus, it is possible that the MRP may increase to at least partially offset falls in the risk-free rate.<sup>170</sup>

The QCA accepts that the Ibbotson method is a long-term historical average that may not reflect recent changes in market conditions that could be expected to continue into the UT5 period. However, for this reason, the QCA does not solely rely on it. By combining the estimates from historical and contemporaneous methods, the QCA is able to balance the strengths and weaknesses of the individual methods.

### Siegel method

The second method for informing the estimate of the MRP is the Siegel method. This method is a variant of the Ibbotson method, based on the premise that, historically, unexpected inflation has reduced the observed real return on bonds but not the real return on equities. To take account of this effect, the Siegel method replaces the historical average real bond yield implicit in the Ibbotson estimate with an estimate of the expected long-run real bond yield.<sup>171</sup>

After considering stakeholders' comments, the QCA continues to view the Siegel method as a relevant method for estimating the MRP. The Siegel estimate is 5.9 per cent for the preferred sampling period of 1958–2017. This estimate takes into account a four-year risk-free rate and annualisation of the relevant historical data (as described previously).

Aurizon Network said the Siegel method should not be afforded any weight in estimating the MRP.<sup>172</sup> Aurizon Network's primary concerns are that the Siegel method:

- is inconsistent with the principle of using long-term historical times series without adjustment (for example, for specific events like the GFC)
- relies on the strong assumption of a stable expected real government bond return.

Frontier elaborated on these concerns, specifically that the Siegel method conflicts with the notion that the historical average excess return is an unbiased estimate of the long-run average MRP. Frontier pointed out that, while many shocks have affected market returns and government bond yields over time, analysts do not make adjustments to the time series on the basis that returns were above/below what investors expected at the time. By way of example, Frontier said that over the six-year period, 2007–2012, aggregate returns on the Australian market were zero. While these outcomes were below investors' expectations, the historical time series is not adjusted for this shock.<sup>173</sup> Frontier said that over time these events will tend to average out, and that for example, the low real rates observed in the 1970s look no more out of place than the high real rates of the 1980s and 1990s. Frontier concluded that, by giving weight to the Siegel estimate, the QCA has accepted that the historical average excess return is not unbiased due to one particular explanation, unexpected inflation.<sup>174</sup>

Frontier further submitted that making adjustments to historical yields on government bonds to reflect the regulator's estimate of what investors expected the yields to be, is unorthodox. Frontier said there is no

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<sup>170</sup> Aurizon Network, sub. 38: 15.

<sup>171</sup> For a discussion of the Siegel method, see QCA 2014c: 59–62.

<sup>172</sup> Aurizon Network, sub. 1: 288–289; sub. 38: 20.

<sup>173</sup> Aurizon Network, sub. 9: 27–28.

<sup>174</sup> Aurizon Network, sub. 38: 19–20.

objective standard by which historical data may be said to be unexpected and therefore in need of adjustment.

The QCA does not agree with this criticism of the Siegel method. While the QCA acknowledges that shocks of short duration might tend to offset over a long time period, not all shocks, or sources of bias, are necessarily equal. This point can be illustrated with reference to Frontier's example, where the period in question is six years. A six-year period represents 4.5 per cent of the entire Ibbotson series of data (1883–2017) and 10 per cent of the Ibbotson sub-series (1958–2017) on which the QCA places primary weight.<sup>175</sup> In contrast, the high inflation period identified by CFC is 1940–1990, which is about 38 per cent of the entire Ibbotson series of data and 55 per cent of the Ibbotson 1958–2017 sub-series.<sup>176</sup> These differences are very substantial.

This analysis is consistent with CFC's observation that the Siegel method is adopted to address a persistent bias in a large proportion of the Ibbotson time series rather than a bias over some short period within that series—biases of the latter type could be expected to wash out over a long time series.<sup>177</sup> Therefore, in our view, the persistence of high inflation over this extended period merits an explicit adjustment to account for it.

In response, Frontier said that, as a matter of logic, it cannot be that an event that persisted for 50 years could have been unexpected for its entire duration. In other terms, Frontier considered that it cannot be the case that investors across the market were surprised by inflation outcomes year after year for 50 consecutive years.<sup>178</sup>

However, as indicated by CFC, Australia's experience over 1883–2017 can be divided into three distinct sub-periods: a low inflation era (1883–1939); a high inflation era (1940–1990); and a second low inflation era (1991–2017), with average inflation rates of 0.9%, 6.4% and 2.4% respectively. The corresponding average real yields on 10-year government bonds were 3.6%, 0.9% and 3.3%. In the high inflation sub-period, clearly real yields on government bonds were well below those yields from the previous sub-period and with little 'compensation' in the following low inflation sub-period.

**Table 27 Historical inflation and 10-year CGS real yields**

<i>Historical sub-period</i>	<i>Inflation (mean)</i>	<i>10-yr CGS real yield (mean)</i>
<b>1883–1939</b>	0.9%	3.6%
<b>1940–1990</b>	6.4%	0.9%
<b>1991–Jun17</b>	2.4%	3.3%

The effect would have been to markedly increase the Ibbotson estimate in this high inflation sub-period, and this fact remains true regardless of when during the high inflation sub-period investors ceased being surprised by the inflation shock. Importantly, it is the evidence on inflation rates and the corresponding real bond yields that strongly suggests the Ibbotson estimate has been increased by this phenomenon, and this evidence is not related to the persistence (or not) of investors' 'surprise' at the inflation shock.

<sup>175</sup> The last year of data includes January to June 2017 (inclusive, with the last 20 days of June corresponding to Aurizon Network's averaging period), so 2017 only includes a half year of data. So the entire data series (1883–June 2017) comprises 134.5 years of data.

<sup>176</sup> The high inflation period (1940–1990) overlaps the preferred time period of 1958–2017 for 33 years (1958–1990). Therefore, the calculation is  $33/59.5 = 55\%$ .

<sup>177</sup> CFC 2017a: 21.

<sup>178</sup> Aurizon Network, sub. 43: 17.



Frontier further said that the required data to implement the Siegel method is not available as inflation-indexed government bonds only began trading in 1987. Frontier said that the QCA's assumption that the post-1987 average real yield is the same as the average real yield for the 1958–1986 period is not reasonable, due to the volatility in the real yields on indexed bonds. Frontier said that this assumption is a factor that is relevant to determining the weight (if any) that should be given to the Siegel estimate.<sup>179</sup>

The QCA considers that extrapolating the average real government bond yield from the more recent data (1986–2017) to apply over 1958–1985 is reasonable and supported by the empirical evidence.<sup>180</sup>

In undertaking our assessment, the QCA has used the average real yield on inflation-indexed bonds since their issue (July 1986–June 2017), which is approximately 3.4 per cent. The QCA disagrees with Frontier that extrapolating this estimate to the earlier period (1958–1985) is unreliable due to the volatility of estimates over time. By comparison, this estimate is very close to the average real risk-free rate of 3.6 per cent for the first sub-period (1883–1939) of low inflation. The latter period featured low inflation (0.9 per cent) in comparison to the subsequent high-inflation period of 1940–1990 (6.4 per cent). Accordingly, the QCA concludes that the empirical evidence supports the extrapolation of the real bond yield data to the earlier period.

Table 28 outlines our responses to other specific issues raised by stakeholders regarding the Siegel method.

**Table 28 QCA consideration of issues relating to the Siegel method**

<i>Issue</i>	<i>Analysis</i>
<p>Frontier said that the Siegel method relies on the assumption that actual inflation exceeded investors' expectation of inflation.<sup>181</sup> While Siegel himself proposed several explanations for the low, real government bond yields observed since the 1920s, the QCA's approach focuses on only one of those explanations—unanticipated inflation. As a result, the QCA's Siegel approach overstates the importance of unanticipated inflation.</p>	<p>The QCA disagrees with this criticism. The primary consideration is not necessarily the reason for the low, real government bond yields, but whether an adjustment is warranted.</p> <p>The explanations Frontier alludes to presumably are: i) the legacy of fear from the Great Depression; ii) interest rate controls from the end of World War II to the 1980s; iii) redistributive government policies after the Great Depression; and iv) increased liquidity in the market for government bonds.</p> <p>However, none of the four explanations can explain the negative real returns that arose during the late 20th century, with Siegel (2011) reporting an average of –3.9 per cent on bonds for 1966–1981.<sup>182</sup></p> <p>CFC also added that the first two of Siegel's explanations—the legacy of fear from the Great Depression and internal rate controls from World War II until the 1980s—were temporary.<sup>183</sup> This reinforces the conclusion that low real yields on bonds in the late 20th century were temporary, leading to an upward but temporary effect on the estimated MRP, and thereby justifying a downward adjustment to the Ibbotson estimate.</p>
<p>Frontier said the QCA's implementation of the Siegel method makes a very strong assumption—the average real government bond yield using data from 1896 to the</p>	<p>The QCA considers our assumption is reasonable and supported by empirical evidence. As noted above, the basis of our adjustment is the average real yield on</p>

<sup>179</sup> Aurizon Network, sub. 38: 19–20; sub. 43: 18.

<sup>180</sup> Australian government indexed bond yields are available from July 1986 to the present. Therefore, our averaging period is 1986–2017. Frontier appears to use an averaging period commencing in 1987.

<sup>181</sup> Aurizon Network, sub. 9: 28–29.

<sup>182</sup> Siegel 2011: 146, Table 1.

<sup>183</sup> CFC 2017a: 21–22.

<i>Issue</i>	<i>Analysis</i>
<p>present is the best estimate of what investors would have expected across all historical periods—given differences across periods in economic development, fiscal policy and central banking objectives.<sup>184</sup></p>	<p>inflation-indexed bonds since their issue (July 1986–June 2017), which is about 3.4 per cent. By comparison, this estimate is very close to the average real risk-free rate of 3.6 per cent for the first low inflation sub-period of 1883–1939.</p> <p>CFC has previously confirmed that our assumption is reasonable.<sup>185</sup></p>
<p>Frontier said the Siegel adjustment to the Ibbotson estimate is likely to be overstated as it fails to account for likely illiquidity premiums within the yields on inflation-protected bonds that are used to estimate the expected real yield on conventional bonds.<sup>186</sup></p>	<p>No evidence has been presented to support Frontier's claim.</p> <p>Furthermore, the QCA does not agree with Frontier that using real yields on inflation-protected bonds would necessarily lead to overestimating the real yield on conventional bonds due to a premium for inferior liquidity (which raises their real yield). CFC said using the yield of inflation-protected bonds to estimate the expected real rate on conventional bonds might underestimate the expected real yield on conventional bonds. This is because the real yield on conventional bonds is uncertain (because inflation is uncertain), and the same does not apply to inflation-protected bonds. Therefore, the QCA concludes that the net effect of these forces is unclear.<sup>187</sup></p>
<p>Frontier said the prediction based on the Siegel method (that the real government bond yields would rise relative to 1990 levels) has turned out to be completely wrong.<sup>188</sup> The current 10-year and 20-year averages of real government bond yields in Australia are 2.0 and 2.7 per cent, which are below the QCA's 3.8 per cent estimate of investor expectations for real government bond yields.</p>	<p>The QCA does not agree with Frontier's characterisation of Siegel's prediction.</p> <p>As pointed out by CFC, Siegel said that real yields are 'likely to be significantly higher than that estimated on earlier data'.<sup>189</sup> This statement can only be reasonably interpreted in the context of a long time series (e.g. not over the past 10 years only). Over the period since inflation-protected bonds have been available (1986–2017), the average real yield has been 3.4 per cent. By contrast, for the period of the 'earlier data' (1940–1990), the average realised yield on conventional 10-year government bonds was 0.9 per cent. This time series data therefore provides a strong validation of Siegel's prediction.</p>
<p>The Brattle Group said that the Siegel method was developed for the period 1940–1990, which was characterised by high inflation. The Brattle Group said Lally has not shown that the relationship post-1990 remains the same.<sup>190</sup></p>	<p>The QCA disagrees with The Brattle Group's claim that it is necessary to update Siegel's study. The Siegel methodology is based on the premise that the inflation shock in the late 20th century induced an overestimate of the MRP from the Ibbotson method, which warrants correction.<sup>191</sup> If the premise is valid, and the correction addresses the problem, there is no reason to repeat the study beyond 1990 because the inflation shock has not persisted beyond 1990.</p>

<sup>184</sup> Aurizon Network, sub. 9: 28–29.

<sup>185</sup> CFC 2015a: 28.

<sup>186</sup> Aurizon Network, sub. 9: 29.

<sup>187</sup> CFC 2017a: 22–23.

<sup>188</sup> Aurizon Network, sub. 9: 29.

<sup>189</sup> Siegel 1999: 15.

<sup>190</sup> Aurizon Network, sub. 4: 19–20.

<sup>191</sup> CFC 2017a: 34.

For the reasons above, the QCA remains of the view the Siegel method is a relevant method for estimating the MRP.

## Survey evidence

### Surveys

The QCA has used survey evidence that includes the Fernandez et al. international survey<sup>192</sup>, the KPMG valuation practice survey<sup>193</sup> and information from independent expert reports. The QCA considers that these sources provide useful information to inform an estimate of the MRP.

The Fernandez et al. 2017 survey estimate is 7.6 per cent (median), and the KPMG survey estimate is 6.0 per cent (median), which gives a mean for the survey component of 6.8 per cent. Taking into account our earlier comments on the risk-free rate differential, these estimates are comparable to estimates of 7.9 per cent and 6.3 per cent for a four-year risk-free rate, which gives an average of 7.1 per cent. As explained previously, the adjustment for the bond differential is 0.34 per cent. These estimates do not include an explicit adjustment for imputation credits.

The baseline MRP estimate reported by independent experts is 6.0 per cent. This estimate does not include an explicit adjustment for imputation credits. For the reasons provided below, the QCA does not make uplifts to the baseline estimate from the experts' reports. Also, as explained previously, the adjustment for the bond rate differential is 0.34 per cent. Therefore, the experts' median estimate adjusted for the four-year differential is 6.34 per cent.

The equally-weighted mean of the survey estimate and the experts' estimate is 6.7 per cent, without an explicit adjustment for imputation credits and 7.6 per cent with an explicit adjustment—the midpoint is 7.2 per cent.

In its original submission, Aurizon Network did not support the consideration of the Fernandez et al. international survey results, but said that the QCA should refer to the evidence from independent expert reports.<sup>194</sup> However, Aurizon Network subsequently submitted a second report in May 2017 by Frontier that encourages the QCA to take into account the most recent (2017) Fernandez et al. survey result (which was released after Frontier's first report, dated November 2016). The Fernandez et al. 2016 median MRP for Australia was 6.0 per cent, but the Fernandez et al. 2017 median result was 7.6 per cent.<sup>195</sup>

In the September 2017 submission, Frontier said that the Fernandez et al. 2017 survey results yield a raw estimate of the MRP of 7.6 per cent (median), equivalent to 8.3 per cent adjusted for dividend imputation. Frontier added that the survey respondents used a risk-free rate above the prevailing government bond yield so the MRP should be above 8.2 per cent.<sup>196</sup>

The QRC considered that survey evidence should be treated with great caution. The QRC noted that the Tribunal has said, in relying on survey results, consideration must be given to at least: the types of questions, the wording of the questions, the number and sample of respondents, as well as the survey's timing. The QRC also considered caution is warranted in interpreting independent expert reports given the different context in which they are prepared.<sup>197</sup>

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<sup>192</sup> The QCA has taken into account Aurizon Network's submission (sub. 30), including the most recent Fernandez MRP survey results.

<sup>193</sup> KPMG 2017b.

<sup>194</sup> Aurizon Network, sub. 1: 290.

<sup>195</sup> See Fernandez et al. 2016 and Fernandez et al. 2017.

<sup>196</sup> Frontier references 8.3% in its Table 5 but refers to 8.2% in the text. See Aurizon Network, sub. 38: 30.

<sup>197</sup> QRC sub. 53: 15.

The QCA agrees with Aurizon Network, Frontier and the QRC that caution should be exercised when considering this type of evidence. Consistent with our views set out in our Market Parameters decision, the QCA considers this evidence to be useful. All methods for estimating the MRP have both strengths and weaknesses, and surveys are no exception. However, they can provide relevant information when they are timely and the product of careful consideration.<sup>198</sup>

In considering the Fernandez et al. 2017 result of 7.6 per cent, the QCA notes this survey estimate is markedly higher than previous Fernandez results for Australia, which are in the range of 5.1–6.0 per cent for 2011–2017. Further, and as pointed out by CFC, the 7.6 per cent estimate is greater than all estimates of the MRP for developed countries over this entire period, with the exception of several estimates for Portugal (which, unlike Australia, has experienced severe market-wide economic crises in recent years).<sup>199</sup> The sample size (26) is also the smallest sample size across all of the markets for the previous three years (2015–2017) and is not large in any absolute sense.<sup>200</sup>

Therefore, while the QCA has taken the Fernandez et al. 2017 estimate into account, it should be treated with caution. Accordingly, as a cross-check, the QCA also examined survey results from the most recent KPMG valuation survey (2017), which surveys a number of valuation practitioners. In this survey, the most commonly adopted estimate for the MRP was 6.0 per cent (also the median).<sup>201</sup> The QCA has taken this estimate into account to complement the Fernandez et al. 2017 estimate when computing the survey component of the overall survey estimate.

Aurizon Network said that the QCA has chosen to question the Fernandez et al. 2017 sample size and estimate for the first time, when this survey is producing a higher estimate than previously.<sup>202</sup> The QCA considers its concern to be justified, as prior Fernandez et al. survey estimates have fallen in the range 5.1–6.0 per cent. This fact, coupled with the observation that the Fernandez et al. estimate of 7.6 per cent is greater than all estimates of the MRP for developed countries over 2011–2017, supports our incorporation of the KPMG survey.

### Independent expert reports

Frontier's second report also included information based on four expert valuation reports, on the basis that these reports are timelier than the earlier set of expert reports previously referenced by us. The new reports are authored by four different valuation experts—Lonergan Edwards, Grant Samuel, Deloitte, and KPMG—and are dated between February and July 2016.<sup>203</sup> Frontier said that all four experts set the required return on equity materially above a 'mechanistic' estimate (that is, obtainable by inserting the current government bond yield and a fixed MRP into the CAPM) in one of three ways:<sup>204</sup>

- applying a risk-free rate above the contemporaneous bond yield
- applying an ad hoc increase to the mechanistic CAPM estimate
- using an estimate of the MRP higher than 6.5 per cent.

Frontier calculated a 'required market return' from each expert report by adding the risk-free rate and MRP (applying an equity beta of 1.0 for the market). Frontier then calculated an 'effective MRP' by deducting a contemporaneous government bond yield. Based on this process, Frontier reported that these four

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<sup>198</sup> QCA 2014c: 64–65.

<sup>199</sup> These crises have resulted in bailouts by both the International Monetary Fund and the European Union (CFC 2017b: 20).

<sup>200</sup> CFC 2017b: 19–20.

<sup>201</sup> KPMG 2017b: 11.

<sup>202</sup> Aurizon Network, sub. 40: 105.

<sup>203</sup> Aurizon Network, sub. 30: 8–9.

<sup>204</sup> Aurizon Network, sub. 30: 8.

independent experts are currently using MRPs in the range of 6.9 per cent to 8.7 per cent, with a mean of 7.9 per cent.<sup>205</sup> Frontier said that including an imputation adjustment would increase the mean estimate to 8.7 per cent.<sup>206</sup>

The QCA has reviewed the four experts' reports provided by Frontier. Our view is that all that one can confidently conclude from these reports is that the median, baseline MRP estimate is 6.0 per cent.<sup>207</sup> While these reports apply a cost of equity that is higher (than one based on a 6.0 per cent MRP), they obtain the higher cost of equity by using one or more uplifts.

As a general principle, the QCA considers that analysts' uplifts to the MRP are generally not appropriate in a regulatory context for a number of reasons. In some cases, these uplifts might be used to address non-systematic risks or risks not captured in cash flow forecasts. They also could reflect the 'one-off' nature of the particular valuation for which the expert is providing advice. In the case where the valuation is for a regulated firm, the uplift might take into account the analyst's expectation that the firm in question will out-perform regulatory benchmarks. These are all reasons to treat uplifts with caution.

Relevantly, in the present reports, the uplifts tend to reflect either the analyst's concern with currently 'low' risk-free rates or a preferred term structure for the risk-free rate. For example, KPMG's report implies a required return for the market of 10.4 per cent, comprising a risk-free rate of 4.4 per cent and an MRP of 6 per cent. KPMG states that the 4.4 per cent is a "blended risk free rate (of the spot Australian government bond rate and long term forecast rate)".<sup>208</sup> Therefore, this 'long term forecast rate' likely reflects the fact that KPMG's relevant valuation period exceeds the term of the available bond rate (among other factors).

As the QCA has previously indicated, applying such a long-term risk-free rate is not consistent with the regulatory task, which reassesses the rate of return at each regulatory cycle. Further, KPMG describes its MRP assumption of 6.0 per cent as the "appropriate market risk premium for investments in Australia".<sup>209</sup> Given this statement, as well as the stated rationale for the 4.4 per cent risk-free rate, it does not seem reasonable to us to conclude that this information supports an 'effective MRP' of 8.0 per cent, at least for regulatory purposes.<sup>210</sup>

As explained above, valuation reports are concerned with valuing equities involving cash flows out to infinity. Therefore, experts tend to speculate on the term structure of interest rates beyond 10 years and apply an average, long-term rate.<sup>211</sup> For these reasons, the QCA reaffirms the view that adjusting the rate in this way has no implications for the QCA, as the risk-free rate in the regulatory context will be revised periodically at regular resets.

#### Adjustments for imputation credits

Aurizon Network considered a with-imputation credit survey estimate should be used, rather than an estimate based on a simple average of the with-imputation and without-imputation estimates.<sup>212</sup> Aurizon Network reasoned the with-imputation estimate should be used as the regulatory framework requires a

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<sup>205</sup> Frontier calculated 'effective MRPs' of: 6.9% (Lonergan Edwards), 8.7% (Grant Samuel), 7.8% (Deloitte), and 8.0% (KPMG). See Aurizon Network, sub. 30: 9.

<sup>206</sup> Aurizon Network, sub. 30: 9; sub. 38: 30–31.

<sup>207</sup> Only Deloitte provides a baseline estimate (7.75%) above 6.0%. See Deloitte 2016: 39.

<sup>208</sup> KPMG 2016: 85.

<sup>209</sup> KPMG 2016: 85.

<sup>210</sup> Frontier calculated an 'effective MRP' for KPMG of 8.0%. See Aurizon Network, sub. 30: 9.

<sup>211</sup> As the term structure of interest rates is currently upward-sloping, the term structure beyond the four-year period that is relevant for regulatory purposes will result in an average rate that exceeds the regulatory rate.

<sup>212</sup> Aurizon Network, sub 40: 105–106; sub 43: 19–20.

with-imputation estimate of the MRP, and all the other approaches the QCA apply produce a with-imputation estimate.

The QCA disagrees with Aurizon Network’s argument. In describing certain results as ‘excluding imputation credits’, the QCA is referring to these results as not reflecting an explicit adjustment for imputation credits. The QCA makes this point in our discussion of adjusting for imputation credits in our Market Parameters decision.<sup>213 214</sup> Therefore, our estimates of 6.7 per cent and 7.6 per cent should be interpreted as lower and upper bounds on the appropriate MRP estimate inclusive of the credits. From this range, the QCA selects the midpoint. The QCA notes that CFC’s advice supports this approach, and ‘would even favour a figure below the midpoint’.<sup>215</sup> The QRC made a similar point.<sup>216</sup>

**Table 29 QCA consideration of issues related to the survey method**

<i>Issue</i>	<i>Analysis</i>
Aurizon Network and Frontier said that the Fernandez survey consistently produces an MRP estimate close to 6.0 per cent regardless of the market circumstances. <sup>217</sup>	This statement is wrong—the Fernandez survey has produced varying estimates of the MRP over time. For example, it produced a median MRP estimate of 5.1 per cent in 2015, which was a fall from a median of 6.0 per cent for the previous year. <sup>218 219</sup> The most recent Fernandez survey (2017) produces an estimate of 7.6 per cent, which Aurizon Network and Frontier support.
Regarding the independent expert reports, Aurizon Network and Frontier said that the QCA should use the mean, rather than the median, when inferring the MRP estimate from these reports as there is no outlier in the sample. <sup>220</sup>	Our general preference is to use the median rather than the mean to reduce the influence of outliers. The QCA considers that making an exception in this case would introduce debate about what constitutes an outlier.
Frontier provided a list of reasons (e.g. lack of information about the respondents) that it previously submitted to justify its view that the Fernandez surveys should be afforded no weight. <sup>221</sup> However, Frontier acknowledged that the arguments about the limitations of the Fernandez surveys have already been addressed by the QCA in previous decisions.	The QCA refers to the relevant points as expressed in our previous decisions. <sup>222</sup> The QCA remains of the view that the Fernandez survey results are relevant to our consideration of an appropriate MRP for Aurizon Network.

<sup>213</sup> QCA 2014c: 65, 81.

<sup>214</sup> The draft decision also made this point: “The Fernandez et al. 2017 survey estimate is 7.6 per cent (median), and the KPMG survey estimate is 6.0 per cent (median), which gives a mean for the survey component of 6.8 per cent. These estimates do not include an *explicit adjustment* for imputation credits” (emphasis added) (QCA 2017e: 482).

<sup>215</sup> CFC 2018: 23.

<sup>216</sup> QRC, sub. 53: 15.

<sup>217</sup> Aurizon Network, sub. 1: 290; sub. 9: 30–31.

<sup>218</sup> Fernandez et al. 2015.

<sup>219</sup> In the DBCT final decision the QCA stated that the survey evidence supported an estimate of 6.0% excluding imputation credits, and 6.8% including imputation credits. The change between the draft and final decisions was due to the more recent Fernandez survey results becoming available, which was taken into account for the DBCT final decision.

<sup>220</sup> Aurizon Network, sub. 1: 290; sub. 9: 31–32.

<sup>221</sup> Aurizon Network, sub. 9: 30.

<sup>222</sup> QCA 2014e: 231–232.

### Cornell dividend growth model

The fourth method used to inform the QCA's estimate of the MRP is the Cornell version of the dividend growth model (DGM). Like the standard DGM, the market return is the rate of return that reconciles the current value of the market portfolio with the present value of the expected future stream of dividends.

Our Cornell dividend growth estimates range from 5.6 per cent to 7.5 per cent, with a median estimate of 6.4 per cent. These estimates are based on inputs over the relevant June 2017 averaging period, including a 10-year risk-free rate (for the reasons explained below). The estimates differ from previous estimates in that they include an explicit adjustment for share repurchases (also explained below).

The key features of our Cornell-type DGM are described in detail in our Market Parameters decision.<sup>223</sup> There are two principal features of our Cornell-type DGM that are most relevant here. First, while the standard DGM assumes that the market return on equity is the same in all future years of the analysis, our method allows for the possibility that the market return on equity reverts to a long-term average value after the first 10 years (that is, a 'two-discount-rate' model).<sup>224</sup> Second, our Cornell-type DGM model applies a downward adjustment to the expected long-run growth rate of GDP to accommodate new equity issues and the formation of new companies over time.

Aurizon Network (and its consultants, Frontier and The Brattle Group) raised particular concerns regarding these two features of the model, as well as two additional concerns:

- *two-discount-rate model*—the model assumes that equity holders require a low return for the first 10 years but then a higher, long-run return on equity thereafter; however, the MRP estimate is based on the low return for the first 10 years.<sup>225</sup>
- *growth rate dilution*—the model assumes that corporate dividends and earnings do not grow as fast as Gross Domestic Product (GDP) (that is, the QCA's MRP estimate is based on a growth rate that is less than the long-run GDP growth rate), which is inconsistent with recent empirical evidence.<sup>226</sup>
- *share repurchases*—an adjustment should be made to the cash dividends input of the model to allow for the future repurchases of shares<sup>227</sup>
- *term of the risk-free rate in the DGM*—the risk-free rate used in estimating the MRP from the Cornell DGM is inconsistent with the risk-free rate used in the first term of the CAPM.<sup>228</sup>

### Two-discount-rate model: term structure for the return on equity

Frontier raised several objections to the use of two discount rates in our Cornell-type DGM.

Frontier said it is not standard practice to use the two-discount-rate model. Frontier observed that independent experts and other regulators use a single discount rate (that is, assume that the term structure of the return on equity is 'flat'), as their objective is to estimate a long-run return on equity (and the QCA should do likewise).<sup>229</sup>

<sup>223</sup> QCA 2014c: 67–73.

<sup>224</sup> As stated in the Market Parameters decision, as at October 2013, this rate comprised a long-run MRP of 6.0% and a 10-year risk-free rate of 5.8%, giving a long-run return on equity of 11.8% (see QCA 2014a: 71, footnote 88). The risk-free rate is regularly updated by extending the time series to include current information.

<sup>225</sup> Aurizon Network, sub. 38: 24–25.

<sup>226</sup> Aurizon Network, sub. 1: 291–292; sub. 9: 32–33.

<sup>227</sup> Aurizon Network, sub. 4: 20–22.

<sup>228</sup> Aurizon Network, sub. 1: 291.

<sup>229</sup> Aurizon Network, sub. 38: 27.

Our view is that it is important to obtain the best estimate of the current MRP from the Cornell DGM. It is very likely that the true term structure for the (market) cost of equity at times significantly deviates from a flat term structure. Frontier's proposed approach applies a stronger assumption—that the current cost of equity is always equal to the long-term cost of equity. The QCA prefers not to adopt this strong assumption. Our view is that the better approach is to set the expected 10-year cost of equity in 10 years to an estimated long-run average value and then use the Cornell DGM to obtain the current 10-year cost of equity.<sup>230</sup>

Relevantly, the justification for two discount rates (that is, a 'non-flat' term structure) will be stronger when market conditions substantially differ from the long-term average, which is the case at present (as argued by Aurizon Network and Frontier).<sup>231</sup> Moreover, in such a situation, Lally demonstrates that the benefit, in the form of reduced estimation error, of applying two discount rates is material.<sup>232</sup>

Frontier also said that the two-discount-rate model results in a systematic downward bias because the discount rate is reset at the start of each regulatory period (for example, every four years) and therefore the higher, long-run average return that applies after 10 years is never achieved. As an example, Frontier said that suppose investors require a return of 10 per cent over 20 years (and market conditions remain stable). If the regulator determines the return over the last 10 years to be 11 per cent and therefore, sets the rate of return over the first 10 years to 9 per cent (that is, to 'balance things out'), investors never receive the average of 10 per cent because the regulator resets the return to 9 per cent at the start of each regulatory period. As the later period never arises, the average allowed rate of return is underestimated.<sup>233</sup> Frontier therefore concluded there is no accountability for the assumption about required returns in the post-10 year period.

The QCA does not agree with this view. The result from applying the Cornell DGM could result in a short-term MRP estimate that is higher, lower, or equal to the long-run estimate. For example, for the UT4 averaging period of October 2013, the Cornell DGM estimate of the MRP, using a 20-year convergence period and a 0.5 per cent dilution rate was 8.28 per cent. The RFR over that period was 4.06 percent. Therefore the short-run return on equity was 12.34 per cent, which is greater than the long-run return on equity of 11.8 per cent at that time. The outcome depends on the data, and Frontier's example only illustrates one possibility.

This conclusion leads to the third objection raised by Frontier, namely that there is no basis for the 11.8 percent long-run required return. In particular, Frontier said the long-run average risk-free rate of 5.8 per cent is based on average 10-year bond yields starting in 1993, but government bond yields have fallen consistently since that time. For example, the 10-year government bond yield at the time of the Market Parameters decision was 4.29 per cent but was 2.6 per cent as of August 2017. Frontier said it is therefore logical that the likelihood of the yield increasing to 5.8 per cent over the next 10 years is now materially lower than at the time of that decision. On this basis, Frontier concluded that a better estimate of the government bond yield 10 years from now is the forward rate (based on Bloomberg data).<sup>234</sup>

The QCA also disagrees with Frontier on this point. As outlined in the QCA's Market Parameters decision that the risk-free rate of 5.8 per cent (applied in that decision) was an average of (annualised) yields of 10-year government bonds over a long period of time. The QCA remains of the view that this underlying period of estimation remains appropriate, in particular that a long-run, historical average is preferable to a forward rate. As interest rate processes are mean-reverting, and a long-run rate to apply 10 years into the future is

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<sup>230</sup> If the true current cost of equity is actually equal to the long-run, 10-year cost of equity, then the data will admit this possibility.

<sup>231</sup> Aurizon Network, sub. 1: 256; sub. 38: 13–14.

<sup>232</sup> Lally 2013b: 11–12.

<sup>233</sup> Aurizon Network, sub. 38: 24–25.

<sup>234</sup> Aurizon Network, sub. 38: 24–26.



required, an historical average over the longest period, for which the 10-year rate is stable, is appropriate.<sup>235</sup> CFC also concurs with this view.<sup>236</sup>

Finally, Frontier said that the QCA has not updated our long-run estimate of the market return on equity. In particular, Frontier said that the QCA has not updated our estimate of the long-run risk-free rate, which was estimated at 5.8 per cent in the Market Parameters decision.<sup>237</sup> However, this claim is not correct. The QCA did update the estimate of the long-run risk-free rate when estimating the Cornell estimate, and the estimate of the long-run risk-free rate was 5.48 per cent. The QCA draft decision (p. 487, footnote 1549) states “This average changes as it is updated for new information.”<sup>238</sup>

#### Dilution of the long-run expected growth rate

Frontier raised two fundamental objections to our dilution of the long-run expected growth rate. First, Frontier disagreed with the conceptual basis of our deduction (of 0.5–1.5 per cent) from the long-run expected growth rate on the basis that empirical evidence suggests that the effect is very small (and therefore can be ignored). To illustrate this point, Frontier estimated pre-tax corporate profits at 11.6 per cent of GDP as at 2013 and said that, if GDP grows at 5.6 per cent for 50 years and pre-tax corporate profits grow faster at 6.1 per cent (for example) for 50 years, then pre-tax profits will only reach 14.7 per cent of GDP after this time.<sup>239</sup>

However, in the Cornell DGM perpetuity framework, the relevant growth rate in the model is a long-term rate, and it applies to the (aggregate) earnings of all shares in currently existing and future companies. That is, aggregate earnings are distributed among existing shares, new shares issued in the future by existing firms, and (new) shares issued by new firms formed in the future. Therefore, the long-run growth rate of earnings of existing shares must be less than the long-run growth rate in GDP to accommodate new share issues and the formation of new companies over time. As a consequence, the QCA disagrees with Frontier's claim that this feature of the Cornell DGM is simply a 'conceptual proposition'. Rather, our view is that this feature is a matter of mathematical logic in applying the model.

Moreover, the relevance of empirical evidence is not about whether a deduction should be made but about informing the amount of the deduction. The Market Parameters decision suggests a possible range of 0.5–1.5 per cent, with a midpoint of 1.0 per cent for the dilution effect (and our model examines all three possibilities).

In this context, Frontier's second objection was that there is no empirical support for a deduction based on data from recent decades. Specifically, Frontier said post-1990 data indicates a real earnings per share growth rate of 5.0 per cent and a real GDP growth rate of 3.4 per cent. Further, Frontier said that our deduction from the GDP growth rate assumes that investors form their expectations about future growth in dividends on the basis of data from the 1970s and 1980s (that is, in the period prior to central bank inflation targeting), when the real earnings per share growth rate was 1.8 per cent and the real GDP growth rate was 3.0 per cent.<sup>240</sup>

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<sup>235</sup> As explained in the Market Parameters decision, the averaging period starts in 1993 because this year coincides with the commencement of central bank inflation targeting and accordingly, can be reasonably considered the starting point of a stable process. This average changes as it is updated for new information.

<sup>236</sup> CFC 2017b: 16.

<sup>237</sup> Aurizon Network, sub. 43: 22. See the Market Parameters decision for the derivation of the estimate of 5.8% (QCA 2014c: 71).

<sup>238</sup> QCA 2017e: 487.

<sup>239</sup> Aurizon Network, sub. 38: 23.

<sup>240</sup> Aurizon Network, sub. 38: 23–24.

Frontier's preference for no dilution arises from its preferred sample period (1990–2013), also previously proposed by SFG Consulting.<sup>241</sup> The QCA's view is that, in the context of a relevant long-term rate, an earnings per share growth rate of 5.0 per cent is materially too high, as the real GDP growth rate over the same period was 3.4 per cent. Clearly, this relativity cannot hold over the long run, and what is required for the model is a long-run rate, not a short-run rate. By analogy, if we are seeking an estimate of the MRP using the Ibbotson method, and we believe (for example) that the last 25 years is the best sample period (due to inflation targeting affecting the cost of equity)—but the *ex post* realised MRP over this period is negative—then this outcome would preclude sole reliance on that period for estimating the Ibbotson MRP.

Accordingly, the QCA supports using a longer period of data to smooth out such effects. Relevantly, SFG Consulting's full time period of 1969–2013 shows a real earnings per share growth rate of 1.5 per cent, relative to a real GDP growth rate of 3.2 per cent.<sup>242</sup> These figures imply a deduction for dilution of 1.7 per cent, which is greater than our current deduction (midpoint) of 1.0 per cent. This data suggests our adjustment for dilution might be conservative.

#### Adjustment for share repurchases

The Brattle Group said the QCA's Cornell DGM would underestimate the MRP to the extent there are cash flows to investors other than dividends, such as cash returned via share repurchases. Accordingly, The Brattle Group said that the model should include an adjustment to cash dividends to reflect the effect of share repurchases and that its analysis of share-buyback yield at the ASX 200 is consistent with (approximately) an additional 0.5 percent in yield.<sup>243</sup>

The QCA agrees with The Brattle Group that an adjustment should be made for share repurchases. However, in considering this matter in UT4, the QCA identified data availability as problematic. Since that time, the QCA has undertaken additional work to obtain and analyse the relevant data to estimate an adjustment. Our analysis indicates that, based on the most recent data available, share repurchases comprise about 7 per cent of cash dividends.<sup>244</sup> Taking this factor into account increases the cash dividend yield by about 0.3 per cent, or 30 basis points.

The QCA notes CFC's comment that any adjustment for the effect of share repurchases should take into account that repurchases (rather than dividends) would have raised the earnings per share growth rate, and this increment should be deducted from the historical earnings per share growth rate in the model.<sup>245</sup> However, The Brattle Group's response is that no adjustment to the historical growth rate is necessary because analysts would form a view about growth rates with the knowledge of any expected repurchases. The QCA are inclined to accept The Brattle Group's view on this point, as these activities are typically reported through market announcements and are therefore public knowledge.<sup>246</sup>

#### Term of the risk-free rate in the DGM

In the case of Aurizon Network, a four-year risk-free rate is applied in the first term of the CAPM to satisfy the NPV=0 principle. A current, 10-year risk-free rate is deducted when estimating the Cornell-type MRP.

Aurizon Network's view is that the two risk-free rates should have consistent terms; that is, our estimate of the Cornell MRP should be based on a four-year risk-free rate.

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<sup>241</sup> SFG Consulting 2014: 19–26.

<sup>242</sup> SFG Consulting 2014: 20.

<sup>243</sup> Aurizon Network, sub. 4: 20–22.

<sup>244</sup> See Brown and Davis 2012: 109–135. Updated data has been kindly provided by Professors Christine Brown and Kevin Davis.

<sup>245</sup> CFC 2015a: 40–41.

<sup>246</sup> Brown and Davis 2012: 117.

As indicated in our discussion of 'term-matching', the QCA considers it appropriate to make this adjustment to the Ibbotson, Siegel and Wright estimates and to the survey estimates. However, the QCA considers it inappropriate to make the adjustment to the Cornell MRP as doing so will increase the bias of the Cornell MRP estimate.

Specifically, in the regulatory context of estimating the MRP, an MRP estimate is sought for a finite time period. Standard estimates of the MRP from the DGM involve estimating the market cost of equity for an infinite period but then deducting a risk-free rate for a finite period. CFC demonstrates that the inconsistency between the infinite term for the market cost of equity and the finite term for the risk-free rate will bias the resulting estimate of the MRP.<sup>247</sup>

However, this bias can be reduced by matching, to the greatest extent possible, the term of the market cost of equity to the term of the risk-free rate. As the term of the market cost of equity is infinite, satisfying this condition means using the yield of the longest-term bond available (10 years) for the risk-free rate. Following this process will produce an estimate of the MRP that is less biased than an estimate that arises from a process that deducts a shorter-term risk-free rate.

Aurizon Network objected to this rationale on the basis that it is being used to support a long-term equity perspective when the dividend growth model is applied. Aurizon Network implied that this practice is inconsistent with our estimation of other WACC parameters, which is underpinned by the assumption of a short-term investment perspective (based on short-term bond values). Accordingly, Aurizon Network considered that the result is a downward-biased MRP estimate.<sup>248</sup>

The QCA does not agree that this approach produces a biased estimate relative to using a four-year rate. The issue here is not consistency per se (that is, applying a four-year risk-free rate) but obtaining the least biased estimate of the MRP. In this context, if a four-year risk-free rate is deducted from a 10-year market cost of equity, then there is a mismatch between the term of the market cost of equity and the term of the risk-free rate.

Under these circumstances, CFC's analysis demonstrates that the best (that is, least imperfect) estimate of the MRP for the next four years is obtained by deducting the 10-year risk-free rate from the estimate of the 10-year market cost of equity. The MRP estimate from this process will be less biased than the estimate produced from the process suggested by Aurizon Network. Further, as this estimate of the MRP is consistent with an estimate for the next four years, it is therefore also consistent with the regulatory horizon.

#### Frontier's updated DGM estimates

Frontier presented its own set of DGM estimates as at July 2017, which it stated are based on the AER's preferred construction of the DGM. Like our Cornell-type DGM, the AER's approach utilises a three-stage model but only considers a 10-year transition path.<sup>249</sup> In contrast to our approach, the AER only estimates MRPs based on a single market cost of equity ('single-discount-rate' model).<sup>250</sup>

While Frontier did not support our two-discount-rate approach, for comparison, it also presented MRP estimates using this method. In doing so, Frontier said it applied a 10-year forward rate, rather than an historical rate, in estimating the long-run risk-free rate in the long-run cost of equity. Frontier reported that

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<sup>247</sup> CFC 2015c.

<sup>248</sup> Aurizon Network, sub. 40: 103.

<sup>249</sup> In addition, the AER also considers a two-stage model. In a two-stage model, the forecast short-term growth rates apply for the first few years after which the short-term rate immediately reverts to the long-term, constant growth rate. In a three-stage model, the forecast short-term growth rates apply for the first few years, after which there is a multi-year transition path over which the short-term rate gradually converges to the long-term, constant growth rate (AER 2017d: 234).

<sup>250</sup> AER 2017d: 233–238.

the majority of its MRP estimates are in the range of 7.0 to 8.0 per cent. In particular, Frontier reported that, with a growth rate of 4.6 per cent (reflecting a 1 per cent deduction from expected long-run growth for dilution) and a long-run risk-free consistent with market conditions, MRP estimates are 7.54 per cent and 7.42 per cent for 10-year and 20-year convergence periods, respectively.<sup>251</sup>

However, Frontier concluded that an MRP of 7.5 per cent would be a lower bound when applying the Cornell method on the basis that no deduction should be made for dilution and that a single cost of equity should apply.<sup>252</sup>

The Cornell estimates of 7.54 per cent and 7.42 per cent derived by Frontier compare to QCA estimates of 6.63 per cent and 6.23 per cent (median of 6.43 per cent) for the 1.0 per cent dilution rate. The divergence in estimates is explained by both methodological and timing differences. Frontier's submission does not provide its estimate of the forward 10-year bond rate that it applied when estimating the long-run cost of equity and does not detail other inputs that underlie its MRP estimates. As a result, the QCA is unable to reproduce Frontier's estimates.

In examining the model and comparing results with the information at hand, it is apparent that Frontier's assumption of a materially lower 10-year risk-free rate in the long-run cost of equity substantially changes the results. For the reasons given previously, the QCA does not agree with using a 10-year forward rate. Further, the time period selected by Frontier for obtaining its inputs (July 2017) does not align with Aurizon Network's averaging period (June 2017). The QCA notes that analysts' growth forecasts were materially higher in July 2017 than in June 2017 (about 4.1 per cent in comparison to 3.6 per cent), which contributes to Frontier's higher estimates.

Stakeholders also made other comments in relation to our version of the DGM. The table below provides our responses to the issues raised by stakeholders.

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<sup>251</sup> Aurizon Network, sub. 38: 28.

<sup>252</sup> Aurizon Network, sub. 38: 28–29.

**Table 30 QCA consideration of issues relating to the Cornell DGM**

<i>Issue</i>	<i>QCA analysis</i>
The two-discount-rate approach has the effect of increasing the volatility of the estimate of the MRP. <sup>253</sup>	Lower volatility is not necessarily a desirable property <i>per se</i> . What is relevant is whether that (lower) volatility matches the true situation. The single-discount-rate model preferred by Frontier will result in lower volatility but greater error in the estimate of the return on equity when returns are unusually low or unusually high. CFC provides an example to support this point. <sup>254</sup>
The Brattle Group prefers the Bloomberg model because it uses all cash flows distributed to shareholders, rather than only dividends, and because it uses different convergence rates (to the GDP growth rate) for immature versus mature firms. <sup>255</sup>  According to The Brattle Group, Bloomberg currently forecasts an MRP of 7.6 per cent for Australia without the value of imputation credits. <sup>256</sup> The Brattle Group found an MRP estimate of 8.6 after adjusting for imputation credits.	The QCA notes the full details of the Bloomberg model are not disclosed. However, CFC notes that, in the Bloomberg model, the long-run expected growth rate in cash flows is set equal to the long-run growth rate of GDP. <sup>257</sup> As stated previously, The QCA does not agree with this assumption.  The Brattle Group has used a different approach to estimating the effects of imputation credits. However, the adjustment is coincidentally equal to the QCA's adjustment. <sup>258</sup>
Given the effects of share repurchases, The Brattle Group said that an upward adjustment of 50 basis points to the estimated MRP is required. <sup>259</sup>	The Brattle Group does not explain how it arrives at an estimate of 50 basis points. In any case, the QCA has now directly addressed share repurchases in its DGM approach.
The Brattle Group said that standard dividend growth models ignore option values inherent in equities, the effect of which is to underestimate the MRP. <sup>260</sup>	The QCA agrees that standard dividend growth models ignore option values. However, as demonstrated by CFC, the effect is to instead overestimate the MRP, rather than underestimate the MRP, as claimed by The Brattle Group. <sup>261</sup>

For the reasons above, the QCA continues to prefer our Cornell-type DGM to inform our estimate of the MRP.

#### Wright method

The Wright method assumes that the risk-free rate and MRP are perfectly negatively correlated, resulting in a constant return on equity. In other words, when the (observable) risk-free rate decreases (increases), the (unobservable) MRP increases (decreases) by an offsetting amount.

The QCA's Wright estimate is 9.5 per cent for the preferred sampling period of 1958–2017, and this estimate takes into account the four-year risk-free rate. Frontier estimated a Wright MRP of 8.9 per cent based on a 10-year risk-free rate.<sup>262</sup>

<sup>253</sup> Aurizon Network, sub. 38: 25.

<sup>254</sup> CFC 2017b: 17–18.

<sup>255</sup> Aurizon Network, sub. 4: 20–22.

<sup>256</sup> Aurizon Network, sub. 4: 21.

<sup>257</sup> CFC 2017a: 32.

<sup>258</sup> CFC 2017a: 32.

<sup>259</sup> Aurizon Network, sub. 4: 22.

<sup>260</sup> Aurizon Network, sub. 4: 22.

<sup>261</sup> CFC 2017a: 33.

<sup>262</sup> Aurizon Network, sub. 38: 32–33.

Aurizon Network said that the Wright method should be considered, along with the Ibbotson method, to estimate the MRP from historical information.<sup>263</sup> In particular, Frontier considered that both the Ibbotson and Wright methods should be afforded material weight as they sit at either end of a theoretical spectrum:

- The Ibbotson method assumes that the best estimate of the MRP is the average excess return and the required return on equity rises and falls one-for-one with changes in government bond yields.
- The Wright approach assumes the best estimate of the real required return on equity is the average real return on equity, which means that the MRP changes over time due to variation in government bond yields and inflation expectations.<sup>264</sup>

Frontier also said that, in determining the MRP, it is important to have regard to all methods in a manner that is reflective of their applicability to current market conditions. In this context, Frontier noted that Lally supported giving both the Ibbotson and Wright methods equal weight and that current market conditions are substantially different from average. For these reasons, Frontier said that the weight applied to the Ibbotson and Siegel methods on a combined basis should be equivalent to the weight applied to the Wright approach.<sup>265</sup> However, Frontier said the QCA's draft decision on DBCT gave very low weight to the Wright method.<sup>266</sup> Frontier concluded:

...there is no basis for the QCA's effective rejection of the Wright evidence—it has provided no cogent reason for rejecting the Wright evidence and it has done so against the advice of its consultant.<sup>267</sup>

The QRC considered that the Wright assumption that the cost of equity is more stable over time than the MRP is not supported by empirical evidence. The QRC said that our analysis supports greater stability in the MRP than the real return on equity over time. Accordingly, the QRC said more reliance should not be placed on the Wright estimate.

The QRC also considered that the Wright estimate is an outlier among the five estimates—it is not reflective of current market expectations of the MRP (as indicated in the DGM or survey/experts' estimates), nor is it reflective of the historical MRP (as indicated in the Ibbotson and Siegel estimates). Accordingly, the QRC concluded the Wright estimate should be given limited weight.<sup>268</sup>

The QCA agrees that low weight has been given to estimates from the Wright method in previous decisions.<sup>269</sup> However, the QCA disagrees with Frontier's claim that no 'cogent reason' has been provided for doing so; Frontier has simply misrepresented the QCA's position.

The QCA's Market Parameters decision considered arguments relating to the Wright method. In particular, the QCA examined theoretical and empirical evidence relating to the relationship between bond yields and the MRP. In doing so, the QCA noted that drawing definitive conclusions is difficult due to the unobservability of the MRP.<sup>270</sup>

In evaluating the evidence, the QCA also noted that Wright et al. 2003 originally argued for the stability of the return on equity in the context of data for the United Kingdom. Accordingly, the QCA sought to examine the relative stability of the MRP and the real return on equity for Australia (using data for Australia). The variability in computed 30-year rolling averages of the MRP estimate and the cost of equity estimate

<sup>263</sup> Aurizon Network, sub. 1: 290.

<sup>264</sup> Aurizon Network, sub. 9: 34.

<sup>265</sup> Aurizon Network, sub. 38: 33–34.

<sup>266</sup> Aurizon Network, sub. 9: 34–35.

<sup>267</sup> Aurizon Network, sub. 9: 35.

<sup>268</sup> QRC, sub. 53: 15.

<sup>269</sup> QCA 2016b: 78.

<sup>270</sup> QCA 2014c: 78–81.

suggested that the MRP is less variable over time than the cost of equity.<sup>271</sup> This analysis was a principal factor in informing our view at the time that the Wright method should receive relatively low weight.<sup>272</sup>

Given stakeholder submissions on the Wright method, the QCA has again reviewed material related to this method, including this previous analysis. In doing so, the QCA has concluded that a limitation of the earlier analysis is that it did not test the statistical significance of the difference between the variances of the MRP and the real return on equity time series. Accordingly, the QCA considers such testing should be undertaken. However, across the 100 years of data used in the analysis, there are too few independent observations to strongly conclude that the MRP is less variable over time than the cost of equity.

As a result, the QCA has revised its position on the Wright method. While our analysis shows relatively greater stability in the MRP than the real return on equity over time, our view is that this analysis is not determinative, given the limitations identified. In this regard, The QCA notes Lally's advice that the empirical evidence on this matter, while favouring the Ibbotson method over the Wright method, is not decisive.<sup>273</sup> For these reasons, and taking into account this advice, The QCA has given more regard to estimates from the Wright method.

In response to the QRC's concerns, the QCA acknowledges that the Wright estimate is the highest of the five estimates. However, the QCA considers that it provides useful information on the MRP, as it is another indicator of current market conditions.<sup>274</sup> The QCA agrees with the QRC that the statistical evidence is more supportive of the stability of the MRP than it is of the stability of the (real) cost of equity. Given the statistical testing limitations indicated previously, our view is that increasing the weight on this estimate is appropriate. In doing so, the QCA still places greater emphasis on the Ibbotson/Siegel estimates.

## Beta

### Aurizon Network's proposal

Aurizon Network proposed an equity beta of 1.0, based on an asset beta of 0.55, gearing of 55 per cent and a debt beta of 0.12.<sup>275</sup> Aurizon Network's beta proposal was accompanied by reports from the consultants, The Brattle Group and Frontier.<sup>276</sup>

Aurizon Network's proposal applies an ordinary least squares regression analysis of stock returns on market returns, using five years of weekly data, to identify the equity betas for a sample of comparator businesses. Aurizon Network's proposal considered North American gas and oil pipelines to be the most appropriate comparators for Aurizon Network, with some weight given to railway companies, and that broad utility businesses are not appropriate. The Brattle Group estimated an asset beta range of 0.55 to 0.65 for these comparators. Aurizon Network proposed to use the lower bound of this range for the UT5 undertaking pricing period, submitting an asset beta of 0.55.<sup>277</sup>

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<sup>271</sup> Using historical data from 1883–2013, the analysis involved computing rolling 30-year averages for the real rate of return on equity, long-term government bond yield and MRP. The relative stability of each series can be determined by comparing the standard deviations. The standard deviation of the real equity return is 1.61%, while the standard deviation of the MRP is 0.86%. QCA 2014c: 86–87.

<sup>272</sup> QCA 2014c: 85–88.

<sup>273</sup> Lally 2013a: 66.

<sup>274</sup> The Wright estimate, while providing some indication of current market conditions is a hybrid method because it relies on both historical and contemporaneous data. Specifically, it uses an (average) historical real return on equity but combines it with a current expected inflation rate and then deducts a current risk-free rate.

<sup>275</sup> Aurizon Network applied the Conine de-levering/re-levering model to convert the equity and asset betas.

<sup>276</sup> Aurizon Network, sub. 4; sub. 6.

<sup>277</sup> Aurizon Network, sub. 1: 273–274.

The QCA has assessed Aurizon Network's proposal, and has considered submissions from stakeholders and their consultants, as well as the advice from Incenta Economic Consulting (Incenta).<sup>278</sup> For the reasons set out in this section, the QCA's decision is that the equity beta proposed by Aurizon Network is not appropriate. The QCA's decision is that the beta estimates in Table 31 are appropriate.

**Table 31 QCA's beta estimates for the decision**

<i>Beta</i>	<i>Estimate</i>
<i>Debt beta</i>	0.12
<i>Asset beta</i>	0.42
<i>Equity beta</i>	0.73

One of the factors that the QCA must have regard to under s. 138(2)(g) is the pricing principles in s. 168A. Relevantly, the pricing principles provide that the price of access to a service should generate expected revenue for the service that is at least enough to meet the efficient costs of providing access to the service and include a return on investment commensurate with the regulatory and commercial risks involved (s. 168A(a)). In this regard, in assessing Aurizon Network's proposal, the QCA has sought to establish an appropriate comparator for Aurizon Network's exposure to systematic risk, in order to provide for a rate of return that is commensurate with Aurizon Network's exposure to its commercial and regulatory risks.

After considering the submissions provided by stakeholders and the analysis provided by Incenta,<sup>279</sup> the QCA does not consider that North American pipelines or rail freight transportation businesses are appropriate comparators for Aurizon Network.

In comparing those relevant characteristics that are expected to affect systematic risk and examining the underlying economic fundamentals, the QCA considers regulated energy and water businesses are comparable firms of similar systematic risk to Aurizon Network at this time.

The QCA considers that an equity beta of 0.73 is commensurate with the commercial and regulatory risks involved in providing access to the declared service.

#### Key issues identified during the QCA's investigation

The QCA has considered all elements of Aurizon Network's beta proposal as well as other relevant aspects of Aurizon Network's 2017 DAU proposal in making this decision. The following issues attracted comment from stakeholders or were identified for further consideration:

- the appropriate beta estimate for Aurizon Network's 2017 DAU
- identifying appropriate comparator businesses for Aurizon Network. This assessment:
  - examines key considerations when evaluating Aurizon Network's systematic risk
  - provides an overview of the samples of industry groups that possess characteristics relevant to the systematic business risk of Aurizon Network
- reviews each of the industry group samples to assess whether they are appropriate comparators for Aurizon Network, including:
  - North American pipelines businesses as proposed by Aurizon Network

<sup>278</sup> The QCA engaged Incenta to provide independent, expert advice on an appropriate asset/equity beta value for Aurizon Network and to inform our assessment of Aurizon Network's beta proposal.

<sup>279</sup> Incenta Economics 2017. Incenta completed a first principles analysis.



- freight rail transportation businesses as proposed by Aurizon Network
- regulated energy and water businesses
- toll roads businesses
- examines whether the available empirical evidence supports the first principles analysis
- considers other regulatory decisions
- the estimation methodology used to estimate Aurizon Network's asset beta
- the reliability of the Sharpe-Lintner CAPM.

### The appropriate beta estimate for Aurizon Network's 2017 DAU

In considering whether Aurizon Network's equity beta estimate is appropriate, the QCA has considered all relevant submissions and expert reports, including the expert reports submitted by Aurizon Network and the report provided by Incenta Economics.

The Brattle Group calculated a range of asset betas from 0.4 to 1.1 using its estimation methodology. The Brattle Group considered the asset betas associated with regulated energy and water sample are lower than what is representative for Aurizon Network's equity, with the electric utilities sample being the least comparable to Aurizon Network. The Brattle Group also found the United States Class 1 rail subsample to have higher risk than Aurizon Network. Excluding these two end points (electric utilities and United States Class 1 rail subsamples), The Brattle Group narrowed the range of asset betas to 0.45 to 0.85.<sup>280</sup>

The Brattle Group considered firms in the North American pipeline sample to be most directly comparable to Aurizon Network for purposes of determining a representative asset beta. The Brattle Group concluded that the beta range of 0.55 to 0.65 associated with the North American pipeline sample is reasonable, and that the midpoint of 0.6 represents the best point estimate of Aurizon Network's asset beta.<sup>281</sup> Aurizon Network proposed to use the lower bound of this range for the UT5 undertaking period, submitting an asset beta of 0.55.

In contrast, Incenta identified regulated energy and water businesses as most similar to Aurizon Network on the basis of systematic risk. In estimating Aurizon Network's asset beta, Incenta's preferred methodology relies on 10-year estimation periods for its asset beta estimates and took account of both monthly and weekly data. Incenta noted that, for the sample period, there was considerable divergence in the asset beta estimates for regulated energy and water businesses, depending on whether weekly or monthly data is employed, and depending on the period of analysis (that is, 5 or 10 years).<sup>282</sup> Incenta's assessment produced an asset beta point estimate for Aurizon Network of 0.42.

Incenta considered that identifying a lower bound estimate (using five years of observations) would entail considerable imprecision. While identifying an upper bound is also subject to imprecision, Incenta's first principles analysis concluded that toll roads would likely be an upper bound, but considered these toll road firms to have greater systematic risk than Aurizon Network.<sup>283</sup> Incenta's upper bound estimate for Aurizon Network's asset beta of 0.50, based on the higher of the average/median estimates using 10-year monthly and weekly data for toll roads.

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<sup>280</sup> Aurizon Network, sub. 4: 57.

<sup>281</sup> Aurizon Network, sub. 4: 57.

<sup>282</sup> Incenta Economics 2017: 76.

<sup>283</sup> Incenta Economics 2017: 14.

Incenta calculated an equity beta estimate of 0.73 for Aurizon Network, by re-levering the benchmark asset beta of 0.42 (applying the benchmark level of gearing (55 per cent) and the Conine formula, using a debt beta of 0.12 and a gamma value of 0.46).

Aurizon Network maintained that an asset beta value of 0.55 based on a US gas pipeline comparator group appropriately reflects the systematic risks of CQCN. Aurizon Network submitted that this is well within the beta range identified by Incenta. Aurizon Network considered that excluding North American gas pipelines from the comparator group in estimating Aurizon Network's asset beta is unreasonable.<sup>284</sup>

As indicated in the analysis below, the QCA considers that the regulated energy and water businesses sample provides the most appropriate set of comparators for Aurizon Network at this time, and the QCA has a preference for adopting a 10-year period to estimate Aurizon Network's beta.

The QCA considers that Aurizon Network's proposed asset and equity betas are not appropriate. In particular, the QCA considers that Aurizon Network's use of the North American pipeline sample in establishing its beta will materially overstate Aurizon Network's systematic risk. As such, Aurizon Network's proposed asset and equity betas do not reflect appropriate measures of the underlying business risk of Aurizon Network relative to the risk of the market as a whole.

The QCA's view is that 0.42 reflects the most appropriate empirical estimate of Aurizon Network's asset beta at this time and is commensurate with the regulatory and commercial risks involved in providing access to the service. This asset beta converts to an equity beta of 0.73, using the Conine re-levering approach applied by both Aurizon Network and Incenta. Based on these considerations, the QCA's decision is that it is not appropriate to adopt Network's proposed beta estimates and that an asset beta of 0.42 and equity beta of 0.73 is appropriate for Aurizon Network.

The QRC considered it reasonable for the QCA to adopt an asset beta of 0.42 and equity beta of 0.73 for Aurizon Network—although believed this to be a conservative estimate of the equity beta that it is likely to overstate the degree of risk faced by Aurizon Network.<sup>285</sup> Additionally, the QRC noted that other Australian regulators' beta estimates for regulated energy and water businesses are typically lower than the QCA's beta estimates.<sup>286</sup>

The QRC considered that the asset beta should be based on the asset betas determined for the closest comparators. In this context, the QRC also submitted that a new undertaking is an appropriate time to reconsider that estimate.<sup>287</sup>

The QCA's assessment of beta for the 2016 Undertaking determined that the equity beta estimate be set at 0.8 but recognised that Incenta's recommended estimate of 0.73 was justifiable.<sup>288</sup> In approving an equity beta of 0.8, among other considerations, the QCA acknowledged the need for regulatory certainty, noting the 2016 Undertaking was Aurizon Network's first regulatory reset since the privatisation of its parent company.<sup>289</sup>

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<sup>284</sup> Aurizon Network, sub. 40: 80, 125 and 127.

<sup>285</sup> The QRC considered that: some energy and water businesses within the sample are likely to face greater risk than Aurizon Network; and the asset beta estimates for the relevant sample are materially lower over the recent 5-year estimation period in comparison to the 10-year estimates. Both of these matters are considered as part of the QCA's analysis.

<sup>286</sup> QRC, sub. 53: 16, 18. For example, the AER adopts an equity beta of 0.7 and the Essential Services Commission adopts an equity beta of 0.65.

<sup>287</sup> QRC, sub. 21: 23 and 32.

<sup>288</sup> QCA 2014e: 253.

<sup>289</sup> QCA 2015: 249–252.

In any case, the QCA indicated, as part of its assessment of Aurizon Network's 2014 DAU, that the evidence suggested that an equity beta of 0.8 (asset beta of 0.45) could be considered conservative. The QCA also noted that future considerations of a beta estimate for Aurizon Network could lead to reductions in this estimate.<sup>290</sup>

In relation to an equity beta estimate of 0.73, Aurizon Network and Frontier submitted:

- (a) There is a lack of predictability in the QCA's rate of return decisions, given that the empirical evidence present by Incenta is essentially unchanged since UT4 (although the upper bound of the asset beta range for UT5 is slightly higher) but a lower beta was adopted. No explanation has been provided as to why it is reasonable to depart from the previous decision and it is unclear why the same evidence now supports a different beta estimate.
- (b) There is also a lack of transparency in the QCA's rate of return decisions, given that the UT4 Final Decision stated that the 'best' possible estimate of beta had been adopted based on the evidence available at the time. Given this best estimate and no change in the evidence since UT4, reducing the asset beta allowance for the UT5 period would result in Aurizon being under-compensated for the UT5 regulatory period. The QCA did not indicate in the UT4 Final Decision that it would consider lowering the beta allowance in future periods.
- (c) The fact that the same evidence as UT4 has resulted in a lower beta estimate for UT5 is inconsistent with the promotion of regulatory certainty.
- (d) The QCA appears to overlook a key consideration cited in its UT4 decision, that estimating beta with high precision is difficult, suggesting: caution be shown in making significant changes to previous estimates; and selecting a point estimate as precise as 0.73 may represent an attempt to be over-precise. The estimate of the parameter is inherently uncertain such that it cannot be reliably estimated to two decimal places, but can only be narrowed down to within a reasonable range. Because beta estimates are known to be statistically imprecise, it is important that a regulator does not rely exclusively on a single statistically imprecise beta point estimate—such an approach involves a substantial risk of under-compensating investors.
- (e) The QCA's proposal to lower the allowed asset beta for the UT5 period suggests that maintaining an environment conducive to investment in new infrastructure is now a less important consideration.<sup>291</sup>

The QCA recognises that caution is required when making decisions on beta estimates. These decisions have important implications for both access providers and access seekers/holders. Our decision with respect to equity beta reflects our assessment of the regulatory arrangements proposed by Aurizon Network in its 2017 DAU.

The QCA does not consider that there is a lack of predictability in the decision that an equity beta of 0.73 is appropriate for the 2017 DAU. As noted above, the UT4 decision making process outlined that future considerations of a beta estimate for Aurizon Network could lead to reductions in the equity beta of 0.8. In both UT4 and UT5 the QCA considered that Incenta's recommended estimate of 0.73 was justifiable for Aurizon Network.

The key difference between the two regulatory decisions is that the QCA applied its judgement to, amongst other things, provide a beta estimate that reflected the fact it was Aurizon Network's first regulatory reset since the privatisation of its parent company. In this instance, such consideration no longer applies and the QCA does not consider that such an adjustment is appropriate or has been justified by Aurizon Network.

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<sup>290</sup> QCA 2014e: 253.

<sup>291</sup> Aurizon Network, sub. 40: 125–126; sub. 44: 1–2, 5–12.

Furthermore, the approach for estimating an appropriate asset beta for Aurizon Network is different here to the approach adopted for the 2016 Undertaking—the former reflecting both monthly and weekly return interval beta estimates. In considering these matters afresh, Aurizon Network has not demonstrated that it is appropriate to apply an uplift to the recommended equity beta estimate.

The QCA does not consider that there is a lack of transparency in the QCA's rate of return decisions. As noted in UT4, the QCA's best estimate must also be informed by our judgement, taking into account all relevant information. The QCA considers that an equity beta of 0.8 for UT4 was the best estimate for that point in time—taking into account all factors, which included, amongst other things, the fact that the 2016 Undertaking was Aurizon Network's first regulatory reset since the privatisation of its parent company. In making this decision, the QCA did not 'err on the high side' or 'inappropriately set an asset beta at the higher end of a range'—noting that the upper bound of this range produced an asset beta of 0.49.

The QCA notes that the 2014 DAU final decision did not directly stipulate that the QCA considered a beta of 0.8 to be a conservative estimate and that future considerations could lead to reductions in the equity beta of 0.8. However, the final decision clearly referred to maintaining "the position proposed in the MAR draft decision", which outlined the QCA's position on these matters. The QCA considers that it was made clear that such considerations helped inform the decision making process for UT4.

As such, the QCA does not consider that a decision to adopt an equity beta of 0.73 is inconsistent with the promotion of regulatory certainty.

Aurizon Network has undertaken, and sought from the QCA, a fresh review of these matters, and this is the approach the QCA has taken. While the UT4 equity beta estimate is within the range being proposed by Incenta, the QCA notes that Aurizon Network's proposal is not within this range.

The QCA considers that an asset beta of 0.42 is the best available empirical estimate of Aurizon Network's asset beta, based on the information, analysis and weight of evidence provided. The QCA notes that this is not based on any material change in Aurizon Network's systematic risk between regulatory periods, but rather on recognising that the uplift previously provided is no longer supported. Further, future consideration of changes in the beta estimate should be related to changes in Aurizon Network's underlying systematic risk (for example, to Aurizon Network taking on an additional business risk that has a systematic component).

The QCA acknowledges that estimating betas with a high degree of precision is inherently difficult. From the evidence provided, an equity beta of 0.73 is the best expected unbiased estimate—which minimises the sum of squared errors. The QCA considers that this is the best point estimate to adopt for an individual WACC parameter to limit the potential for a bias estimate. Importantly, the QCA considers that adjusting the WACC estimate to account for the risk of imprecision is best reflected as part of the overall WACC, rather than an uplift to individual parameters.

With this in mind, it is noted that the QCA's overall WACC estimate of 5.7 per cent for Aurizon Network's 2017 DAU would be equivalent to obtaining an overall WACC estimate from a bottom-up estimate of the individual parameters in which the equity beta is set at above 0.80, all else being equal. This approach for estimating the WACC reflects the fact that the QCA has not relied exclusively on a point estimate, which is subject to considerable statistical imprecision, but has considered the appropriateness of the overall outcome and exercised its judgment in reaching a final view.

Furthermore, the QCA considers that this approach to setting the overall WACC provides for an environment conducive to investment in infrastructure, as well as operating and maintaining the CQCN.

### QCA considerations when evaluating Aurizon Network's systematic risk

Aurizon Network said that the equity beta is one of the key parameters that reflects Aurizon Network's commercial and regulatory risks and that the first step in the estimation process is to define the firm's risk

profile.<sup>292</sup> Aurizon Network stated that its commercial and business risk environment is the key driver of beta. Aurizon Network considered:

- The beta estimate needs to reflect the key risk characteristics of its industry and market environment.
- The key priority is identifying firms that have comparable risk characteristics, having regard to their business and operating environments.<sup>293</sup>

Aurizon Network did not consider that being subject to regulation is a primary driver of the beta estimate. Aurizon Network and Frontier considered that regulation, at most, is just one of the many dimensions that should be considered in determining the appropriate comparator businesses for Aurizon Network. As such, Aurizon Network did not support the sole reliance on an industry comparator based on the form of regulation. Aurizon Network considered that this approach results in the form of regulation being the dominant firm characteristic that determines Aurizon Network's exposure to systematic risk. Aurizon Network and Frontier submitted that all of the comparators considered by the QCA are likely to have some useful information to assist in determining Aurizon Network's beta estimate and that at least some weight should be afforded to these other comparator groups, rather than assigning 100 per cent weight to a single sub-sample.<sup>294</sup>

Similarly, The Brattle Group said that supply risk, demand risk, operating risk, and stranding risk represent important considerations when evaluating the systematic business risk of commodity transportation infrastructure networks like Aurizon Network.<sup>295</sup> Frontier said that industry characteristics, customer concentration, and exposure to a particular type of customer also matter for risk. Frontier considered that, as firms in the same industries under different forms of regulation have similar beta estimates, the firm's industry is at least one relevant criteria for analysis.<sup>296</sup>

The QRC's consultant, Castalia, said that in practice the variability of returns relative to the market portfolio as a whole may be driven by a mix of industry-specific and regulation-specific factors.<sup>297</sup>

The QCA has had regard to Aurizon Network's key risk characteristics, as well as to risk characteristics of potential comparators, in order to identify appropriate comparators for Aurizon Network. The QCA agrees with Aurizon Network that regulation is one of a number of drivers of systematic risk that should be considered in determining the appropriate comparator businesses for Aurizon Network.

In establishing appropriate comparators for Aurizon Network, the QCA considers Aurizon Network's exposure to systematic risk—that is, the movement of Aurizon Network's returns with the returns of the market. This analysis necessarily includes examining industry and market characteristics that affect Aurizon Network's exposure to risk, as well as the extent to which such risk is addressed by the regulatory framework. In taking this approach, the QCA's analysis does not rely solely on the form of regulation to establish an appropriate set of comparator firms.

In establishing appropriate comparators for Aurizon Network, the QCA has considered the extent to which proposed industry groups are exposed to similar levels of systematic risk (that is, covariance of returns with market returns) as Aurizon Network. The QCA considers that this approach establishes an appropriate set of firms with comparable systematic risk to Aurizon Network, rather than assigning weights to different industry groups that have certain similar, physical characteristics. In circumstances where the QCA's

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<sup>292</sup> Aurizon Network, sub. 1: 271.

<sup>293</sup> Aurizon Network, sub. 1: 273–274.

<sup>294</sup> Aurizon Network, sub. 1: 273, 293, 295; sub. 6: 8; sub. 40: 110; sub. 44: 3, 20.

<sup>295</sup> Aurizon Network, sub. 4: 38.

<sup>296</sup> Aurizon Network, sub. 6: 6.

<sup>297</sup> QRC, sub. 21, Annexure 1: 12.

approach identifies more than one appropriate comparator, or comparator group, for Aurizon Network, then the QCA recognises that it may be appropriate to give them some weight.

The QRC supported assessing Aurizon Network's risk profile and identifying relevant comparators for the purposes of beta estimation.<sup>298</sup>

In relation to considering the influence that the regulatory framework has on Aurizon Network's exposure to systematic risk, Frontier stated that there is no substantial evidence that any particular intensity of regulation leads to a measurable difference in beta estimates.<sup>299</sup>

It does not matter whether regulation offers high or low powered incentives, or whether a price cap or revenue cap is involved – different types of regulation do not show up in the data as leading to different beta estimates.<sup>300</sup>

As such, Frontier concluded that it is highly questionable whether the presence of regulation is the primary determinant of risk.<sup>301</sup> Aurizon Network considered that Frontier's analysis demonstrates that regulation has not been a driving difference in beta estimates in previous research.<sup>302</sup>

Alternatively, Castalia submitted that the conventional wisdom has long been that betas for companies in the same sector in jurisdictions with higher powered regulation are greater than in jurisdictions with lower powered regulation. However, Castalia considered that broad similarities or differences between regulatory regimes of comparators provide relatively little insight about the specifics of risk allocation.<sup>303</sup>

The QRC also submitted that Aurizon Network's risk profile is closely linked to the design of the regulatory framework, with Aurizon Network heavily insulated from risk by its framework. The QRC considered that risk protection mechanisms have also been identified by market analysts, and are factored into market assessments of Aurizon Network's risk profile.<sup>304</sup>

Incenta did not agree with Aurizon Network and Frontier that regulation cannot be an important determinant of asset beta. Incenta acknowledged that there is a body of empirical work that has found no consistent differences in beta risk based on the *form* of regulation. However, Incenta noted that these studies typically have tested for differences in beta caused by applying a different form of price control among utilities whose revenues are dominated by residential customers. Given that residential demand tends not to have a substantial pro-cyclical component, there is a low likelihood of finding material differentials in beta estimates in such circumstances.<sup>305</sup>

More importantly, Incenta stated that the studies referred to by Frontier do not examine the more general question of how beta under certain types of 'cost-based regulation' compares with beta when there is an absence of 'cost-based regulation'.<sup>306</sup> Incenta provided evidence that cost-based regulation insulates the business from earnings variations that would otherwise be pro-cyclical, resulting in a lower asset beta relative to the absence of cost-based regulation.

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<sup>298</sup> QRC, sub. 53: 16.

<sup>299</sup> Aurizon Network, sub. 6: 15.

<sup>300</sup> Aurizon Network, sub. 6: 6.

<sup>301</sup> Aurizon Network, sub. 6: 15.

<sup>302</sup> Aurizon Network, sub. 1: 273.

<sup>303</sup> QRC, sub. 21, Annexure 1: 12.

<sup>304</sup> QRC, sub. 53: 16–17.

<sup>305</sup> Incenta Economics 2017: 62–63.

<sup>306</sup> Incenta's term, 'cost-based regulation', is not referring to a specific form of price control or incentive regime, but to the fact that regulation is undertaken at specified points in time when revenues or prices are re-set relative to costs in order to provide an expected return on investment that, given the level of risk, is consistent with returns that would be earned in competitive markets.

As indicated by Incenta, Peltzman<sup>307</sup> hypothesised that regulatory buffering of the firm's cash flows will decrease the firm's asset beta. Incenta identified a number of studies that have concluded, all else equal, that the presence of regulation reduces beta.<sup>308</sup>

- Rosenberg and Guy<sup>309</sup> found that regulated industries have amongst the lowest betas after allowing for various firm-specific variables.
- Davidson, Rangan and Rostenstein,<sup>310</sup> and Binder and Norton<sup>311</sup> showed systematic risk was inversely related to the intensity of regulation for the electric utility industry in the United States.

Incenta noted that more studies indicating that the type of regulation matters are examined by Pedell,<sup>312</sup> who concluded:

All the studies find a significant influence of regulatory climate on the cost of capital. They confirm the conjectured correlation between a more favourable regulatory climate and a lower cost of capital. Obviously, a more continuous and cost-orientated regulation is associated with a lower risk, which can be understood as an indication that the buffering hypothesis proves true.<sup>313</sup>

In addition to the studies identified by Incenta, Alexander and Irwin<sup>314</sup> measured the betas of more than 100 infrastructure companies subject to price cap or rate-of-return regulation. Overall, the results showed that price cap regulation was associated with higher betas than rate-of-return regulation in Canada, Japan, Sweden, United Kingdom and the United States.

Although some empirical evidence supports the conclusion that there are no differences in beta risk based on the form of regulation, these studies are unlikely to detect any differences in beta risk given the nature of demand for utilities' services. Aurizon Network considered that this is contradictory to the empirical evidence in support of cash flow buffering assumption regarding cost-based regulation. Aurizon Network noted that the cited works of Davidson, Rangan and Rostenstein (1997), Binder and Norton (1999), and Alexander and Irwin (1996) studies were tested against industries that are largely a function of residential demand.

Aurizon Network was also concerned that the empirical evidence relied on by the QCA is highly selective and, in some instances, superseded by more recent research. Moreover, Aurizon Network said it does not include an assessment of the impact of regulation on asset betas within the railway industry.

Aurizon Network noted that Alexander and Irwin (1996) do not compare within-country differences for types of regulation and reaches different conclusions to the more comprehensive and recent empirical work of Gaggero (2012), which included transport sectors.<sup>315</sup>

Furthermore, Aurizon Network said that the work of Rosenberg and Guy makes no reference to economic regulation but merely observes that the 'Energy, Utilities' industry classification have lower betas on average than other industries. Aurizon Network considered that the insight of the work of Rosenberg and Guy is that:

Because industry betas maintained these differences over the period studied it is appealing to incorporate an unconditional prediction of beta the assertion that the future beta for stocks in

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<sup>307</sup> Peltzman 1976.

<sup>308</sup> Incenta Economics 2017: 28.

<sup>309</sup> Rosenberg and Guy 1976.

<sup>310</sup> Davidson, Rangan and Rostenstein 1997.

<sup>311</sup> Binder and Norton 1999.

<sup>312</sup> Pedell 2006.

<sup>313</sup> Pedell 2006: 250.

<sup>314</sup> Alexander and Irwin 1996.

<sup>315</sup> Aurizon Network, sub. 40: 110–111.

each industry will tend to be close to the historical average for that industry. Thus, the predicted beta for a stock will give some weight to the average historical beta for the industry.<sup>316</sup>

Aurizon Network submitted that it requires a large intellectual leap to conclude that the asset betas for an industry comprised of regulated essential services are appropriate betas for a regulated service within another industry classification, such as coal export rail.<sup>317</sup>

Aurizon Network submitted that the QCA places significant emphasis on various risk mitigation or transfer mechanisms within UT5 and previous undertakings, to support the proposition that Aurizon Network's risk profile is comparable to that of energy utilities. Aurizon Network noted that Professor Lally recently considered that there is no empirical study that provides a clear conclusion on the effect of regulation on beta. Aurizon Network considered that these measures are likely to have an immaterial effect on the empirical basis for the required rate of return and is not a justification for treating Aurizon Network's risk profile as comparable to that of energy utilities.<sup>318</sup>

As a result, Aurizon Network considered that the most robust starting point for asset beta estimation is the average industry beta, which should then be adjusted for firm-specific characteristics within that industry. Aurizon Network said that the extent that the form of regulation does influence asset betas, then that effect should be reflected in adjustments from the industry average. Aurizon Network maintained that North American gas pipelines are the most closely aligned industry to the export rail infrastructure—based on the key characteristics of Aurizon Network's network and the associated market environment and which have comparable risk characteristics—and that Aurizon Network has appropriately adjusted the asset beta to reflect differences in the respective regulatory environments.<sup>319</sup>

The QCA considers that Aurizon Network's regulatory framework is a relevant factor to consider in identifying appropriate comparators to benchmark Aurizon Network's exposure to systematic risk. The QCA notes that there is available evidence supporting the view that aspects of regulation can insulate the business from systematic earnings variations that would otherwise be pro-cyclical.

While the QCA acknowledges that some empirical evidence supports the conclusion of no differences in beta risk based on the form of regulation, the QCA has taken an open mind as to the effect of the form of regulation on an industry group's exposure to systematic risk. In this regard, the QCA considers the overall exposure to systematic risk based on the industry's characteristics, which includes its regulatory framework as a whole.

While the form of regulation is a relevant consideration, it is only one element of Aurizon Network's regulatory framework allocates and mitigates risk. As outlined in Chapter 2, Aurizon Network's regulatory framework contains various mechanisms that allocate risk to industry stakeholders and/or mitigates the extent to which Aurizon Network is exposed to certain risks. Indeed, Aurizon Network recognised that economic regulation may impact the way in which market characteristics translate to commercial risk for these businesses.<sup>320</sup>

The way in which Aurizon Network's regulatory framework allocates and mitigates risk is an important consideration for distinguishing the extent to which Aurizon Network is exposed to systematic risk and for identifying appropriate comparators. The QCA has considered the extent to which the regulatory framework affects Aurizon Network's exposure to systematic risk. While the QCA agrees with Aurizon Network that the most robust starting point for asset beta estimation is the average industry beta, the QCA

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<sup>316</sup> Rosenberg and Guy, 1976: 67.

<sup>317</sup> Aurizon Network, sub. 40: 110.

<sup>318</sup> Aurizon Network, sub. 40: 35, 111.

<sup>319</sup> Aurizon Network, sub. 40:110–111

<sup>320</sup> Aurizon Network, sub. 40: 123



considers that this average industry beta should be based on the industries of appropriate comparators, where such comparators face similar exposure to systematic risk.

In doing so, the QCA has regard to Aurizon Network's key risk characteristics, as well as to risk characteristics of potentially comparable firms, in order to identify an appropriate set of comparators for Aurizon Network. The QCA's assessment approach considers the extent to which these factors affect Aurizon Network's and potential comparators' overall exposure to systematic risk.

### Samples of potential comparators

The Brattle Group constructed samples of publicly traded companies from industry groups that it considered to possess characteristics relevant to the systematic business risk of Aurizon Network.<sup>321</sup>

As part of its first principles assessment, Incenta reviewed samples from the gas and oil transmission pipelines; class 1 railways; and regulated energy and water distribution industries. In addition to these three business groups, Incenta also examined a toll roads sample.

A comparison of The Brattle Group's and Incenta's industry samples is presented in Table 32.

**Table 32 Comparison of industry samples examined by The Brattle Group and Incenta**

<i>Business group</i>	<i>The Brattle Group sample</i>	<i>Incenta sample</i>
North American pipelines	<p>The Brattle Group's 'North American pipelines' sample includes:</p> <ul style="list-style-type: none"> <li>• a natural gas subsample, consisting of four United States publicly traded partnerships with between approximately 50% and 80% of their plant assets dedicated to regulated natural gas transmission</li> <li>• a liquids subsample, consisting of six United States publicly traded partnerships with between approximately 40% and 90% of their plant assets dedicated to operation of regulated 'liquids' pipelines</li> <li>• one U.S publicly traded partnership with approximately 40% of its net plant assets dedicated to regulated pipeline (natural gas and natural gas liquids) operations</li> <li>• two Canadian corporations with approximately 75% of assets dedicated to regulated natural gas and oil pipeline operations.</li> </ul>	<p>Incenta's 'gas and oil transmission pipelines' sample includes the 13 businesses included in The Brattle Group's North American pipelines sample and an additional two natural gas pipeline companies from the United States that are routinely included as comparators by the Federal Energy Regulatory Commission (FERC).</p>
Freight rail transportation	<p>The Brattle Group's 'Freight rail transportation' sample comprises 10 businesses with an exposure to bulk commodity shipping, incorporating a variety of United States and non-United States Class 1 freight rail companies.</p>	<p>Incenta's 'Class 1 railways' sample contains the same businesses as The Brattle Group's freight rail transportation sample.</p>
Regulated energy and water	<p>The Brattle Group's 'Regulated distribution utilities' sample includes:</p> <ul style="list-style-type: none"> <li>• 27 United States electric utilities with more than 50% of their assets under regulation, but several of the utilities providing power generation as well as distribution</li> <li>• six United States natural gas local distribution companies with between approximately 65%</li> </ul>	<p>Incenta's 'regulated energy and water distribution' sample comprises:</p> <ul style="list-style-type: none"> <li>• 67 regulated energy businesses, which includes the 33 energy businesses included in The Brattle Group's sample and 34 additional energy businesses</li> </ul>

<sup>321</sup> Aurizon Network, sub. 4: 33.

<i>Business group</i>	<i>The Brattle Group sample</i>	<i>Incenta sample</i>
	<p>and 90% of their assets dedicated to regulated local distribution of natural gas</p> <ul style="list-style-type: none"> <li>• nine United States water utilities with over 80% of their assets dedicated to regulated water distribution service.</li> </ul>	<ul style="list-style-type: none"> <li>• 11 regulated water distribution businesses, which includes the nine businesses included in this industry by The Brattle Group and two additional UK water businesses.</li> </ul>
Toll roads	Not examined by The Brattle Group.	Incenta's sample comprises six companies.

*Note: The Brattle Group considered that the electric utilities sample is less directly representative of distribution network business characteristics than the other two sub-groups of utilities due to its higher share of unregulated activity and inclusion of some vertically integrated electric utilities (Aurizon Network, sub. 4: 36).*

*Source: Aurizon Network, sub. 4; Incenta Economics 2017.*

The characteristics that are expected to affect systematic risk for each of these business group samples have been analysed in order to determine which of these business groups contains appropriate comparators for Aurizon Network. Our analysis of whether these business groups are appropriate comparators for Aurizon Network is presented below.

### North American pipelines businesses

Both Aurizon Network and The Brattle Group submitted that North American pipelines are the most relevant comparators for determining Aurizon Network's asset beta. Aurizon Network considered that North American pipelines as the appropriate industry comparator group and supported this claim by reference to the common characteristics in business and operating risks.<sup>322</sup>

Aurizon Network considered that the North American pipelines have key similarities to Aurizon Network, including that both are:

- servicing a limited number of commercial customers
- subject to regulation and under an open access regime
- single commodity transportation assets.

Aurizon Network also noted that North American pipelines businesses are underwritten by long-term contracts with customers.<sup>323</sup>

In response, Castalia said it was not convinced by the arguments for the comparability of the North American pipelines sample.<sup>324</sup> The QRC fundamentally disagreed with Aurizon Network's proposal to benchmark its asset beta against North American oil and gas pipelines. The QRC considered that North American pipeline businesses operate under very different regulatory frameworks and are not protected from risk to nearly the extent as Aurizon Network.<sup>325</sup>

Incenta undertook a detailed analysis to assess the comparability of the North American pipelines sample, which included a review of those similarities suggested by Aurizon Network and The Brattle Group. Based on its analysis, Incenta concluded that North American pipelines are not an appropriate comparator industry for Aurizon Network. Incenta expected North American pipelines to have materially higher systematic risk than Aurizon Network, noting that oil and gas transmission pipelines:

<sup>322</sup> Aurizon Network, sub. 4: 46; sub. 1: 273; sub. 40: 127.

<sup>323</sup> Aurizon Network, sub. 4: 46; sub. 1: 273.

<sup>324</sup> QRC, sub. 21, Annexure 1: 12.

<sup>325</sup> QRC, sub. 53: 16–17

- compete against parallel pipelines and alternative transport modes, and are therefore subject to competitive pressures
- have a light-handed regulatory regime, differing from that applied to Aurizon Network
- are vulnerable to changing market conditions and contract roll-off for uncontracted pipeline capacity, unlike Aurizon Network.<sup>326</sup>

Pointing to comments made by Incenta in advice it provided to First State Investments on determining asset betas for gas pipelines in New Zealand, Aurizon Network contended that Incenta appears to provide support for the appropriateness of North American pipelines as a beta comparator.<sup>327 328</sup> Incenta's comments refer to the characteristics of gas pipelines, relating to long-term contracts, pricing structure and customer base.

The QCA has examined these characteristics as part of our first principles analysis. The QCA notes that Incenta's analysis in the above mentioned report focusses on the characteristics of a different group of regulated entities, namely gas and electricity network businesses—not Aurizon Network. Incenta, in its report, supported the proposition that the asset beta for gas pipeline businesses is higher than the asset beta for electricity distribution businesses.<sup>329</sup> As such, the QCA does not consider that Incenta's advice to First State Investments is inconsistent with its advice provided to the QCA.

The QCA acknowledges that certain similarities exist between North American pipeline businesses and Aurizon Network—the prevalence of long-term contracts, a limited number of commercial customers and single commodity transportation pipelines. However, Aurizon Network has a number of other business and operating characteristics that are not present for North American pipeline businesses, which serve to limit its exposure to systematic risk. For instance, Aurizon Network, as the sole service provider of the CQCN, has a high degree of market power in relation to its customer base. Furthermore, Aurizon Network's customer base:

- is captured, given there is no viable alternative for customers to transport their commodities to port—unlike North American pipelines that are subject to competitive pressures
- has a resilient demand for CQCN services, given the strong position that CQCN coal producers occupy on the global seaborne coal cost curve.

CQCN coal producers have an incentive to maximise production, at high or low prices. The strong position that CQCN coal producers occupy in the seaborne market, as well as the fact that coal haulage costs are only a fraction of the costs they incur, combined with Aurizon Network's regulatory framework result in coal haulage services (and Aurizon Network's regulatory earnings) not being pro-cyclical. While the QCA recognises that volatile coal prices have had implications for Aurizon Network's customer base, the income elasticity of demand for CQCN haulage services is largely decoupled from that of the commodity being transported.

In contrast, North American pipeline businesses are subject to competitive pressures from parallel pipelines and alternative modes of transport. North American pipeline businesses are susceptible to changing market conditions in the oil and gas markets, such as shifts in the regional demand for capacity. As a result, North American pipeline businesses do not have a captured and resilient customer base to the same extent as Aurizon Network. Therefore, the QCA expects the North American pipeline businesses' earnings to be more pro-cyclical than Aurizon Network's.

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<sup>326</sup> Incenta Economics 2017: 5.

<sup>327</sup> Incenta Economics 2016c.

<sup>328</sup> Aurizon Network, sub. 40: 112–118.

<sup>329</sup> See Incenta Economics 2016c.

Furthermore, Aurizon Network's regulatory framework differs substantially from the United States' regulatory regime for gas and oil pipelines, which does not insulate cash flows from the volatility arising from market shocks in the manner that the regulatory framework insulates the cash flows of Aurizon Network. Thus, North American pipelines are exposed to market forces on their uncontracted capacity.

The QCA considers that these different characteristics will expose North American pipelines to materially higher systematic risk than Aurizon Network is exposed to. Therefore, the QCA considers that North American pipeline businesses are not an appropriate comparator for Aurizon Network.

Further analysis examining the appropriateness of North American pipeline businesses as a comparator for Aurizon Network is below. In particular, this analysis examines those characteristics proposed by Aurizon Network and The Brattle Group in support of North American pipeline businesses being an appropriate comparator.

### The regulatory framework

Aurizon Network and The Brattle Group noted that North American pipelines are subject to regulation and operate under an open access regime. These businesses provide service under cost-of-service regulation by the Federal Energy Regulatory Commission (FERC), the Canadian National Energy Board (NEB), and certain state regulatory bodies in the case of intrastate pipelines.<sup>330</sup>

The Brattle Group considered that this regulation and long-term capacity contract features of the North American pipeline industry serve to buffer revenue variability in the manner identified by the QCA and Incenta with respect to Aurizon Network. The Brattle Group acknowledged that the specific rate design applied to regulated natural gas and oil pipelines by FERC and the NEB are not perfectly analogous to the QCA's regulation of Aurizon Network. However, The Brattle Group referred to the QCA's UT4 decision:

We also accept that the empirical evidence, as provided by Incenta, suggests that, while cost based regulation will reduce a firm's systematic risk, variations in the specific form of cost-based regulation, including additional regulatory mechanisms, are unlikely to be reflected in observed measures of systematic risk.<sup>331</sup>

As such, The Brattle Group considered that any difference in the asset beta of regulated pipeline companies is likely to be explained by structural differences between the transmission and distribution businesses.<sup>332</sup>

Castalia stated that, to the extent that Aurizon Network is exposed to the variability of returns, the drivers of such variability primarily have to do with the workings of the regulatory regime rather than with the specifics of the industry in which it operates.<sup>333</sup> Aurizon Network submitted that despite this statement, Castalia mainly cited industry-specific differences of United States pipeline companies when rejecting them as the most comparable firms for Aurizon Network.<sup>334</sup>

Castalia considered that, although there are many broad similarities between the Australian and North American approaches to economic regulation of monopolies, there are also many material differences in how regulatory decisions are made and the risks that regulated companies take.<sup>335</sup> The QRC noted that Aurizon Network has the benefit of a myriad of revenue protection mechanisms—many of these mechanisms are outlined in Chapter 2. The QRC considered that Aurizon Network's regulatory framework,

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<sup>330</sup> Aurizon Network, sub. 1: 273; sub. 4: 40–41, 46.

<sup>331</sup> QCA 2014e.

<sup>332</sup> Aurizon Network, sub. 4: 46.

<sup>333</sup> QRC, sub. 21, Annexure 1: 15.

<sup>334</sup> Aurizon Network, sub. 26: 25.

<sup>335</sup> QRC, sub. 21, Annexure 1: 13.

which aligns revenue with cost at periodic intervals and minimises revenue risk during a regulatory period, is a key feature relevant to its systematic risk.<sup>336</sup>

As noted, there are limitations in interpreting the available empirical evidence as concluding there is no difference in beta risk based on the form of regulation. Instead, the QCA has considered the extent to which the regulatory framework affects Aurizon Network's exposure to systematic risk.

Aurizon Network's regulatory framework entails more than the application of revenue cap regulation. The regulatory compact contains various mechanisms that allocate risk among industry stakeholders and/or seek to mitigate the extent to which Aurizon Network is exposed to certain risks. These mechanisms are further discussed in Chapter 2.

Incenta considered that the regulatory approach applied to North American pipelines is substantially different in nature to that applied to Aurizon Network. As such, it is incorrect to assume that Aurizon Network and North American pipelines are subject to comparable regulatory frameworks. Incenta considered that cost-of-service regulatory tariffs for the pipelines are influenced by fluctuations in the market with no pre-determined regulatory period.<sup>337</sup>

The way in which regulatory rates are established for liquid and natural gas pipeline companies in the United States is summarised below (see the boxes below).

Aurizon Network acknowledged that there are differences in the regulatory ratemaking and the risk profiles between gas and oil pipelines.<sup>338</sup> Aurizon Network submitted that other comparable entities in the transport and energy infrastructure sectors may not have a regulatory revenue cap as currently applies to Aurizon Network, but rather are protected from volume risk through other commercial mechanisms.<sup>339</sup>

Aurizon Network submitted that the assertion that Aurizon Network's regulatory framework differs substantially from the United States regulatory regime for gas and oil pipelines, is reached without any objective evidence of the contracted revenue profile of these businesses and the underlying variability of their cost base even under these differences.<sup>340</sup>

The QCA agrees with Aurizon Network that commercial mechanisms other than a revenue cap may protect entities from volume risk. Industry characteristics that influence the extent to which businesses are exposed to systematic risk are considered in establishing an appropriate comparator for Aurizon Network. For instance, the QCA acknowledges that long-term contracts are a characteristic of the gas and oil pipelines industry—the extent to which these arrangements affect exposure to volume risk are considered below.

The regulatory regime for United States oil and natural gas pipelines is light-handed and relies on the fact that pipelines are subject to competitive pressures. Where North American pipeline rates are constrained by competition, pipeline companies are not necessarily subject to cost-of-service rates. As noted by Incenta, in competitive markets, North American pipeline rates are constrained by competition, not regulation.<sup>341</sup> Where this is the case, regulation does not insulate North American pipelines' cash flows from the volatility arising from market shocks.

The QRC considered that many pipelines in the United States are not natural monopolies, and are constrained by competitive forces and not regulation. The QRC considered that this is reflected in the evolution of the regulatory framework for United States pipelines towards a more 'light-handed'

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<sup>336</sup> QRC, sub. 21: 30.

<sup>337</sup> Incenta Economics 2017: 5, 8, 61–62.

<sup>338</sup> Aurizon Network, sub. 40: 112–113.

<sup>339</sup> Aurizon Network, sub. 40: 85.

<sup>340</sup> Aurizon Network, sub. 40: 112.

<sup>341</sup> Incenta Economics 2017: 8.

approach—with the approach to rate-setting depending on the degree of competition faced by each pipeline.<sup>342</sup>

In relation to oil pipelines, market-based rates and settlement rates are a common feature in United States oil pipeline ratemaking. Relevantly, it appears that a number of the businesses in the North American pipelines sample have numerous tariffs established as either market-based rates or settlement rates—and thus are not subject to cost-of-service regulation.

Aurizon Network stated that the QCA has not sought to assess the relevance of gas or oil pipelines as an appropriate comparator. Aurizon Network considered that when the comparator assessment is restricted to the North American gas pipelines there are significant similarities in the drivers of gas pipeline earnings and Aurizon Network earnings that are highly relevant to determining the asset beta for Aurizon Network.<sup>343</sup> Aurizon Network submitted that in concluding that the systematic risk of North American gas pipelines is not comparable to that of Aurizon Network, the QCA and Incenta relies on:

- the fact that pipeline carrier can deviate from cost-of-service rates through negotiated settlements as part of the regulatory framework
- the issues of potential under-recovery of uncontracted capacity.<sup>344</sup>

Aurizon Network said that the QCA and Incenta have not adequately assessed the design of negotiated settlements. In particular, Aurizon Network considered that the use of negotiated settlements does not diminish the relevance of North American gas pipelines as an appropriate comparator industry, submitting that negotiated settlements:

- typically include some form of revenue adjustment process, which may also take the form of end-of-period adjustments or adjustments to the capital base
- have distinct advantages, on balance, in lowering systematic risk as they allow for long-term price and term certainty, which supports efficient long-term finance—insulating the firm’s earnings volatility over the business cycle<sup>345</sup>
- are not likely to materially depart from cost-of-service regulation outcomes, particularly where users have recourse to cost-of-service rates if the pipeline carrier unilaterally demands excessive prices.<sup>346</sup>

Aurizon Network submitted that Incenta has not provided any empirical analysis or examples of the nature of asymmetric risks that North American gas pipelines are exposed with respect to costs they would not be able to transfer to customers within the negotiated settlement, or the nature of the review provisions with those settlements.<sup>347</sup>

In regards to negotiation rates for gas pipelines, FERC does not compile an industry-wide list of negotiated rate agreements or volumes transported under negotiated rate agreements. However, FERC notes that the use of negotiated rate agreements has become routine for both long-term and short-term service agreements.<sup>348</sup>

The QCA considers that the use of negotiated settlements in the United States regulatory regime for gas pipelines does not specifically diminish the relevance of North American gas pipelines as an appropriate

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<sup>342</sup> QRC, sub. 53: 17.

<sup>343</sup> Aurizon Network, sub. 40: 112–113, 118.

<sup>344</sup> Aurizon Network, sub. 40: 114.

<sup>345</sup> Aurizon Network and the Brattle Group argue that the long-term contracts associated with negotiated settlements serve to buffer the regulatory cash flows.

<sup>346</sup> Aurizon Network, sub. 40: 115.

<sup>347</sup> Aurizon Network, sub. 40: 116.

<sup>348</sup> Correspondence with FERC, 27 July 2017.

comparator industry. Noting the characteristics of negotiated settlements, and that such agreements must have a recourse rate allowing the shipper to revert to back to cost-of-service rates, the QCA considers that negotiated settlements may insulate cash flows from market shocks in a similar manner to cost-of-service rates. However, the extent to which these forms of ratemaking provide for long-term price and term certainty is reliant on the existence of long-term contracts, which is discussed below.

While cost-of-service regulation is adopted in the regulatory regimes to mitigate any existing market power the pipeline carriers may have, cost-of-service rates (where applied) are influenced by the economic cycle. For instance, these tariffs:

- provide a ceiling for oil pipeline transportation rates, which are indexed by tracking economy-wide costs rather than pipeline-specific costs
- expose the gas pipeline transportation rates to the volume risk of the uncontracted portion of their capacity.<sup>349</sup>

Aurizon Network's regulatory framework, on the other hand, applies a revenue cap regulatory regime to all access holders with periodic price reviews using the 'building block' approach. Incenta said that unlike the cost-of-service rates for North American pipelines, Aurizon Network's revenue cap provides for revenue to be recovered irrespective of short-run fluctuations in usage. Incenta considered that Aurizon Network's regulatory framework, which incorporates a revenue cap and pre-determined periodic price reviews, will result in cash flows that are essentially independent of the economic cycle, which in turn will result in relatively low systematic risk.<sup>350</sup>

Incenta considered that the extent of FERC's regulatory buffering of the cash flows of North American pipelines is substantively different to the buffering of Aurizon Network's cash flows under the QCA's regulatory framework.<sup>351</sup>

The QRC considered that, even in cases where cost-based price cap regulation is applied, this does not protect a pipeline's cash flow from volume risk, unlike Aurizon Network's revenue cap framework.<sup>352</sup>

Aurizon Network acknowledged that its regulatory framework includes various review measures, but did not deem that these are of sufficient significance to warrant the exclusion of United States gas pipelines as a comparator group.<sup>353</sup>

Aurizon Network considered that the regulatory framework increases investor exposure to systematic risk through the price reset process in contrast to investors in other infrastructure assets that are subject to long-term stable cash flows under long-term contractual and pricing frameworks supported by long-term efficient financing arrangements. Aurizon Network submitted that equity returns determined by the regulator will be subject to the business cycle.<sup>354</sup>

Aurizon Network submitted that unlike contractual buffering of earnings, its regulatory framework provides no long-term price or risk certainty beyond the current regulatory period. Aurizon Network considered that its shareholders are subject to the regulatory uncertainty as to how future regulatory decisions will influence systematic risk, or how prices and revenues will respond to changes in market conditions. Aurizon

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<sup>349</sup> Incenta Economics 2017: 8.

<sup>350</sup> Incenta Economics 2017: 29, 31.

<sup>351</sup> Incenta Economics 2017: 30.

<sup>352</sup> QRC, sub. 53: 17.

<sup>353</sup> Aurizon Network, sub. 40: 116.

<sup>354</sup> Aurizon Network, sub. 40: 44.

Network submitted that the rail access regime is not prescriptive, with current arrangements not binding on subsequent regulatory determinations, all matters are considered 'afresh' at each review.<sup>355</sup>

After examining both Aurizon Network's and United States gas and oil pipeline regulatory frameworks, the QCA concludes that the FERC regulatory regime does not insulate North American pipelines' cash flows from the volatility arising from market shocks to the same extent as Aurizon Network's regulatory framework insulates its cash flows. Therefore, the QCA considers that, in comparison to North American pipeline businesses, Aurizon Network is substantially insulated by its regulatory framework from earnings variations that would otherwise be pro-cyclical.

In the United States, regulatory ratemaking for oil and natural gas pipelines is light-handed in comparison to Aurizon Network's regulatory framework; for the pipelines, regulation relies on the existence of competition within the markets. FERC regulates the transportation rates of natural gas and oil pipelines in the United States but applies two different regulatory frameworks (see the boxes below).

The QCA acknowledges that the regulatory returns determined by the regulator will be subject to the business cycle. As outlined in Chapter 5, Aurizon Network has the ability to manage risk associated with varying market conditions. Additionally, the regulatory process, which includes regulatory resets, is also a mechanism for mitigating Aurizon Network's exposure to the risk of shifts in market conditions.

The QCA acknowledges that the extent to which regulatory resets expose businesses to systematic risk needs to be considered within the context of other mechanisms and industry characteristics that affect risk exposure. Where industries have alternative mechanisms to regulation, such as long-term contracts and pricing frameworks, the way in which these arrangements affect risk exposure should be considered.

While long-term contracts have the potential to provide for greater price certainty for the duration of the contract, the QCA considers that overall Aurizon Network's regulatory framework is more effective in insulating cash flows from the volatility arising from market shocks than the long-term contracts of North American pipelines (see analysis on long-term contracts below).

Overall Aurizon Network has a stable and well established regulatory framework, in which the QCA assesses whether to approve Aurizon Network's draft access undertaking within a propose-respond framework, assessing the reasonableness of Aurizon Network's proposal. Within this framework, while individual elements contained within an Aurizon Network access undertaking may change overtime, the overall framework remains stable. Importantly, the QCA must have regard to Aurizon Network generating expected revenue that is at least enough to meet the efficient costs of providing access to the CQCN and include a rate of return commensurate with the regulatory and commercial risks involved. Combined with Aurizon Network's captured and resilient customer base, the regulatory framework is effective at insulating Aurizon Network's long-term cash flows from market shocks.

The extent to which long-term contracts insulate the cash flows of North American pipelines businesses from the volatility arising from market shocks is discussed below.

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<sup>355</sup> Aurizon Network, sub. 40: 116.



### Regulatory ratemaking for natural gas pipelines

The Natural Gas Act requires that rates charged for interstate pipeline services be 'just and reasonable'. The basic methodology used by FERC to establish 'just and reasonable' rates is cost-of-service ratemaking.

With the issuance of Order No. 636, FERC adopted the straight fixed-variable (SFV) method for cost-of-service ratemaking for interstate natural gas pipelines. Under the 'straight fixed-variable' methodology, all fixed costs are classified to the demand component and all variable costs are classified to the commodity component.

Transmission costs are allocated among the various types of transportation services offered by the pipeline carrier to reflect the varying types of services provided (for example, transportation contracts differ in regard to the reliability of natural gas delivery). Rates may be classified as either firm service rates or interruptible rates.

Firm service contracts reserve the allocated capacity of a pipeline, which guarantees the reserved capacity is available for the contract holder to use as requested. Firm service rates usually consist of two parts:

- (a) A reservation charge represents the amount that a customer must pay monthly to guarantee service on any day up to the daily contract demand. The reservation charge is payable regardless of whether the customer transports gas.
- (b) A usage charge bills the customer per unit of gas actually shipped.

Interruptible service contracts are considered less reliable, as contract holders are not guaranteed in advance of whether an interruption will occur. Interruptible rates are designed as volumetric rates and charged per unit of gas transported. The interruptible service rate is derived using a 100 per cent load factor rate.

Both firm service and interruptible service rates are designed to recover a proportion of the fixed and variable costs associated with the two contract types. The total usage costs are divided by the projected annual firm and interruptible transportation volumes, with the reservation costs divided by the contract demand volumes for firm services plus an imputed volume for interruptible service.

When designing reservation rates, a pipeline must either credit interruptible revenues against its cost of service or allocate costs to its interruptible service. If a pipeline's interruptible revenues do not match its credit or allocation of costs, it is possible a pipeline will under recover its fixed costs.

Carriers argued, particularly in regard to the appropriate rate treatment for the costs associated with a pipeline's loss of revenues resulting from the expiration of contracts, that additional rate design flexibility was needed in order to market excess capacity and recover costs associated with their turned-back capacity. As a result, there are instances where a pipeline carrier can deviate from cost-of-service rates:

- (a) Market-based rates—where a natural gas company can establish that it lacks significant market power, market-based rates are a viable option for achieving the flexibility and added efficiency required by the current marketplace.
- (b) Incentive rates—incentive regulation provides for light-handed regulation without harm to consumers, where pipeline carriers possess market power. Rates are performance-based proposals where carriers share resulting efficiency gains of the program with their ratepayers.
- (c) Negotiated/recourse rates—these offer the potential for increased market responsiveness in pipeline services without protracted disputes regarding market power, where pipelines do not attempt to establish a lack of market power and do not want to undertake an incentive rate program. The availability of a recourse service assures that users can fall back to cost-of-service rates if the pipeline carrier unilaterally demands excessive prices or withholds service.

Sources: *Federal Energy Regulatory Commission 1999; Revisions to Oil Pipeline Regulations Pursuant to the Energy Policy Act of 1992, Order No. 561, October 22, 1993; Federal Register / Vol. 61, No. 26 / Wednesday, February 7, 1996 / Notices, p4634; FERC correspondence.*

### Regulatory ratemaking for oil pipelines

The oil pipeline rate methodologies and procedures are outlined in the Code of Federal Regulations. In establishing the initial rates for access to the pipeline, the pipeline carrier must justify an initial rate under Title 18, Section 342.2 of the Code of Federal Regulations for a new service by filing either:

- (a) cost, revenue, and throughput data supporting such a rate; or
- (b) a sworn affidavit that the rate is agreed to by at least one non-affiliated person who intends to use the service in question.

As such, it is not the case that all rates are established with respect to the cost-of-service method. However, where a rate is established through agreement with a non-affiliated shipper, it may be challenged by anyone with an economic interest to which the pipeline must then justify using the cost-of-service method.

Following the establishment of initial rates, Title 18, Section 342.3 of the Code of Federal Regulations requires the pipeline carrier to compute a rate 'ceiling level' for each index year by multiplying the previous index year's ceiling level by an index published by FERC. The indexing methodology establishes a rate ceiling, not the rate itself, with the index tracking economy-wide costs rather than pipeline-specific costs. Pipeline carriers are able to readily propose rate changes within the indexed ceiling. Alternatively, if a carrier shows that there is a substantial divergence between the actual costs experienced by the carrier and the rate resulting from application of the index, it may change the rate.

Additionally, Title 18, Section 342.4 of the Code of Federal Regulations outlines instances under which the pipeline carrier may change a rate without having regard to the ceiling level:

- (a) market-based rates—a carrier may attempt to show that it lacks significant market power in the market in which it proposes to charge market-based rates
- (b) settlement rates—the proposed change has been agreed to by each person who is using the service covered by the rate.

Therefore, it does not necessarily hold that the liquid pipelines contained in the North American pipelines sample are subject to cost-of-service rates. Market-based rates and settlement rates are common features in United States oil pipeline ratemaking. For instance, Buckeye Pipe Line Company L.P., Magellan Pipeline Company L.P., and TransCanada Keystone Pipeline, which are all part of the North American pipelines sample, have numerous tariffs established as either market-based rates or settlement rates.

*Sources: Federal Energy Regulatory Commission 1999 Code of Federal Regulations, Title 18, Section 342.4; Revisions to Oil Pipeline Regulations Pursuant to the Energy Policy Act of 1992, Order No. 561, October 22, 1993; Federal Register / Vol. 61, No. 26 / Wednesday, February 7, 1996 / Notices, p4634; FERC correspondence.*

### Elasticity of demand

The Brattle Group stated that:

since the explosion of North American oil and natural gas production over the last decade, demand for transportation services has become increasingly reliable and insensitive to commodity prices.<sup>356</sup>

Incenta concluded that income elasticity of demand is more likely than price elasticity of demand to be associated with beta, as it relates to demand through the economic cycle, while empirical evidence linking price elasticity of demand to beta has shown varying results.<sup>357</sup>

Incenta reported that what matters for systematic risk is whether the firm's cash flows are pro-cyclical, in which case systematic risk is higher. While Aurizon Network's customer base may be affected by the pro-cyclical nature of the coal market, Incenta considered that the coal producers' income elasticity of demand for the CQCN services is, to a large extent, decoupled from the elasticity of the demand for coal from the CQCN. This is due to:

- miners having an incentive to maximise production even at low prices—and even if the price dips below the all-in cash cost of production—if the price is expected to rise above that cost in due course

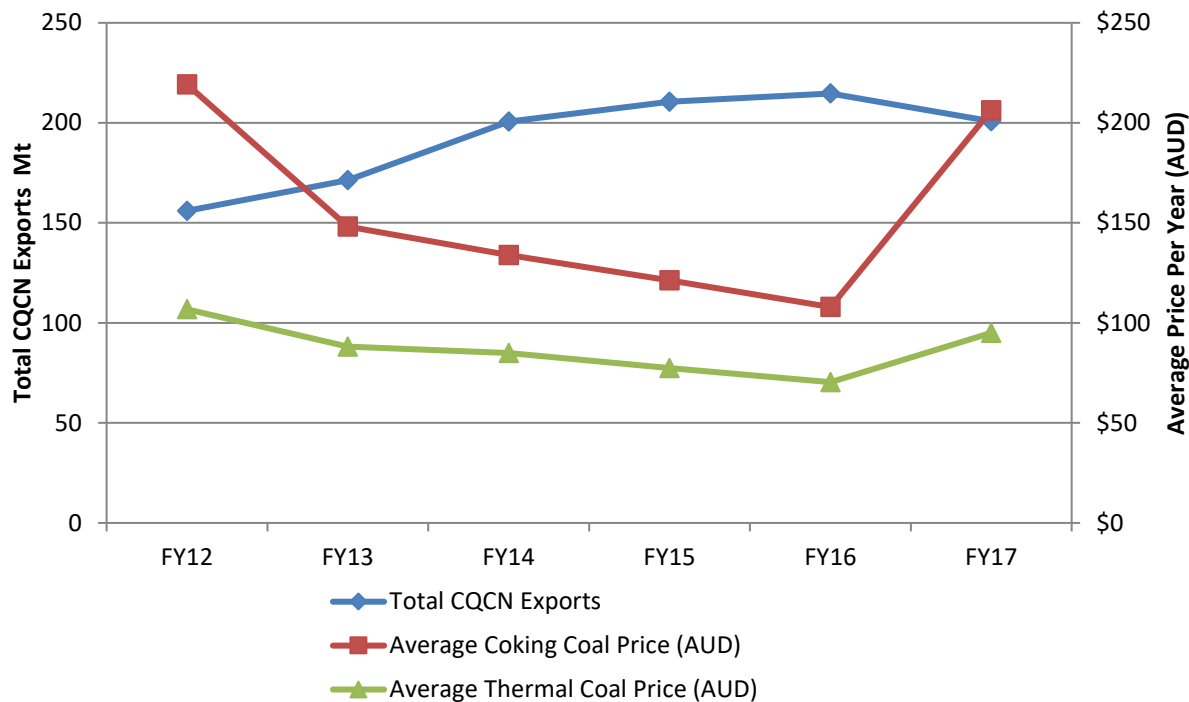
<sup>356</sup> Aurizon Network, sub. 4: 40.

<sup>357</sup> Incenta Economics 2017: 60.

- Aurizon Network’s revenue cap regulatory framework that ensures, in NPV terms, any pro-cyclicality is eliminated.<sup>358</sup>

This conclusion is supported by analysis undertaken by Resource Management International (RMI), which shows that despite the falling coal prices there has been no corresponding reduction in overall coal exports from Queensland (Figure 1).

**Figure 1 Queensland coal exports vs coal prices**



Source: RMI 2017, Queensland Government statistics, and QCA analysis.

Aurizon Network submitted that the income elasticity of the demand for coal-carrying train services in the short- to medium-term is highly dependent on the supply chain being fully contracted and capacity constrained. In circumstances where supply chain substitution occurs and supply chain capacity materially exceeds demand then the service provider has no market power to protect earnings through take-or-pay contracts as these obligations can be avoided.<sup>359</sup>

Aurizon Network argued that the regulatory framework curtails its ability to manage the income elasticity associated with the demand for coal—given restrictions on Aurizon Network’s ability to price differentiate between producers. In comparison, Aurizon Network submitted that pipeline owners may price differentiate to maximise demand for the services and exploit the price elasticity of its customers to reduce income elasticity of transmission services.<sup>360</sup>

The QCA does not agree that income elasticity of the demand for coal-carrying train services in the short- to medium-term is highly dependent on the supply chain being fully contracted and capacity constrained. As outlined in Chapter 2, the regulatory regime provides Aurizon Network with stable regulatory returns during the regulatory period. Where an allowable revenue shortfall occurs, Aurizon Network’s regulatory framework, amongst other things, contains:

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<sup>358</sup> Incenta Economics 2017: 33.

<sup>359</sup> Aurizon Network, sub. 40: 118–119.

<sup>360</sup> Aurizon Network, sub. 40: 118.

- take-or-pay mechanisms—enabling Aurizon Network to recover a revenue shortfall directly from an access holder
- revenue cap mechanism—if the take-or-pay mechanisms do not recover a revenue shortfall, the revenue cap mechanism allows the revenue shortfall to be recovered two years later through reference tariffs
- system reference tariffs—if an access holder counterparty fails, system reference tariffs recover the system allowable revenue from the remaining users within that system, thereby socialising counterparty risk among the users in that system.

While the regulatory framework may be restrictive in relation to price differentiation, the mechanisms provided in the compact limit Aurizon Network's exposure to volume risk.

Additionally, Aurizon Network is the sole below-rail service provider for the mines in the CQCN, with Queensland coal producers occupying a highly competitive position in the global supply of seaborne coal export.

Aurizon Network submitted that the income elasticity of demand for coal rail freight services in the CQCN and the income elasticity of demand for gas pipeline transmission is derived from the demand preferences of the end users of the commodity. To the extent there are available substitutes in the long term then there is no practical difference in the income elasticity of these services. More specifically, Aurizon Network said there is no functional difference between:

- the supply of gas via a transmission pipeline that may, at the expiry of contracts, be subject to displacement or substitution from gas supplied from another region
- the supply of coal via a rail transport corridor which is subject to the displacement of demand from coal sourced from other global supply chains.<sup>361</sup>

The Brattle Group submitted that while demand for 'retail' natural gas distribution services has few substitutes and is highly inelastic, 'wholesale' demand for natural gas (or oil or petroleum products) supplied along a specific route can be responsive to broader regional supply and demand forces. The Brattle Group said that shippers usually do not have competitively priced transportation alternatives along a given route.<sup>362</sup>

The Brattle Group considered that demand for pipeline transportation services has become increasingly reliable and insensitive to commodity prices, especially since the recent explosion in North American oil and natural gas. However, The Brattle Group noted that if dynamics shift in supply markets or downstream demand centres, over time, a given pipeline's customers may shift their demand to alternative routes. Aurizon Network acknowledged that gas transmission pipelines are subject to competition for the market associated with expansions and development of new pipelines where large industrial energy consumers and utilities have alternate regional supply options.<sup>363</sup>

Aurizon Network also considered that given the prevalence of ship-or-pay contracts within negotiated settlements for gas pipelines then the income elasticity of demand is also decoupled from the commodity being transported.<sup>364</sup>

The QRC considered that a key difference between Aurizon Network and the North American pipeline businesses is that North American pipeline businesses are, to varying degrees, exposed to competition. The

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<sup>361</sup> Aurizon Network, sub. 40: 118.

<sup>362</sup> Aurizon Network, sub. 4: 40.

<sup>363</sup> Aurizon Network, sub. 4: 40; Aurizon Network, sub. 40: 119.

<sup>364</sup> Aurizon Network, sub. 40: 118.

QRC submitted that in the United States there are important geographic features which undercut pipeline businesses' ability to act as natural monopolies, and instead expose their operations to competition. For instance, major consumption markets often lie between different supply areas, leading to intensive rivalries between producers and pipeline companies striving to meet the demand.<sup>365</sup>

Incenta considered that the income elasticity of demand for the North American pipeline services, in contrast to that of Aurizon Network, is not decoupled from that of the commodity being transported, with the exception of the contracted demand for the pipeline. Unlike Aurizon Network, North American pipelines are subject to:

- competitive pressure from parallel pipelines and alternative modes of transport
- a regulatory framework that does not buffer their cash flows in the same way that regulation buffers the cash flows of Aurizon Network.<sup>366</sup>

The QCA does not agree with Aurizon Network that there is no functional difference between the extent to which there are available substitutes for CQCN services to that of United States gas pipeline services. Aurizon Network is a monopolist service provider with a captured and resilient customer base.

The QCA acknowledges that the existence of ship-or-pay contracts will, to a certain extent, decouple the income elasticity of demand for pipeline services from that of the commodity being transported. However, where competition exists in gas pipeline markets, the extent to which the pipelines' customers are captured will be reliant on the coverage of these long-term contracts. Even where long-term contracts are in place, companies will be exposed to counter-party risk, which is limited for Aurizon Network due to the CQCN market characteristics (as discussed below).

In certain markets, pipelines are not subject to direct competitive pressure in a gas pipeline market, but rather are subject to competition for the market. While pipelines may have a more captured customer base in these instances, the resilience of its customer base will be reliant on the characteristics of the regional market in question. The QCA considers that demand for pipeline services in regional markets will vary, reflecting the differing characteristics of regional pipeline customers. Aurizon Network's analysis focuses on market characteristics of the United States gas pipeline industry in its entirety.

Relevantly, the natural gas sector has undergone considerable transformation in recent years, as outlined by the U.S. Department of Energy (2015):

The natural gas sector in the United States has been fundamentally transformed by technological advancements in horizontal drilling and hydraulic fracturing that have enabled the economic extraction of natural gas from shale formations. This breakthrough has, in turn, unlocked new, geographically diverse natural gas resources that are unprecedented in size.<sup>367</sup>

As outlined in a report by the Analysis Group, this increase in shale gas production has changed the geographic locus of domestic production, shifted the flows on the interstate pipeline network (changing the nature of market demand and impacts on competitors), and dramatically altered the nature of imports/exports of natural gas.<sup>368</sup> This considerable transformation in the sector has benefitted some regions to the detriment of others. For instance, the most prolific shale gas basin in the United States is the Marcellus. As noted by the US Department of Energy, the growth of the Marcellus basin has resulted in displacement of gas supplied from alternative regions:

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<sup>365</sup> QRC, sub. 53: 17.

<sup>366</sup> Incenta Economics 2017: 29–30.

<sup>367</sup> US Department of Energy 2015.

<sup>368</sup> Tierney 2017.

The growth in Marcellus shale gas production has had a major impact on the flow of natural gas throughout the United States. Natural gas that was once imported from other states into eastern markets has been increasingly displaced by Marcellus production.<sup>369</sup>

As such, pipelines servicing certain regional markets may have a less resilient customer base than other pipelines, depending on the competitiveness of its customer base in supplying the market.

Incenta considered that the competitive environment has been accentuated by the fracking revolution, which has driven down the price of oil and gas, causing a substitution of gas-fired for coal-fired power stations<sup>370</sup>—see box below. Noting that North American gas and liquids transmission pipelines have a high component of industrial/commercial demand, Incenta expected the demand of North American pipelines to be pro-cyclical.<sup>371</sup>

#### The price of oil and gas and substitution of gas-fired for coal-fired power stations

In a previous publication, The Brattle Group noted that:

*Recent years have seen fundamental changes in the supply and competitive landscape of the North American natural gas market. In response to high natural gas prices that prevailed during most of the last decade, gas producers in the lower 48 now have developed new sources of supply and technology, particularly to access new shale gas formations. These new supplies have encouraged a substantial expansion of the natural gas pipeline network in North America to allow the producers to reach end-use markets... The result has been a considerable increase in competition and risk, which can have serious consequences for pipelines and their required rates of return.*<sup>372</sup>

Analysis Group reported that the abundance of natural gas resources and production in the United States has in turn had a stark impact on the price of natural gas, which has driven significant fuel switching in the electric power sector—primarily from coal to natural gas.<sup>373</sup>

Department of Energy reported that revenue and/or cost recovery for United States pipeline shippers depends on the demand for natural gas, which is highly seasonal, particularly in the East of the country.<sup>374</sup> As outlined by FERC in 2016:

*Overall in 2016 there were record low natural gas prices and near record low electricity prices. Although natural gas production fell for the first time since 2005, flat demand due to above average winter temperatures at the start of the year and high natural gas storage inventories contributed to the low prices. The low natural gas prices further incentivized gas-fired generation in 2016, and for the first time in history, natural gas' share of total electricity generation output overtook coal's on an annual basis.*<sup>375</sup>

Castalia submitted that, until recently, the domestic United States gas market was isolated from the rest of the world. In contrast to Queensland coal, the historical estimates of beta for the United States gas market would capture variability that is highly specific to the North American gas market conditions. Castalia noted that, as Queensland coal is largely exported, coal producers face much more diversified market risks.<sup>376</sup>

Aurizon Network considered that Castalia's submission supports the proposition that the medium- to long-term elasticity of demand for Queensland coal is subject to greater competition and substitution risks than demand for domestic gas by American utilities—with long term supply agreements and effective vertical relationships through contracting.<sup>377</sup>

As acknowledged above, the existence of ship-or-pay contracts will, to a certain extent, decouple the income elasticity of demand for pipeline services from that of the commodity being transported. However,

<sup>369</sup> US Department of Energy 2015: 3.

<sup>370</sup> Incenta Economics 2017: 29–30.

<sup>371</sup> Incenta Economics 2017: 34.

<sup>372</sup> Carpenter et al. 2012.

<sup>373</sup> Tierney 2017: 23.

<sup>374</sup> US Department of Energy 2015: 4.

<sup>375</sup> Federal Energy Regulatory Commission 2017

<sup>376</sup> QRC, sub. 21, Annexure 1: 13.

<sup>377</sup> Aurizon Network, sub. 40: 118.

where competition exists in gas pipeline markets, the extent to which the pipelines customers are captured is generally subject to the coverage of these long-term contracts.

The QCA does not consider that Queensland coal is subject to greater competition and substitution risks than demand for domestic gas by American utilities. The QCA reiterates that Aurizon Network has a captured and resilient customer base due to the market characteristics of the CQCN. The United States domestic gas market is subject to regional displacement to account for the varying supply and demand characteristics within the industry.

For these reasons, the QCA maintains its position that, while volatile coal prices have had implications for Aurizon Network's customer base, Aurizon Network's cash flows would not be expected to be pro-cyclical.

The QCA considers that the cash flows of North American pipelines are expected to be more pro-cyclical than that of Aurizon Network.

### Long-term contracts

Aurizon Network and The Brattle Group both said that long-term capacity reservation contracts are a central feature of the North American pipelines industry. The Brattle Group submitted that the companies in the North American pipelines sample have substantial contract cover over relatively long time horizons, suggesting a high degree of comparability to Aurizon Network.<sup>378</sup>

The Brattle Group estimated the average, median, and aggregate levels of contract cover for United States natural gas pipelines for 5, 10, and 15 years from the present (Table 33). Aurizon Network and The Brattle Group considered that this analysis demonstrates the prevalence of long-term, take-or-pay contracts in the natural gas pipeline industry. Additionally, The Brattle Group submitted that it is confident that a very high proportion of capacity in the natural gas subsample and for TransCanada Corp is contracted in the near-term, with possibly more than 50 per cent remaining contracted 15 years out.<sup>379</sup>

**Table 33 Age-discounted contract cover for 33 largest United States natural gas pipelines**

	<i>5-year contract cover</i>	<i>10-year contract cover</i>	<i>15-year contract cover</i>
Average	70%	56%	49%
Median	68%	54%	46%
Aggregate	68%	55%	48%

Source: Aurizon Network, sub. 4: 45.

Aurizon Network considered that any exposure to uncontracted capacity requires the pipeline owner to possess uncontracted capacity and this risk can be avoided through matching pipeline capacity with expansion contracts.<sup>380</sup> Aurizon Network submitted that there is little consideration as to the materiality of the volume risk associated with the uncontracted portion of gas pipeline capacity and how those risks have been ameliorated by capacity expansions through underwritten contracts.<sup>381</sup>

The Brattle Group submitted that in the United States major liquids pipeline expansion projects are mostly or fully-subscribed under long-term capacity reservation contracts before the project enters service (or even begins construction).<sup>382</sup>

<sup>378</sup> Aurizon Network, sub. 1: 273; sub. 4: 40–41, 45–46.

<sup>379</sup> Aurizon Network, sub. 1: 273; sub. 4: 43–44.

<sup>380</sup> Incremental capacity expansions are subsequently obtained through increased gas compression. AN, sub. 40: 119.

<sup>381</sup> Aurizon Network, sub. 40: 115.

<sup>382</sup> Aurizon Network, sub. 4: 43.

Aurizon Network considered that competition has limited impact on the requirement to secure long-term contracting to finance the expansion or investment, diminishing the systematic risk of real options associated with expansions. Aurizon Network considered that this competition for the market is comparable to the market forces relevant to the negotiation for the expansion of the rail network where:

- producers will only progress the development of their mining projects if the expansion occurs on reasonable terms
- large producers typically have active interests in multiple resources and projects globally and have some discretion on which coal supply chains they might seek to expand production.<sup>383</sup>

Long-term, take-or-pay contracts are a feature of the CQCN.

As noted by Incenta, a business will be less pro-cyclical if it has long-term contracts with suppliers and customers, all other things being equal. The existence of long-term contracts is therefore likely to have a reducing effect on the beta of both North American pipelines and Aurizon Network.

However, Incenta considered that the extent of contract capacity is more important to North American pipelines than it is to Aurizon Network, in terms of limiting exposure to systematic risk.<sup>384</sup> In contrast to Aurizon Network, North American pipelines are subject to competitive pressure from parallel pipelines and alternative modes of transport and to light-handed regulation, and are exposed to market forces on their uncontracted capacity.<sup>385</sup>

Castalia submitted that the risk allocation in the gas carriage contracts typically used in North America is materially different to the risk allocation under the typical Australian rail access agreements. Castalia also considered that on-shore gas production locations tend to be significantly shorter lived than coal mines, increasing stranding risks for mid-stream service providers.<sup>386</sup>

While North American pipelines are exposed to market forces on their uncontracted capacity, the QCA notes that matching pipeline capacity with expansion contracts is a way for pipeline businesses to manage this risk. Indeed, Aurizon Network has the ability to implement access conditions to manage such risk.

Relevantly, North American pipelines' volumes are not protected once the contract expires or is terminated. Thus, Incenta considered that in a downturn North American pipelines are exposed to counterparty risk on their contracted capacity, as the failure of a contracting counterparty immediately impacts the pipeline business. Incenta considered that this implies that contract roll-off is likely to be a significant issue for North American pipelines and that a material proportion of pipeline capacity would be vulnerable to changing demand in a given year.<sup>387</sup>

Noting that market dynamics may change over the life of a contract, competition could result in lower shipping rates and/or unused capacity for the pipeline operator following the expiration of a long-term contract. For example, recontracting risk is a key risk facing certain pipeline operators, such as Boardwalk Pipeline Partners. In a recent equity research report, Credit Suisse noted a key risk facing Boardwalk Pipeline Partners is recontracting around 1.8 billion cubic feet of Texas Gas contracts and 1.25 billion cubic feet of Gulf Crossing contracts that roll off in 2019. In fact, 75 per cent of Gulf Crossing contracts were scheduled to roll off in 2019.<sup>388</sup>

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<sup>383</sup> Aurizon Network, sub. 40: 119.

<sup>384</sup> Incenta Economics 2017: 62.

<sup>385</sup> Incenta Economics 2017: 43.

<sup>386</sup> QRC, sub. 21, Annexure 1: 13.

<sup>387</sup> Incenta Economics 2017: 43.

<sup>388</sup> Credit Suisse 2017.



The threat of contract roll-off in itself exposes pipelines to market forces, as businesses may be inclined to restructure contracts to manage recontracting risk. While contract restructuring may further extend the terms of existing contracts, the pipeline customer may achieve better contract terms, such as different contracted volumes or lower rates. The QCA notes that on 2 October 2017 Boardwalk Pipeline Partners announced that its Texas Gas Transmission Company subsidiary sought approval from FERC to restructure some of its existing firm transportation agreements and enter into new firm transportation agreements with subsidiaries of Southwestern Energy.<sup>389</sup>

By contrast, Incenta said Aurizon Network is the monopoly provider of the CQCN with a captive and resilient customer base. Incenta considered that the position that these captive users occupy in the global seaborne coal cost curve is more important to Aurizon Network's long-term cash flows than the coverage and scope of its take-or-pay contracts. If the users are positioned at the favourable (lower) end of the cost curve, their export volumes are likely to be maintained and contracts renewed in the event of an economic downturn.<sup>390</sup> Furthermore, Incenta noted that Aurizon Network's regulatory framework does not expose it to the volume risk of uncontracted capacity in the same manner as North American pipelines.

Incenta noted that Aurizon Holdings Limited, with reference to Aurizon Network, has itself commented to its shareholder base that its regulated below-rail business is a:

- Defensive, regulated asset supporting major export industry with RAB of \$5.6bn, with
- Low volume and commodity price risk with socialisation and revenue protection, and
- High quality customers with high quality mines.<sup>391</sup>

Incenta considered that these statements imply that Aurizon Network considers it has low risk because its counterparties occupy strong positions in their own industry. The depth and diversification of Aurizon Network's customer base was also acknowledged by Moody's in its December 2017 credit opinion on Aurizon Network:

The credit profile is further underpinned by the take-or-pay nature of Network's contracts with users over the entire Queensland coal export rail network - which provides it with the right to recover operating costs and earn a return on its assets - and the depth and diversification of its customer base.<sup>392</sup>

Further, Incenta considered that even if the mine's parent business fails and the assets are sold, it would be expected that the volumes would be recontracted to new mine owners. Thus, Incenta considered that contract roll-off is not likely to be a significant issue for Aurizon Network.<sup>393</sup>

Aurizon Network submitted that its comments—as summarised above by Incenta—are also replicated by firms within the gas pipeline comparator group.<sup>394</sup>

Aurizon Network considered its asset stranding risks are understated, while the asset stranding risks associated with North American gas pipelines are overstated.<sup>395</sup> Aurizon Network submitted that a large proportion of the CQCN regulatory asset base is subject to asset stranding risk in the event of a structural change in the demand for metallurgical coal. This is fundamentally different to that faced by North

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<sup>389</sup> Boardwalk Pipeline Partners 2017.

<sup>390</sup> Incenta Economics 2017: 35.

<sup>391</sup> Aurizon Holdings 2016.

<sup>392</sup> Moody's Investor Service 2017.

<sup>393</sup> Incenta Economics 2017: 62.

<sup>394</sup> Aurizon Network, sub. 40: 113–114.

<sup>395</sup> Aurizon Network, sub. 40: 119.

American gas pipelines which are expected to have underwritten large and significant expansions through transport agreements prior to their investment.<sup>396</sup>

The QCA notes that Aurizon Network obtained access conditions for its WIRP investment, which provided compensation, in terms of the WIRP fee arrangements, for assuming the asset stranding risks associated with its WIRP investment—as proposed in the access conditions report for the WIRP investment.

Additionally, Aurizon Network considered that the prospect of uncontracted capacity is incongruent with the current and projected demand for gas transmission services. Aurizon Network said that the energy market dynamics have seen a considerable shift in the composition of the North American energy mix, with an increased use of natural gas in both electricity generation and industrial consumption. Aurizon Network considered that the rate of expansion in the gas market substantively mitigates the prospect of excess or uncontracted capacity and that expansions will be subject to ship-or-pay contracts with scale matched to that demand.<sup>397</sup>

As outlined in Chapter 2, the QCA considers that the evidence provided does not suggest that long-term demand deterioration in the CQCN is likely. The competitiveness of CQCN producers and long-term market outlook for CQCN coal does not suggest that a structural change in the seaborne coal export market would materially affect the risk of long-term demand deterioration in the foreseeable future. In considering the current and projected demand for gas transmission services Aurizon Network's analysis focuses on the United States gas pipeline market in its entirety. The QCA considers that regional market dynamics vary, reflecting the differing characteristics of regional pipeline customers. As outlined above, pipelines servicing certain regional markets may have a less resilient customer base than other pipelines, depending on the competitiveness of its respective customer base. Evolving market conditions—including shifts in energy market dynamics—may affect the competitiveness of certain regional areas to supply the market and persistently low oil and gas prices may affect the profitability of some assets.

While scaling pipeline expansions to ship-or-pay contracts may mitigate these risks to a certain extent, pipeline operators are exposed to contract roll-off and counterparty risk on their contracted capacity.

Aurizon Network submitted that under cost-of-service regulation, the accumulated depreciation of the rate base is subject to a straight-line reduction in the book value over an economic life of 20 to 25 years as per the FERC cost-of-service rates manual. Aurizon Network considered that this is materially different to Aurizon Network's investment recovery profile of the appreciating RAB and rolling 20-year depreciation. Aurizon Network submitted that the FERC approach involves substantially less asset stranding risk where investment is underpinned by long-term contracts representing a large proportion of the NPV of the original investment.<sup>398</sup>

The QCA notes that the depreciation recovery profile allowed under FERC's cost-of-service rates may differ to that of Aurizon Network's. However, the QCA considers that it is the extent to which the long-term contract rates recover the costs associated with the pipeline that is important in considering the asset stranding risk of the pipeline. Although long-term contracts are a feature of the United States' pipelines industry, it does not follow that these long-term contracts necessarily recover the costs of the pipeline for the life of the assets. For instance, in its application to FERC,<sup>399</sup> the Mountain Valley Pipeline refers to foundation shippers agreeing to transportation capacity for 20-year terms. However, in the same application Mountain Valley Pipeline proposes a depreciation rate of 2.5 per cent—corresponding to a 40-year asset life.

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<sup>396</sup> Aurizon Network, sub. 40: 119.

<sup>397</sup> Aurizon Network, sub. 40: 41, 115.

<sup>398</sup> Aurizon Network, sub. 40: 119–120.

<sup>399</sup> Mountain Valley Pipeline LLC 2015.

As noted above, North American pipelines businesses are exposed to contract roll-off and counterparty risk. Aurizon Network also considered that the likelihood of a pipeline being subject to asset stranding from competition or having uncontracted capacity in a growing gas market is low given the regulatory requirements for obtaining certification of a new interstate pipeline under the Natural Gas Act of 1938.<sup>400</sup>

However, FERC's assessment of gas transportation proposals has been guided by its 1999 Statement of Policy. Since 1999, FERC has approved more than 400 pipeline applications, rejecting only two applications.<sup>401</sup> As outlined in a report by IEEFA, FERC's Statement of Policy largely relies on the subscription of pipeline capacity as evidence that the pipeline is necessary.<sup>402</sup>

It is unclear to the QCA as to whether the FERC certification process will necessarily limit the risk of excess and underutilised pipeline capacity. On 21 December 2017, FERC announced that it will review its policies on certification of natural gas pipelines.

In summary, the QCA considers that, regardless of the economic cycle, Aurizon Network's railing volumes are likely to be maintained and contracts renewed—based on the position that Aurizon Network's captive users occupy in the global seaborne coal cost curve, as well as the way in which Aurizon Network's regulatory framework allocates volume risk. As such, the QCA does not consider that Aurizon Network is vulnerable to cyclical market conditions and associated contract roll-off risk. Furthermore, the competitiveness of CQCN producers and long-term market outlook for CQCN coal do not suggest that a structural change in the coal export market could materially affect the risk of long-term demand deterioration in the foreseeable future, based on the evidence provided.

The QCA considers that North American pipeline businesses, in comparison, remain exposed to market forces on their uncontracted capacity, particularly given these businesses:

- are subject to competitive pressures and a light-handed regulatory regime
- do not necessarily have a captured customer base.

#### Servicing a limited number of commercial customers

Aurizon Network and The Brattle Group said that both the North American pipelines and Aurizon Network service a limited number of commercial customers. The Brattle Group also submitted that pipeline companies are often geographically focused. As such, it considered that energy commodity transportation has relevant business characteristics that are more directly comparable to the operation of a coal rail network than to the regulated energy and water distribution utilities.<sup>403</sup>

In considering the implication of Aurizon Network servicing a relatively small number of customers, Incenta noted that resilience of revenue/earnings through the economic cycle is ultimately what is important for beta. Incenta considered that Aurizon Network's absence of sensitivity to the economic cycle is due to its market power, a captured and resilient customer base, long-term contracting, and regulatory framework<sup>404</sup>—not due to the number of customers it services.

The QCA notes that both Aurizon Network and North American pipelines service a limited number of commercial customers.

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<sup>400</sup> A key requirement of the FERC approval process is avoiding inefficient duplication which typically also requires demonstration of substantial contracted long term firm contracts and that the demand could not be met through existing uncontracted capacity. Aurizon Network, sub. 40: 119.

<sup>401</sup> Tierney 2017.

<sup>402</sup> Institute for Energy Economics and Financial Analysis 2016.

<sup>403</sup> Aurizon Network, sub. 1: 273; Aurizon Network, sub. 4: 40.

<sup>404</sup> Incenta Economics 2017: 59.

## Pricing structure

Aurizon Network considered that there are also similarities in the price structure between Aurizon Network and gas pipelines—submitting that its pricing structure has fixed and variable components. Aurizon Network considered that the gas pipelines' price structure ensures revenues are closely aligned to costs. Furthermore, Aurizon Network stated that variable costs are significantly curtailed given 'many pipelines retain fuel as a percentage of total receipts of gas, thus, pipeline's today often do not include fuel costs in their rates', as outlined in FERC's Cost of Service Rates Manual.<sup>405</sup>

Additionally, Aurizon Network considered that Incenta does not address the issue that  $AT_1$  is a variable charge that sits outside of the revenue cap, or that Aurizon Network's actual costs may significantly depart from the maintenance cost index (MCI)<sup>406</sup> that is used to escalate that rate over each regulatory period. Furthermore, Aurizon Network considered that Incenta appears to under-estimate the wide variability of Aurizon Network's reported annual revenues for the CQCN. Aurizon Network submitted that it would also expect that contract-based, ship-or-pay pricing to involve lower systematic risk than forecast based pricing with regulatory lag of revenue adjustments.<sup>407</sup>

Aurizon Network acknowledged that its regulatory framework includes various review measures, but did not deem that these are of sufficient significance to warrant the exclusion of United States gas pipelines as a comparator group. Aurizon Network considered that differences are likely to relate to recovery of operating costs, which form a relatively minor component of the rate base. Furthermore, Aurizon Network submitted that operating and maintenance costs for gas pipelines are reasonably predictable and closely aligned with industry benchmarks reflected in the FERC indexation, indicating that revenues are likely to move in line with costs over time.<sup>408</sup>

While there may be similarities in Aurizon Network's and the gas pipeline businesses pricing structure, Incenta did not consider this to be the most important influences on Aurizon Network's systematic risk—as outlined in our first principles analysis.

The gas pipelines' price structure ensures revenues are closely aligned to costs—except to the extent that pipelines are exposed to uncontracted capacity. The QCA does not necessarily agree that contract-based, ship-or-pay pricing involves lower systematic risk than forecast based pricing with regulatory lag of revenue adjustments. While Aurizon Network may incur a regulatory lag of revenue adjustments, Aurizon Network's regulatory framework adjusts for the extent to which volumes do not materialise.

The  $AT_1$  component of Aurizon Network's reference tariffs recovers the incremental maintenance costs associated with providing access to the CQCN. These incremental costs should not be incurred by Aurizon Network if railings do not materialise. While there may be a lag between changes in volumes and changes in maintenance activity levels, the regulatory framework provides for Aurizon Network to recover efficient maintenance costs incurred regardless of the railing volumes in the following years.

As noted by Aurizon Network, the extent to which mechanisms, such as the MCI, insulate Aurizon Network from price risk are highly dependent on how the firm's costs and use of inputs are aligned to the regulatory decision and the relevant index. Importantly, these adjustment mechanisms assist Aurizon Network to manage risk associated with external cost shocks incurred throughout the regulatory period. Exposure to price escalation risks will be apparent for all regulated firms that apply an indexation methodology to its cost base to calculate access charges.

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<sup>405</sup> Aurizon Network, sub. 40: 116–117.

<sup>406</sup> The maintenance cost index is an imperfect proxy of Aurizon Network's actual costs constructed from broader macro, non-rail specific industry, indexes.

<sup>407</sup> Aurizon Network, sub. 40: 117.

<sup>408</sup> Aurizon Network, sub. 40: 116.

### Single commodity transportation assets

Aurizon Network and The Brattle Group noted that, similar to Aurizon Network, the North American pipelines are single commodity transportation pipelines. The Brattle Group considered that pipelines are more like Aurizon Network than distribution utilities, in terms of market structure and operational characteristics.<sup>409</sup>

However, Incenta considered that this characteristic provides insufficient information to consider whether two activities are appropriate comparators for a beta analysis. The fact that two types of firms share similar physical characteristics does not necessarily mean that they share similar systematic relationships between their returns and those of the market. The nature of the commodity transported may or may not be important for beta risk, depending on factors such as how the transporting business obtains its returns from the carriage of the commodity. As an example, Incenta noted that if the transporting business obtains returns that are dependent on the price of the commodity and that price is correlated to the market, it will have a higher beta than a transport business whose revenue is independent of the commodity's price.<sup>410</sup>

The QCA agrees with Incenta that the key consideration for estimating the relevant beta is the co-variability of a firm's returns with the economy. The QCA considers that it is important that a beta analysis, in the absence of direct comparators, takes the approach of 'looking through' the physical characteristics of operations to the economic fundamentals. Such an approach most closely identifies firms that match Aurizon Network on the basis of systematic risk. As such, the QCA does not consider that the 'single commodity' attribute is determinative for North American pipelines to be considered an appropriate comparator for Aurizon Network.

### Freight rail transportation businesses

Aurizon Network and The Brattle Group proposed that freight transportation companies, including railways, have similar industry characteristics and are exposed to similar industry risks as Aurizon Network. Specifically, The Brattle Group considered that patterns of cash flows relating to operating expenses, maintenance and expansion capital expenditures, and working capital balances for freight rail companies are likely to be most comparable to those of other freight rail companies.<sup>411 412</sup>

The Brattle Group noted that, while none of the firms in the non-United States Class 1 freight rail sample is directly comparable to Aurizon Network in every aspect, it viewed them as broadly reflecting the operating characteristics of the bulk commodity freight rail business and as adding context to asset beta estimates for the United States Class 1 railroads. However, The Brattle Group found that the United States Class 1 rail subsample has materially higher risk than Aurizon Network.<sup>413</sup> As such, the United States Class 1 rail transportation sample was not used to establish the range for Aurizon Network's beta estimate, while the non-United States Class 1 freight rail sample formed the upper bound of the range.

Frontier considered that it is more likely that the risk exposure of Aurizon Network falls between that of regulated network businesses (energy, water, ports and toll roads) and of rail and transport companies and other network owners.<sup>414</sup>

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<sup>409</sup> Aurizon Network, sub. 1: 273; sub. 4: 46.

<sup>410</sup> Incenta Economics 2017: 59.

<sup>411</sup> Aurizon Network, sub. 1: 293; sub. 4: 46.

<sup>412</sup> The freight rail transportation businesses referred to consist of a United States Class 1 freight rail subsample and a non-United States Class 1 freight rail subsample.

<sup>413</sup> Aurizon Network, sub. 4: 47, 57.

<sup>414</sup> Aurizon Network, sub. 6: i-ii.

The QRC did not consider the proposed freight rail transportation businesses to be appropriate comparators for Aurizon Network, noting the different forms of regulation and market position of the comparator group.<sup>415</sup>

Castalia stated that there is almost no similarity between Aurizon Network (serving a diversified, export-oriented market) and competitive, vertically integrated coal freight businesses serving a closed domestic market where coal competes with the over-supply of gas.<sup>416</sup>

Incenta agreed with The Brattle Group that the United States Class 1 rail subsample has higher risk than Aurizon Network. Incenta considered freight rail transportation businesses are not appropriate comparators for Aurizon Network. Incenta said freight rail transportation businesses are expected to have materially higher systematic risk than Aurizon Network, noting that Class 1 railroads:

- are subject to competitive pressure from parallel railroads and alternative transport modes
- carry loads that are highly sensitive to GDP shocks
- have relatively higher operating leverage
- only have a rate-of-return monitoring regulatory regime that does not buffer cash flows.<sup>417</sup>

Furthermore, Incenta considered that Class 1 railroads' capacity would be vulnerable to shifting demand in any year, as they typically have contracts with one to three year durations, and only in the case of coal traffic are contracts of up to five years observed. Incenta reported that the gas fracking revolution in recent years placed pressure on thermal coal, resulting in a reduction in thermal coal railings by United States Class 1 railroads.<sup>418</sup>

Incenta also stated that The Brattle Group provided no evidence to support the assertion that the 'patterns of cash flows' of Aurizon Network and Class 1 railroads are likely to be comparable. Incenta did not consider these matters raised by The Brattle Group to be correct or relevant, noting:

- An examination of operating leverage showed that Aurizon Network's operating expenditure / assets ratio of 0.10 is much closer to that of regulated energy and water (0.13) than it is to Class 1 railroads (0.24).
- In relation to maintenance and expansion capital expenditures, Aurizon Network's tracks are built to carry materially heavier loads, and consequently the capital expenditure per kilometre of track will be higher than that of Class 1 railroads.
- Working capital balances are irrelevant for beta given that the QCA compensates for working capital via a direct allowance and not through the WACC—nor was an explanation provided as to how, or whether, a link between working capital and beta exists.<sup>419</sup>

The QCA considers that the freight rail transportation group is exposed to materially higher systematic risk than Aurizon Network. Freight rail transportation businesses are subject to competitive pressures from parallel railroads and alternative transport modes, and transport freight that is highly sensitive to GDP shocks. Furthermore, the regulatory regime for freight rail transportation businesses does not insulate cash flows from the volatility arising from market shocks in the same manner as that of Aurizon Network's

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<sup>415</sup> QRC, sub. 21: 22.

<sup>416</sup> QRC, sub. 21, Annexure 1: 15.

<sup>417</sup> Incenta Economics 2017: 43.

<sup>418</sup> Incenta Economics 2017: 35.

<sup>419</sup> Incenta Economics 2017: 64.

regulatory framework. Therefore, the QCA considers that freight rail transportation businesses' cash flows will be more pro-cyclical than the cash flows of Aurizon Network.

While freight rail transportation companies have similar physical industry characteristics, it is unclear how these industry similarities affect the extent to which these firms' earnings are exposed to movements in the economy. As outlined above, Aurizon Network has a different market position, customer base and regulatory framework than that of the freight rail transportation businesses sample. Therefore, the QCA considers that the firms' exposure to systematic risk will be markedly different as a result.

The QCA considers that freight rail transportation businesses are not an appropriate comparator for Aurizon Network.

### Regulated energy and water businesses

Aurizon Network did not agree with the use of regulated water and energy utilities as comparators—submitting that key differences in the regulatory and commercial risk profile between the CQCN and the water and electricity utilities make them unsuitable comparators to determine Aurizon Network's return on equity.<sup>420</sup>

Aurizon Network submitted that its inherently volatile commercial environment presents a very different risk profile to a regulated energy or water utility. Aurizon Network considered that this view is reinforced by the position taken by the ratings agencies and the difference between the benchmark metrics applied to Aurizon Network and utilities in the same BBB+ credit rating category.<sup>421</sup> Aurizon Network noted that, in a credit rating report on Aurizon Network, Moody's stated:

Network's rating tolerance level is set at a materially higher level than equivalently rated regulated electricity and gas utilities in order to reflect Network's intrinsically higher business risk, a consequence of the higher volatility to which its key customers are exposed.<sup>422</sup>

The Brattle Group noted that energy and water distribution utilities have two business characteristics in common with Aurizon Network:

- They operate infrastructure networks dedicated to transportation of a commodity.
- The rates they charge are generally subject to cost-of-service regulation.

However, The Brattle Group considered that the electric, natural gas, and water distribution utilities differ fundamentally from Aurizon Network on two important dimensions:

- nature of customer base—the diffuse and geographically diverse nature of the customer base for energy and water distribution companies serves to mitigate their demand risk
- elasticity of demand for service—distribution utilities benefit from relatively inelastic demand for their service, due to the features of their customer bases and the lack of substitutes for their service to those customers.<sup>423</sup>

The Brattle Group considered that these two characteristics lower the energy and water distribution utilities' business risk relative to that of Aurizon Network. Consequently, The Brattle Group viewed the asset beta estimates from this sample as being lower than what is reasonable for Aurizon Network's asset beta.<sup>424</sup>

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<sup>420</sup> Aurizon Network, sub. 40: 31 and 44.

<sup>421</sup> Aurizon Network, sub. 1: 294; sub. 26: 26.

<sup>422</sup> Moody's Investor Service 2017: 3.

<sup>423</sup> Aurizon Network, sub. 4: 38–39.

<sup>424</sup> Aurizon Network, sub. 4: 40.

Frontier also considered that these factors are likely to have different implications for the systematic risk of the CQCN in comparison to regulated energy and water businesses.<sup>425</sup>

In a report commissioned by Aurizon Network, Synergies<sup>426</sup> compared Aurizon Network's commercial and regulatory risks to those typically found in regulated energy and water network businesses in Australia (with a specific focus on Queensland<sup>427</sup>). Synergies' analysis also outlined differences relating to the nature of customer base and elasticity of demand for service for the two business groups. From its analysis, Synergies considered that electricity and urban water networks face very different market risks to Aurizon Network, with the demand for Aurizon Network's services likely to be significantly more variable and subject to market shocks than is the case for Australian electricity and water networks.<sup>428</sup>

Synergies also considered the regulatory frameworks that apply to electricity and urban water networks differ in some important ways to the framework applying to Aurizon Network.<sup>429</sup>

The QRC, however, considered that the alignment of Aurizon Network's systematic risks to regulated energy and water utilities is evident from a first principles analysis of the risks faced by Aurizon Network. The QRC considered that regulated energy and water businesses are the best comparator groups for Aurizon Network, given these firms:

- are subject to similar regulation
- have a regulatory framework that buffers revenue risk
- have relatively low operational cost risk
- are generally subject to low stranding risk.<sup>430</sup>

Incenta also considered that regulated energy and water businesses are the best available comparators at this time to estimate Aurizon Network's systematic risk. Incenta said both Aurizon Network and regulated energy and water businesses are monopoly service providers, have a 'captured' customer base with resilient demand for the service, and are subject to cost-based regulation for pre-set periods, which largely insulates their cash flows. The regulatory approaches for Aurizon Network and regulated energy and water businesses are cost-based, set controls for a pre-determined period of time, and ensure recovery of revenues with a high degree of probability.<sup>431</sup>

Incenta considered that these common characteristics jointly result in low sensitivity of demand/revenue to GDP shocks. As such, Incenta expects Aurizon Network and regulated energy and water businesses to have similar levels of exposure to systematic risk.<sup>432</sup>

The QRC agreed with Incenta's conclusion, stating that regulated energy and water businesses are most comparable to Aurizon Network largely because the regulatory frameworks that apply to them have similar in-built risk protection mechanisms. However, the QRC considered some businesses within this sample are likely to face greater risk than Aurizon Network—noting that the set of regulated energy businesses includes businesses typically subject to price cap regulation and thus exposed to volume risk. The QRC considered

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<sup>425</sup> Aurizon Network, sub. 6: 7–8.

<sup>426</sup> See Aurizon Network, sub. 35.

<sup>427</sup> The major Queensland energy and water network businesses Synergies considered are Powerlink, Energex, Ergon Energy, Queensland Urban Utilities (QUU) and Unitywater.

<sup>428</sup> Aurizon Network, sub. 35: 30–37.

<sup>429</sup> Aurizon Network, sub. 35.

<sup>430</sup> QRC, sub. 21: 21, 30.

<sup>431</sup> Incenta Economics 2017: 4, 29.

<sup>432</sup> Incenta Economics 2017: 4.



that that the asset beta estimate from this sample is likely to overstate the appropriate asset beta for Aurizon Network.<sup>433</sup>

For the reasons outlined by Incenta, the QCA considers that Aurizon Network and regulated energy and water businesses share common attributes that will result in these firms having similar levels of exposure to systematic risk.

In reaching this conclusion, the QCA considered the two characteristics raised by Aurizon Network, The Brattle Group and Synergies, which they consider lower the energy and water distribution utilities' business risk relative to that of Aurizon Network (that is, nature of customer base and elasticity of demand). The QCA considers that Aurizon Network's customer base and income elasticity of demand for CQCN services provide for low sensitivity of demand/revenue to GDP shocks (the two characteristics are further examined below).

The QCA has assessed the extent to which the regulatory frameworks affect the risks that Aurizon Network and regulated energy and water businesses are exposed to. While the way in which the regulatory frameworks account for risk may differ for these comparators, the QCA considers that Aurizon Network's exposure to volume, counterparty and asset stranding risk is similar to that faced by regulated energy and water businesses—the QCA's analysis is detailed below.

Aurizon Network submitted that it has a fundamental concern about the QCA's and Incenta's analysis, such that it materially underestimates Aurizon Network's systematic risks. Aurizon Network submitted that the QCA's overriding consideration when selecting comparator firm's appears to predominantly be the influence of economic regulation and market power on Aurizon Network's exposure to systematic risk. In particular, Aurizon Network considered that Incenta's reasons for recommending regulated energy and water businesses as relevant comparators rely heavily on the extent to which they are either subject to cost-based regulation that buffers their cash flows or are likely to have significant market power.<sup>434</sup>

Aurizon Network recognised that economic regulation may impact the way in which market characteristics translate to commercial risk for these businesses. Similarly, Frontier considered that regulation and market power could be relevant factors that drive systematic risk (but are not the only relevant factors). However, Aurizon Network and Frontier considered that Incenta's approach implies that the characteristics of the industry being regulated do not matter in estimating beta—leading to the position that, irrespective of the industry of the regulated entity, the best set of comparators will always be regulated energy and water entities. Aurizon Network stated that the QCA has relied extensively on the short-term buffering effects of regulation and determined that risk information derived from other networks with similar operating environments to Aurizon Network is irrelevant.<sup>435</sup>

In particular, Aurizon Network and Frontier submitted that little or no weight is given to other relevant factors (for example, industry characteristics, customer concentration and exposure to certain types of customers) that affect asset beta and should therefore inform the selection of comparators. Aurizon Network submitted that there are considerable differences in the operating environments between gas, electricity and water networks, and a complex and integrated rail network transporting coal.<sup>436</sup>

As such, Aurizon Network considered that the QCA's assessment of the required return on equity fails to give any weight to industry comparators that share similar operational, commercial and regulatory characteristics.<sup>437</sup>

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<sup>433</sup> QRC, sub. 53: 17–18.

<sup>434</sup> Aurizon Network, sub. 40: 12 and 109.

<sup>435</sup> Aurizon Network, sub. 40:109–110, 123; sub. 44: 17–20.

<sup>436</sup> Aurizon Network, sub. 40: 110; sub. 44: 17.

<sup>437</sup> Aurizon Network, sub. 40: 31, 110, 126. Aurizon Network stated that the QCA's approach for estimating beta for Seqwater, which is based upon Incenta's advice of having regard to industry characteristics in its most

As indicated above, the QCA considers that the way in which Aurizon Network's regulatory framework allocates and mitigates risk is an important consideration for distinguishing the extent to which it is exposed to systematic risk. However, the QCA is not of the view that the characteristics of the industry being regulated do not matter in estimating beta. The QCA considers that regulation is only one of a number of drivers of systematic risk that should be considered in determining the appropriate comparator businesses for Aurizon Network.

In establishing appropriate comparators for Aurizon Network, the QCA considers Aurizon Network's exposure to systematic risk. This involves examining industry and market characteristics that affect Aurizon Network's exposure to risk, as well as the extent to which such risk is addressed by the regulatory framework. For instance, an important consideration in establishing Aurizon Network's risk profile is the characteristics of its customer base.

In taking this approach, the QCA's analysis does not rely solely on, or place excess weight, on specific factors, such as regulation and/or market power to establish an appropriate set of comparator firms. Rather, the QCA has regard to Aurizon Network's key risk characteristics, as well as to risk characteristics of potential comparators, in order to identify appropriate comparators for Aurizon Network. The QCA's assessment approach considers the extent to which these factors affect Aurizon Network's and potential comparators' overall exposure to systematic risk.

Where the QCA considers that similarities in operational, commercial and regulatory characteristics affect industry comparators' overall exposure to systematic risk, these characteristics are taken into consideration. However, the QCA is of the view that the fact that two types of firms share similar characteristics, such as operating environments, does not necessarily mean that they share similar systematic relationships between their returns and those of the market.

The QCA remains of the view that Aurizon Network and regulated energy and water businesses share similar levels of exposure to systematic risk, despite having some differences in physical characteristics and operating features. As such, the QCA considers that regulated energy and water businesses are appropriate comparators for Aurizon Network.

#### Nature of customer base

Aurizon Network noted that the regulated utility network businesses' risks and costs are spread across their large and diverse customer bases. The Brattle Group noted that:

- energy and water distribution utilities serve large populations of retail customers—end users of the commodity—in their franchise service territories
- many publicly traded firms in the energy and water distribution business operate multiple regulated utility operating companies in geographically diverse regions.<sup>438</sup>

The Brattle Group considered that the diffuse and geographically diverse nature of the customer bases of energy and water distribution companies serves to mitigate their demand risk, since changes in usage by any individual customer have relatively little impact on overall system revenue.<sup>439</sup>

The Brattle Group submitted these features contrast with Aurizon Network's dedicated operation of the CQCN, with corporate customers accessing its network to transport coal from supply regions to downstream distribution channels. While Aurizon Network's take-or-pay contract arrangements help to reduce its demand risk, The Brattle Group considered that the potential for declining revenue from the

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recent decision, is internally inconsistent and promotes regulatory uncertainty regarding the QCA's WACC determination processes.

<sup>438</sup> Aurizon Network, sub. 1: 294; sub. 4: 38–39.

<sup>439</sup> Aurizon Network, sub. 4: 39.

gradual roll-off of contracts is likely to be high relative to the potential for similar usage declines among distribution utility customer bases.<sup>440</sup>

Synergies also noted that electricity and water networks are characterised by large numbers of low volume customers (low customer concentration), with low dependence on high volume customers for revenue. Alternatively, Aurizon Network has a small number of users (high customer concentration). Synergies also noted that electricity and water networks face diversified economy-wide risk<sup>441</sup>, while Aurizon Network is exposed only to large industrial customers, which in turn are exposed entirely to international coal markets.<sup>442</sup>

Noting that electricity and water networks are not exposed to significant volume or revenue risk in relation to individual customers on their networks, Synergies submitted that take-or-pay contracts for supply are not a feature of these sectors. Synergies considered that Aurizon Network relies on long-term, take-or-pay contracts in order to protect its asset stranding risk. Synergies said that 35 per cent of volume will come off contract in the next five years and in an environment of surplus capacity, there is a reduced incentive for users to commit to long-term contracts.<sup>443</sup>

Frontier noted that, while losses that arise from disconnecting customers can be socialised in both the CQCN as well as regulated energy and water businesses, socialisation is practically more difficult in the case of the CQCN where the disconnection of a single customer might amount to a loss of 10 per cent of the revenue base. Further, Frontier noted that the risk of losses from disconnections is more likely to arise during market downturns.<sup>444</sup>

In considering the nature of the customer base for regulated energy and water businesses, the QRC noted that for particular regulated entities, such as the Gladstone Area Water Board, the bulk of their customers by volume are major industrials and not individual consumers.<sup>445</sup>

Incenta acknowledged that regulated energy and water businesses serve a diverse range of residential customers.<sup>446</sup> The diverse nature of the customer base for energy and water distribution companies serves to mitigate their demand risk. As such, the long-term demand risk for regulated energy and water companies is limited.

Incenta said that the risk inherent in Aurizon Network's relatively small number of customers depends on the competitive position of those customers in the global supply of seaborne coal exports. However, Incenta stated that the position of Aurizon Network's customers is strong (as customers are positioned at the favourable/lower end of the seaborne coal market cost curve), so this risk is low.<sup>447</sup>

In considering the implication of servicing a relatively small number of customers, Incenta noted that resilience of revenue/earnings through the economic cycle is ultimately what is important for beta—not the number of customers *per se*. As outlined above, Incenta considered that Aurizon Network's absence of sensitivity to the economic cycle is not related to the number of customers it services, but rather to its market power, captured and resilient customer base, long-term contracting and regulatory framework.

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<sup>440</sup> Aurizon Network, sub. 4: 39.

<sup>441</sup> Specifically, there is exposure to a broad cross-section of the domestic economy, with high weighting towards domestic, residential users. Commercial and industrial users typically cover a range of market segments, creating a broadly diversified demand risk.

<sup>442</sup> Aurizon Network, sub. 35: 25–27, 30.

<sup>443</sup> Aurizon Network, sub. 35: 29–30.

<sup>444</sup> Aurizon Network, sub. 6: 7.

<sup>445</sup> QRC, sub. 21: 31.

<sup>446</sup> Incenta Economics 2017: 35.

<sup>447</sup> Incenta Economics 2017: 59–60.

As noted above, the QCA does not consider that there is a significant risk of contract roll-off for Aurizon Network. Due to the position that Aurizon Network's captive users occupy in the global seaborne coal cost curve and the high fixed shut-down and start-up costs at mines, Aurizon Network's railing volumes are likely to be maintained and its contracts renewed. Aurizon Network's regulatory framework limits its exposure to the volume risk of uncontracted capacity. Furthermore, the exposure to any such risk may be mitigated by Aurizon Network's ability to submit changes to the regulatory compact as part of regulatory reset every four years or through a DAAU submission.

The QCA considers that, similar to regulated energy and water businesses, Aurizon Network is not vulnerable to cyclical market conditions and associated contract roll-off risk.

### Elasticity of demand

As outlined above, Incenta concluded that income elasticity of demand is more likely than price elasticity of demand to be associated with beta, as it relates to demand through the economic cycle, while empirical evidence linking price elasticity of demand to beta has shown varying results.

The QCA notes that analysis presented by Aurizon Network, The Brattle Group, Frontier and Synergies in relation to Aurizon Network's elasticity of demand focused on the price elasticity of demand.

In this context, Aurizon Network considered that a regulated utility network's demand is comparatively stable and predictable, and customers have a low price elasticity of demand. The Brattle Group attributed this, in part, to the features of utilities' customer bases and the lack of substitutes for their services to those customers. In general, retail end users have limited opportunities to substitute away from the commodity delivered, and the local distribution utility has a natural monopoly, preventing entry of alternative suppliers of the distribution service. Synergies submitted that the clear majority of demand for electricity and water networks relates to residential users, who are not subject to competitive pressures, or domestic economic activity.<sup>448</sup>

The Brattle Group submitted that demand for access to Aurizon Network's infrastructure fundamentally depends on the ability of its customers to profit from transporting coal from, and to, the nodes of that network. This will depend on regional and global demand for Queensland coal, as well as the price of that coal. Synergies also considered that Aurizon Network's customers are price takers in international coal markets, with demand subject to market conditions. Given the recent and ongoing shifts in global energy markets, The Brattle Group submitted that demand for Queensland coal is likely to be more price-elastic and variable than the demand for electric, natural gas, and water distribution services. While noting that regulation and contract cover may reduce Aurizon Network's exposure to demand risk in the short term, The Brattle Group considered that those forces cannot eliminate such risks entirely.<sup>449</sup>

Frontier also considered that the price elasticity of demand is likely to be much higher for the CQCN compared with regulated water and electricity businesses. Frontier noted that regulated energy and water businesses distribute essential commodities to largely residential customer bases that have no viable option other than to pay the network business for providing the essential service. In contrast, Frontier considered that CQCN customers have realistic alternatives in responding to price increases, including securing access to alternative, existing rail links and/or funding new spurs and connections, or reducing contracted volumes.<sup>450</sup>

Frontier also submitted that coal-mining companies are likely to be more sensitive to price during periods when coal prices are lower, coinciding with a downturn in the Australian market. Furthermore, Frontier

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<sup>448</sup> Aurizon Network, sub. 1: 294; sub. 4: 39; sub. 35: 27–28, 30.

<sup>449</sup> Aurizon Network, sub. 4: 39; sub. 35: 27–28, 30.

<sup>450</sup> Aurizon Network, sub. 6: 7.

considered that the CQCN is subject to the risk of a prolonged decline in coal prices, given the volatility in coal prices.<sup>451</sup>

The QRC strongly disagreed with these type of characterisations. It considered that differences in the elasticity of demand ignore that take-or-pay contracts, large sunk costs and lack of available alternatives result in marginal producers continuing to operate, provided they cover their variable costs of production. The QRC also considered that the assertion that the demand for coal is less stable and predictable ignores the fact that electricity network businesses face major industry challenges like:

- batteries/storage solutions
- household solar panels exporting power to the grid
- distributed energy and off-grid power arrangements that have reshaped demand for the services provided by such electricity network businesses.<sup>452</sup>

Incenta reported that regulated energy and water businesses' revenues are resilient to economic cycles and that this is not due to customer numbers, but to:

- the demand having a significant component of residential consumption, which has a low income elasticity of demand
- the firms being subject to cost-based regulation that further buffers their cash flows.<sup>453</sup>

As a result, Incenta expected very little remaining pro-cyclicality in the revenues of regulated energy and water businesses.

While recognising pro-cyclical fluctuations in the demand for Australia's metallurgical coal, Incenta highlighted that Aurizon Network's cash flows are not pro-cyclical, as miners have an incentive to maximise production even at low prices. Incenta considered Aurizon Network's revenue is similarly resilient to economic cycles, given its market power, the characteristics of its customers and its regulatory framework. Incenta considered that Aurizon Network's regulatory framework is likely to achieve 'cash flow buffering' similar to that of regulated energy and water businesses. Aurizon Network's cash flows, like those of regulated energy and water businesses, vary with changes in the RAB, rather than with the state of the economy.<sup>454</sup>

As outlined above, the QCA recognises that volatile coal prices have had implications for Aurizon Network's customer base. However, the income elasticity of customers' demand for the CQCN services is largely decoupled from the elasticity of the demand for coal from the CQCN. Noting that income elasticity of demand is more likely than price elasticity of demand to be associated with beta, the QCA considers that Aurizon Network, The Brattle Group and Frontier have presented no evidence that the income elasticity of demand for energy and water distribution services is lower relative to that of Aurizon Network. Furthermore, Incenta's analysis shows that Aurizon Network's cash flows are not pro-cyclical with the market.

### The regulatory framework

In considering the regulatory framework, submissions focussed on:

- the risks associated with the regulatory framework

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<sup>451</sup> Aurizon Network, sub. 6: 7–8.

<sup>452</sup> QRC, sub. 21: 28, 31.

<sup>453</sup> Incenta Economics 2017: 6.

<sup>454</sup> Incenta Economics 2017: 8.

- the extent to which the regulatory framework addresses risk.

#### Risks associated with the regulatory framework

Aurizon Network considered that the access regime under the QCA Act represents significantly greater regulatory risks than those of the relevant beta comparator groups. Aurizon Network considered that an important aspect of the regulatory framework is the lack of prescriptive detail and the exposure to economic hold-up or regulatory opportunism associated with the presence of regulatory discretion.<sup>455</sup>

Aurizon Network submitted that energy networks are subject to highly prescriptive regulation, while Australian water networks are subject to varying types of regulation under different jurisdictional regimes.<sup>456</sup>

Aurizon Network considered that the prospect of inconsistent decisions is less prominent in prescriptive, rules-based regimes.<sup>457</sup> Aurizon Network said that the premise that the regulatory framework reduces systematic risk ignores the fact that the regulatory regime contained in the QCA Act is not a rules-based or prescriptive regime, giving rise to considerable risk (uncertainty) as to how the regulatory regime may be applied—creating additional regulatory risk.<sup>458</sup>

Additionally, Aurizon Network considered that the absence of a merits review mechanism under the QCA Act adds to Aurizon Network's ongoing regulatory risk. Aurizon Network said that this can be contrasted with the development of regulatory precedent in relation to the rate of return under the Australian national energy regulatory framework, with such a review mechanism in place and the confidence that this provided to investors.<sup>459</sup>

As outlined by Incenta, regulated energy and water businesses are also subject to cost-based regulation. For pricing terms and conditions, the QCA agrees with Synergies that regulatory discretion in relation to expenditure assessments and WACC approval is comparable for the regulated electricity and urban water networks assessed by Synergies and Aurizon Network. In this respect, the regulatory risks of regulated energy and water businesses are comparable to that of Aurizon Network.

In relation to regulatory discretion for non-price terms and conditions, the QCA notes that Aurizon Network has a stable regulatory framework. Within this framework, the QCA assesses whether to approve Aurizon Network's draft access undertaking within a propose-respond framework, assessing the reasonableness of Aurizon Network's proposal. In any case, it is not clear the extent to which the non-price terms and conditions referred to are related to Aurizon Network's exposure to systematic risk. Aurizon Network is able to propose more prescriptive non-price terms and conditions within the regulatory framework, such as use of binding rulings.

Aurizon Network submitted that a material difference between the regulatory framework for the CQCN and regulated water and energy utilities is the differences in estimating the cost of debt. Aurizon Network retained the 'on the day approach' compared with the comparator groups whose regulatory frameworks include 'trailing average cost of debt' methods. Aurizon Network submitted that the QCA's assessment of risk (and beta) has not included this among the matters relevant to providing a return on investment commensurate with the commercial and regulatory risk of providing the declared service.<sup>460</sup>

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<sup>455</sup> Aurizon Network, sub. 40: 44.

<sup>456</sup> Aurizon Network, sub. 40: 123

<sup>457</sup> Aurizon Network, sub. 40: 44.

<sup>458</sup> Aurizon Network, sub. 40: 84.

<sup>459</sup> Aurizon Network, sub. 40: 85

<sup>460</sup> Aurizon Network, sub. 40: 43–44.

In arriving at its decision that an overall WACC estimate of 5.7 per cent for Aurizon Network's 2017 DAU is appropriate, the QCA has given consideration to risks associated with using the 'on the day approach' to calculate the cost of debt (see Chapter 5).

#### Addressing risk within the regulatory framework

Synergies said its analysis indicates that electricity and urban water networks face a somewhat different regulatory impact on their commercial risks compared to Aurizon Network. The Synergies submission and corresponding QCA analysis are summarised in Table 34.<sup>461</sup>

In particular, Synergies considered that Aurizon Network is subject to significantly higher volume and counterparty risks (leading to higher revenue risk) and much higher stranding risks than Australian energy and water networks. While the application of economic regulation may modify the impact of commercial/market risks facing regulated entities, including through mechanisms like revenue caps, it cannot change the nature of the underlying commercial/market risks facing these entities (which Synergies considered are fundamentally higher for Aurizon Network than for electricity and urban water networks).<sup>462</sup>

The QCA does not agree that Aurizon Network is subject to significantly higher short-term volume and counterparty risks than that of regulated energy and water businesses. As discussed in Chapter 2, the QCA considers that Aurizon Network's exposure to short-term volume and counterparty risk is largely addressed by the regulatory compact and the characteristics of its customer base.

Synergies also considered that, overall, it is reasonable to conclude that Australian electricity and water networks are not subject to material risk of bypass—service alternatives for electricity networks are low and for water networks negligible. Alternatively, Synergies submitted that Aurizon Network faces bypass risk in relation to its electric network from diesel traction, and the GAPE and Newlands Systems from an alternate export route offered in the Goonyella System and planned Adani rail line.<sup>463</sup>

Mechanisms in Aurizon Network's regulatory framework, such as socialised take-or-pay reference tariffs and the revenue cap, mean that Aurizon Network is only exposed to bypass risk to the extent that it materialises into an asset stranding risk for that asset. The regulatory framework provides sufficient flexibility to address the circumstances before Aurizon Network, on a case-by-case basis. If such a bypass risk does materialise for a specific asset during the regulatory period, the QCA considers that Aurizon Network has the ability to manage this risk within the regulatory framework. In particular, Aurizon Network is able to submit changes to the regulatory compact as part of a DAAU submission or as part of the next regulatory period. Indeed, Aurizon Network has submitted an Electric Traction DAAU for the 2016 Access Undertaking. In addressing such issues, the QCA supports Aurizon Network submitting reasonable proposals to manage material bypass risk as it arises.

Aurizon Network stated that while the regulatory framework reduces Aurizon Network's exposure to short-term volume risk for each regulatory period, there remains a long-term risk associated with the CQCN that is not mitigated in any way by the framework. Aurizon Network considered that a narrow focus of the commercial and regulatory risks, in terms of both cash flow volatility and the short-term emphasis on cash flow impacts from regulation, leads to a disproportionate assessment of risk. Aurizon Network considered that the longer term risks are a significant influence to the required rate of return and makes essential service utilities the incorrect benchmark for estimating that return.<sup>464</sup>

Aurizon Network considered that the QCA places heavy weight on the revenue cap as a mechanism by which the regulatory framework reduces Aurizon Network's exposure to market risk. Aurizon Network

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<sup>461</sup> Aurizon Network, sub. 35: 30–37.

<sup>462</sup> Aurizon Network, sub. 35: 37.

<sup>463</sup> Aurizon Network, sub. 35.

<sup>464</sup> Aurizon Network, sub. 40: 30–31, 84–85.

considered the revenue cap is unlikely to be effective in dealing with major volume shortfalls within or across regulatory periods, which is a reflection of the characteristics of Aurizon Network's highly concentrated market exposure. Aurizon Network submitted that in the face of significant volume loss, there is genuine uncertainty as to whether remaining users will have the capacity to pay higher prices to recover revenue shortfalls.<sup>465</sup>

In this regard, Aurizon Network reiterated:

- The fragmentation of Aurizon Network's RAB across the CQCN, which has been increasingly compartmentalised to specific customers for pricing purposes, increases these risks.
- Its dependence on a small number of mines for the majority of the revenue recovery and exposure to optimisation risks associated with the loss of one or more major mine in a single coal system.<sup>466</sup>

Aurizon Network submitted that, in contrast, Australian energy and water networks regulated under revenue caps are typically highly effective at mitigating volume risk given:

- a single RAB/revenue cap is generally applied for core network services
- the networks service a large and highly diversified customer base.<sup>467</sup>

Referring to the arrangements under the National Electricity Rules, Aurizon Network considered that the optimisation risk for connection assets is negligible in comparison to the system level risks associated with a significant loss of volumes on prices for remaining users within the CQCN.<sup>468</sup>

The QCA agrees with Synergies that regulated energy and water businesses are generally not subject to material asset stranding risk at this time.

The QCA also acknowledges that Aurizon Network is exposed to counterparty and demand risk associated with long-term demand deterioration for coal from the CQCN. However, based on the evidence available to us, the competitiveness of CQCN producers and long-term market outlook for CQCN coal suggest that producers will remain competitive with other coal export markets in the foreseeable future. As such, the QCA considers that the risk of asset stranding is also low for CQCN assets.

Furthermore, the very limited circumstances under which regulatory optimisation can occur within Aurizon Network's regulatory framework mitigates the risk that capital expenditure previously undertaken by Aurizon Network is not included in the RAB used for pricing purposes.

While Aurizon Network outlines that RAB fragmentation and characteristics of its customer base may exacerbate a risk of long-term demand deterioration, Aurizon Network has not provided evidence to suggest that the underlying risk of long-term demand deterioration for coal from central Queensland is likely. As noted in Chapter 2, the competitiveness of CQCN producers and the long-term market outlook for CQCN coal does not suggest that a structural change in the coal export market, which could materially affect the risk of long-term demand deterioration, is expected in the foreseeable future, based on the evidence provided.

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<sup>465</sup> Aurizon Network, sub. 40: 124.

<sup>466</sup> Aurizon Network, sub. 40: 124.

<sup>467</sup> Aurizon Network, sub. 1: 294; sub. 40: 124.

<sup>468</sup> Aurizon Network, sub. 40: 44–45.



**Table 34 Synergies submission comparing the impact of regulation**

<i>Issue</i>	<i>Synergies submission</i>	<i>QCA analysis</i>
Fragmentation of the RAB	Electricity and water networks generally maintain aggregated RABs rather than customer-segmented RABs as is the case for Aurizon Network's fragmented RAB, which causes even greater customer concentration. Aurizon Network's RAB is fragmented into seven discrete RAB components, resulting in greater concentration of market risk factors. There is no mechanism for revenue shortfalls or stranding events affecting one RAB component to be compensated from another RAB component.	It is unclear to which extent Aurizon Network's RAB fragmentation affects the risk of asset stranding and why this justifies a higher beta.  In any case, other mechanisms in the regulatory compact address short-term revenue shortfalls in a RAB component, and no evidence has been provided of a structural deterioration in demand in a specific RAB component. <sup>469</sup> As such, from the evidence provided, the QCA does not view that RAB fragmentation is materially increasing Aurizon Network's exposure to a structural deterioration in demand.
Volume risk mitigation	Revenue caps are used for mitigation of volume risk for both Aurizon Network and electricity networks. For electricity networks, noting the outlook for moderate growth in energy demand and the highly diversified nature of this demand, the revenue cap is likely to be effective in managing volume risk in the medium to long term.  In contrast, Aurizon Network has concentrated exposure to the coal market. While the revenue cap passes volume risk to customers, where market circumstances result in a significant loss in demand, the capacity of remaining users to pay revenue cap-induced price rises is uncertain.  While revenue caps are not applied for water networks, volume risk is generally low given the essential nature of the service. Volume risk is typically mitigated through tariff structure and price reviews.	The QCA considers that, similar to regulated energy and water businesses, Aurizon Network's regulatory compact mitigates Aurizon Network's exposure to short-term volume and counterparty risk—allocating short-term demand risk to other parties in the industry. The QCA noted that despite the falling coal prices there has been no corresponding reduction in overall coal exports.  Furthermore, the competitiveness of CQCN producers and long-term market outlook for CQCN coal does not suggest that a structural change in the coal export market could materially affect the risk of long-term demand deterioration in the foreseeable future.
Asset stranding risk	The electricity regulatory framework provides strong protection against asset stranding risk for the electricity networks. Furthermore, asset stranding risk is low given the essential nature of the service; and the very large and highly diversified customer base.  Water networks generally do not receive this level of regulatory protection but asset stranding risk is low, given the essential nature of the service; and the very large and highly diversified customer base.  This compares to Aurizon Network, which only has the opportunity for socialisation of stranding risk within segmented RAB groups, with no specific stranding protection between RAB groups. Together with a highly concentrated market and customer exposure,	The QCA considers that, similar to regulated energy and water businesses, the risk of asset stranding facing Aurizon Network is low.  The QCA acknowledges that a structural change in the coal export market could materially affect the risk of long-term demand deterioration. However, Aurizon Network has not provided any evidence of a long-term structural decline in demand for coal from central Queensland. As outlined above, the competitiveness of CQCN producers and long-term market outlook for CQCN coal suggest that producers will remain competitive with other coal export markets in the foreseeable future.

<sup>469</sup> The competitiveness of CQCN producers and long-term market outlook for CQCN coal suggest that producers will remain competitive with other coal export markets in the foreseeable future, based on the evidence provided to us.

<i>Issue</i>	<i>Synergies submission</i>	<i>QCA analysis</i>
	this leads to significant stranding risk for some segmented RAB groups.	
Operating and maintenance risk	Risk is generally low across each of the businesses, given their capital-intensive nature. In particular, the risk for electricity networks and Aurizon Network is broadly comparable, given the high degree of regulatory discretion in assessing expenditure proposals at each regulatory reset.	The QCA agrees with Synergies that the operational and maintenance risk is low for Aurizon Network and the Australian electricity and water networks. Additionally, Aurizon Network's regulatory compact provides efficient costs and cost-pass through arrangements, as well as Aurizon Network being able to submit changes to the regulatory arrangements.
Performance risk	Risk is higher for electricity and urban water network providers, given strict obligations created by safety and supply-related legislation and subordinate regulations. In contrast, regulation is unlikely to have a material impact on Aurizon Network's performance risk.	The QCA agrees with Synergies that the regulatory framework is unlikely to have a material impact on Aurizon Network's performance risk. Aurizon Network bears liabilities for performance under contracts.
Financing risk	The application of regulation changes the way in which regulated businesses must manage their financing risk, in order to best match regulatory reset periods. Financing risk is generally higher for Aurizon Network given many financiers are withdrawing from providing finance to businesses that have direct coal exposure. Aurizon Network has a greater financing and refinancing risk as it will have access to a smaller pool of available capital.	The QCA acknowledges that the financing risk of these entities may differ. Aurizon Network may adopt a different debt management strategy to that of the electricity and water networks examined by Synergies.  Aurizon Network's cost of debt sufficiently compensates Aurizon Network for the debt management strategy it adopts and for the financing and re-financing risk that it encounters.
Regulatory discretion at reset	Regulatory discretion regarding expenditure assessments and WACC approval is comparable for revenue and/or price-regulated electricity and urban water networks and Aurizon Network. Aurizon Network is subject to some additional risk, as the regulatory discretion extends to the non-price terms and conditions upon which it negotiates and provides access.	The QCA agrees with Synergies that regulatory discretion in relation to expenditure assessments and WACC approval is comparable for the regulated electricity and urban water networks assessed by Synergies and Aurizon Network. In relation to regulatory discretion for non-price terms and conditions, the QCA notes that Aurizon Network has a stable regulatory framework. In any case, it is not clear the extent to which the non-price terms and conditions referred to are related to Aurizon Network's exposure to systematic risk.

Source: *Aurizon Network, sub. 35: 30–37.*

### Toll roads sample

Aurizon Network submitted that it did not assess toll roads due to the latter not having sufficient industry characteristics to Aurizon Network to be considered a reasonable or reliable comparator group.<sup>470</sup>

The QRC considered that toll roads would be anticipated to involve higher risk than Aurizon Network, such that they could only be considered an upper bound on the beta estimate.<sup>471</sup>

Incenta also considered toll road businesses to have higher systematic risk than Aurizon Network. Incenta said toll roads typically face a degree of competition from alternative routes and transport modes that apply

<sup>470</sup> Aurizon Network, sub. 40: 120.

<sup>471</sup> QRC, sub. 21: 22.

competitive pressure on toll road operators. Noting that there are often alternatives to toll road services, and traffic can be sensitive to GDP shocks, Incenta also expects the demand of toll road customers to display some sensitivity to the economic cycle. Additionally, Incenta reported that toll roads generally bear full demand risk, and are not buffered by regulation in the same manner as Aurizon Network.<sup>472</sup>

In response, Aurizon Network did not agree that toll roads represent a cap on Aurizon Network's asset beta, but rather considered there is a reasonable empirical basis for toll roads representing a floor for that beta estimate.<sup>473</sup>

Aurizon Network considered that a combination of stable earnings, expenditure and financing produces highly stable EBITDA margins for toll road businesses, submitting:

- Competition is weak given that toll concessions are typically awarded over roads that are being constructed to alleviate congestion on alternate routes and often involve non-compete or compensation clauses. Aurizon Network considered this ensures that toll road operators are subject to low price elasticity, with long term population growth and the associated growth in demand for road trips the primary driver of demand for toll roads causing little volatility in annual earnings.
- Since the introduction of automatic tolling the cash operating costs of toll-roads have become more stable and there is minimal road maintenance expenditure with major period maintenance being highly predictable and funded through a maintenance reserve.
- The financing arrangements for toll roads involve long-dated debt maturities which are also typically hedged against interest rate risk—in contrast to regulated assets which are subject to increased exposure to systematic risk at price resets. Although toll road businesses are expected to be subject to inflation risk given debt financing is its most significant costs, the inflation indexation of toll charges mitigates this risk.<sup>474</sup>

Aurizon Network contended that cost-based regulation is unnecessary for toll roads as 'revenue is closely matched to cost over time'. Aurizon Network said that toll roads are subject to a regulatory framework through the construction of the relevant concession agreement, which serves to 'buffer' cash flows through various mechanisms such as:

- non-compete and compensation clauses;
- toll indexation with deflation protection measures limit downside exposures
- equity return caps which increase the licence or concession fee payments to the government owners.<sup>475</sup>

Additionally, Aurizon Network stated that the comparator toll-road group also own a portfolio of toll roads which would be expected to provide further diversification benefits and reduction in systematic risk relative to a coal system with industrial exposure to a single commodity.<sup>476</sup>

Aurizon Network's assertion that toll roads face weak competition from alternative routes is dependent on the on the assumption that capacity is fully constrained on alternative routes. Where this is not the case, the service provider has little market power or a regulatory framework that insulates its cash flows from the volatility arising from market shocks. Furthermore, such an assertion relies on assumptions about demand characteristics and preferences of toll road consumers.

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<sup>472</sup> Incenta Economics 2017: 4, 29, 34.

<sup>473</sup> Aurizon Network, sub. 40: 123.

<sup>474</sup> Aurizon Network, sub. 40: 122–123.

<sup>475</sup> Aurizon Network, sub. 40: 121.

<sup>476</sup> Aurizon Network, sub. 40: 123.

The QCA acknowledges that certain mechanisms, such as non-compete and compensation clauses, may protect toll roads in the medium-term from other competitors from entering the market. However, this does not provide any protection from competition from existing alternatives to toll road services.

Despite having characteristics that mitigate the risk of cost variation—providing for a stable cost base—the fact remains that toll roads generally bear demand risk. As outlined by Incenta, the QCA would expect the demand of toll road consumers to display some sensitivity to the economic cycle, since there are often alternatives to toll road services. Alternatively, as noted above, Aurizon Network is a monopoly service provider of the CQCN with a captured and resilient customer base, and has a regulatory framework that mitigates revenue risk.

Aurizon Network considered that Incenta's analysis lacks supporting evidence as to how toll road earnings are exposed to the economic cycle, only including a comparison of toll roads return on assets (ROA) with real GDP growth. Aurizon Network considered that this analysis reveals no insight into the systematic risk of toll roads other than a long-term trend decline in ROA which is relatively invariant to the economic cycle and for the most part counter-cyclical. Aurizon Network submitted that Incenta relies predominantly on the belief that toll roads face significant competition and therefore that toll road services are sensitive to GDP shocks, despite the relative invariance of ROA to the global financial crisis.<sup>477</sup>

However, while Incenta supplemented its first principles analysis by examining empirical evidence to consider whether it supported the first principles' findings, Incenta emphasised that undue weight should not be placed on the ROA-GDP relationships presented (see below). Incenta's conclusion that toll roads are expected to have higher systematic risk relative to Aurizon Network is supported by its first principles analysis.

From the first principles analysis presented by Incenta, the QCA expects toll roads businesses to be exposed to higher systematic risk in comparison to Aurizon Network. Given that toll roads businesses have the next highest asset beta estimate after regulated energy and water, Incenta used the toll roads estimate as an upper bound on the asset beta of Aurizon Network.<sup>478</sup>

### Empirical evidence for an appropriate comparator

Frontier considered that the 'first principles' analysis employed to determine appropriate comparators involves nothing more than conceptual discussion. Furthermore, Frontier noted that when Aurizon Network considered the same 'first principles', Aurizon Network reached the opposite conclusion. As a result, Frontier considered there is no framework for determining whose conclusion is correct.<sup>479</sup>

Incenta disagreed with Frontier's assertion that the first principles analysis employed to determine appropriate comparators involves nothing more than conceptual discussion. While first principles analysis provides qualitative analysis, Incenta supplemented its analysis by examining empirical evidence to consider whether it supported the first principles' findings. Incenta noted that neither The Brattle Group nor Aurizon Network supported its propositions with empirical evidence.<sup>480</sup>

Specifically, Incenta noted that the beta concept is founded on the proposition that it is the responsiveness of returns of the business in question relative to returns in the market that determines systematic risk.<sup>481</sup> To support its first principles assessment, Incenta calculated the average Return on Assets (ROA) for each

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<sup>477</sup> Aurizon Network, sub. 40: 120–122.

<sup>478</sup> Incenta Economics 2017: 14.

<sup>479</sup> Aurizon Network, sub. 6: 6.

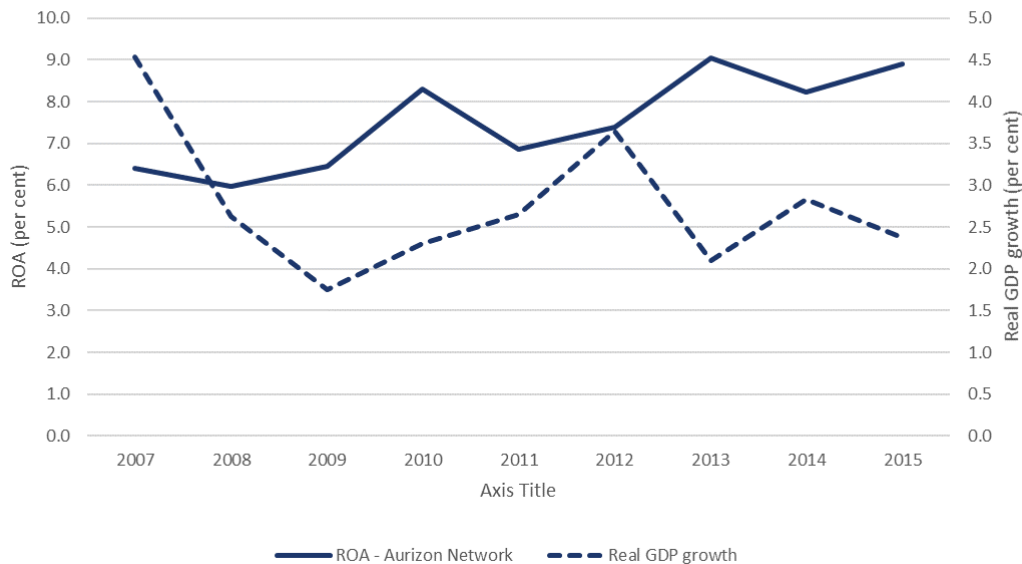
<sup>480</sup> Incenta Economics 2017: 66.

<sup>481</sup> Incenta Economics 2017: 44.

of the proposed comparator groups from 2007 to 2015 and compared the change in ROA with movements in the economic cycle.<sup>482</sup>

While Incenta's analysis showed that Aurizon Network's ROA fluctuated over the time series, these movements were largely independent of the state of the Australian economy.<sup>483</sup>

**Figure 2 ROA vs GDP growth for Aurizon Network, 2007–2015**



Source: Incenta Economics 2017.

Incenta's analysis also demonstrated a relative lack of association between the ROA of regulated energy and water businesses and real GDP growth. On average, the returns of regulated energy and water businesses reacted relatively mildly to the Global Financial Crisis (GFC) and to subsequent changes in the United States' real GDP and 'average' real GDP<sup>484</sup>. Similarly, the average ROA of the toll road sample was relatively unresponsive to the GFC, but showed slightly more variability than the energy and water businesses over the subsequent period.<sup>485</sup>

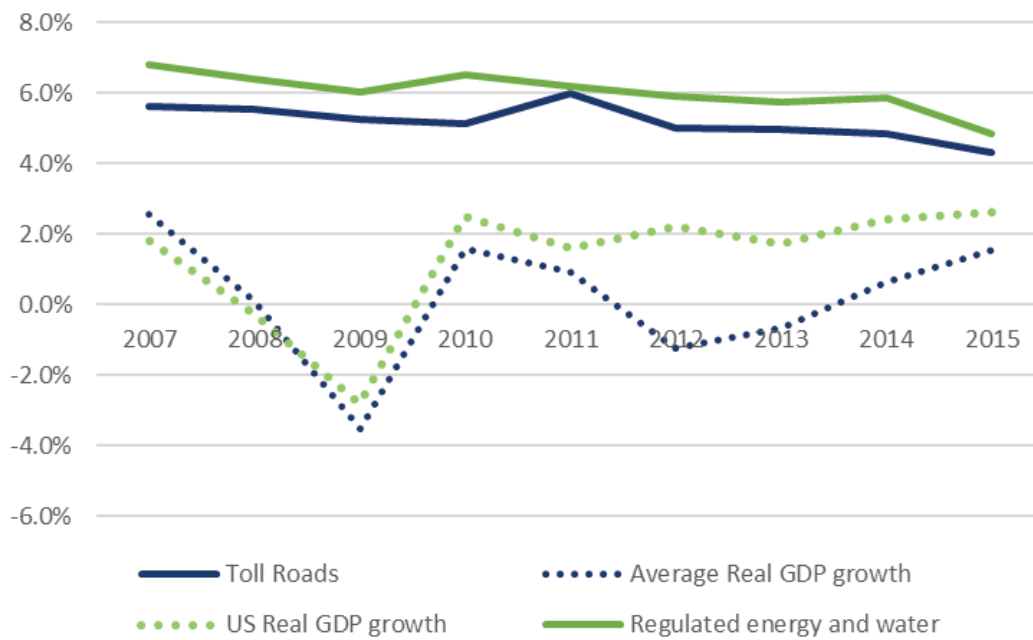
<sup>482</sup> Movements in the economic cycle were represented by the real GDP growth rate of the relevant countries.

<sup>483</sup> Incenta Economics 2017: 45.

<sup>484</sup> Incenta calculated a weighted average of real GDP based on the real GDPs of the countries that the component businesses operate within.

<sup>485</sup> Incenta Economics 2017: 45–46. ROA vs GDP growth for regulated energy / water, and toll roads, 2007–2015.

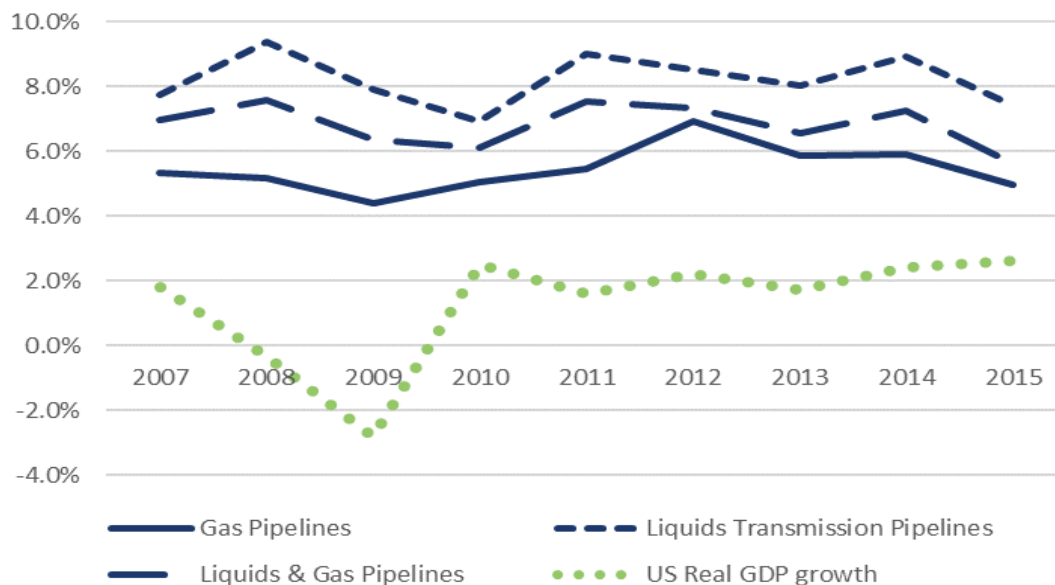
**Figure 3 ROA vs GDP growth for regulated energy / water, and toll roads, 2007–2015**



Source: Incenta Economics 2017.

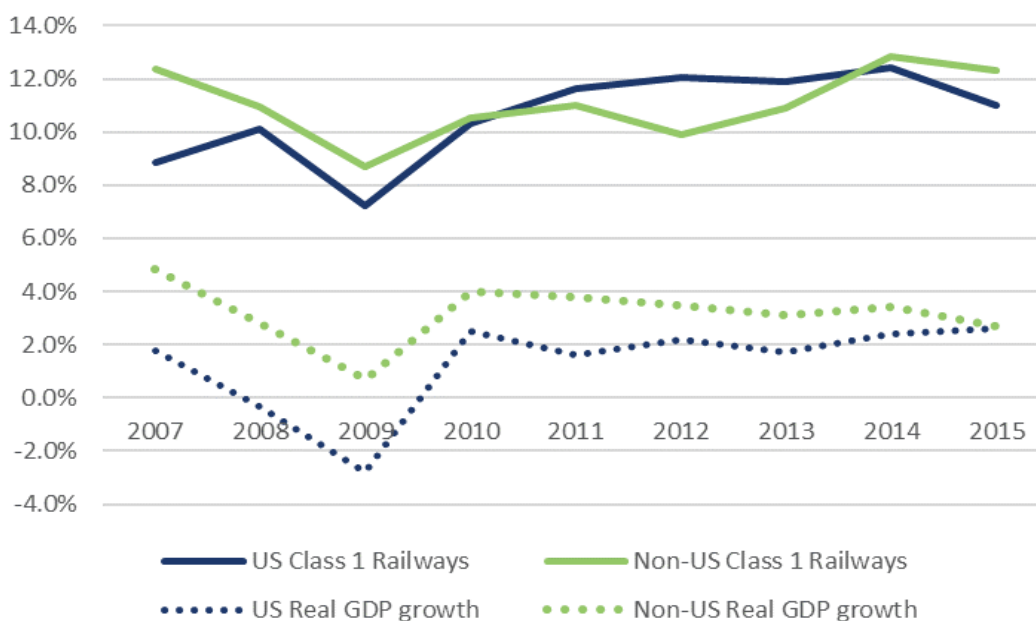
The time series presented by Incenta showed that the cash flows of the North American pipeline businesses appear to be more systematically volatile than those of Aurizon Network. The ROAs of freight rail transportation businesses showed even more pronounced fluctuations than what was observed for North American pipelines businesses. In particular, there was a very pronounced fall in ROA for freight rail transportation businesses during the GFC.<sup>486</sup>

**Figure 4 ROA for North American gas and liquids pipelines, 2007–2015**



Source: Incenta Economics 2017.

<sup>486</sup> Incenta Economics 2017: 47–48.

**Figure 5 ROA for US Class 1 railroads and Non-US Class 1 railroads, 2007–2015**

Source: Incenta Economics 2017.

The ROA time series presented by Incenta shows no evidence of Aurizon Network being systematically correlated to the economic cycle. The QCA considers that this empirical evidence supports the findings of the first principles analysis, that regulated energy and water businesses are appropriate comparators for Aurizon Network.

By contrast, the empirical evidence suggests that both North American pipelines and rail freight transportation businesses display more pro-cyclical earnings, indicating that the cash flows of North American pipeline businesses and freight rail transportation businesses appear to be more systematically volatile than those of Aurizon Network.

The QCA notes that Aurizon Network and its consultants have not presented any empirical evidence to the contrary.

Following consideration of the first principles analysis and supporting empirical evidence, the QCA considers that:

- North American pipeline businesses and freight rail transportation businesses are not appropriate comparators for Aurizon Network
- the regulated energy and water businesses sample is the most appropriate set of comparators for Aurizon Network.

## Other regulatory decisions

### Economic Regulation Authority—Western Australian railway businesses

Aurizon Network noted that the ERA, in its final determination on the WACC methodology to apply to regulated railways in Western Australia<sup>487</sup>, used international rail networks as comparators for the Western Australian railway businesses. In relation to Brookfield Rail, Aurizon Network noted that the ERA:

- considered that Aurizon is potentially the best comparator company to the Brookfield Rail network

<sup>487</sup> ERA 2015.

- considered that non-rail operators are a less valid proxy for Brookfield Rail compared to rail operators
- considered that international railroads are useful in informing the beta estimate, although Brookfield Rail will be of lower risk than American and Canadian railway operators who are exposed to higher degrees of competition from alternative forms of transport
- assigned an asset beta of 0.7, which is at the lower end of the asset beta range for the ERA's sample of overseas railroads.<sup>488</sup>

In response to Aurizon Network, Incenta did not consider its approach, of rejecting Class 1 railways as comparators for Aurizon Network, to be unique or unsubstantiated. Incenta noted that the ERA adopted a much higher asset beta for its freight rail business (Brookfield Rail) than for its urban passenger business (Public Transport Authority). Incenta noted that the ERA did not reference other rail businesses that carry freight, but rather toll roads, when estimating the asset beta for the Public Transport Authority.<sup>489</sup> The ERA then exercised its judgment and chose an asset beta below the toll roads operator with the lowest asset beta.

In its consideration of Aurizon Network as a comparator for Brookfield Rail:

- The ERA acknowledged differences in the regulatory frameworks, noting that Brookfield Rail is subject to a negotiate-arbitrate regulatory regime, while Aurizon Network is subject to a revenue cap.
- The ERA also noted differences between Aurizon Network's and Brookfield Rail's customer bases, particularly Brookfield Rail's reliance on the local grain supply each year.<sup>490 491</sup>

These differences between the regulatory framework and customer base suggests that Brookfield Rail would have higher systematic risk than Aurizon Network.

In any case, the ERA (and its consultant, The Allen Consulting Group) considered Brookfield Rail to be less risky than overseas rail freight systems, due to Brookfield Rail's market power<sup>492</sup> and customer base:

... the Authority's a-priori expectation is that overseas rail operators will possess a higher level of risk, relative to an Australian railway operator, as American and Canadian railway operators, for example, are expected to face higher degrees of competition from alternative forms of transportation, such as roads.<sup>493</sup>

Beta values [from freight rail systems] in these ranges may, however, overstate beta values for the freight rail system in Western Australia for reasons that the comparator businesses considered for this study would have a greater proportion of revenues derived from intermodal (container) traffic, which would generally be expected to have higher levels of non-diversifiable risk (and higher beta values) than the freight rail system in Western Australia, which has a greater proportion of revenues from bulk transport of grain and mineral products.<sup>494</sup>

The QCA considers that our decision to not adopt freight rail transportation businesses as a comparator for Aurizon Network is not inconsistent with the ERA's final determination, given that:

- the ERA considers Brookfield Rail to be less risky than international rail systems

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<sup>488</sup> Aurizon Network, sub. 1: 295.

<sup>489</sup> Incenta Economics 2017: 9, 65.

<sup>490</sup> ERA 2015: 28, 164.

<sup>491</sup> Grain rail transportation faces significant competition from road transport—with grain operators seeking the most cost-effective method of transporting grain to ports following deregulation of grain export marketing arrangements.

<sup>492</sup> Similar to Aurizon Network, Brookfield Rail is a monopoly service provider.

<sup>493</sup> ERA 2015: 29.

<sup>494</sup> The Allen Consulting Group 2007: 31.



- differences between the regulatory framework and customer base suggests that Brookfield Rail would have higher systematic risk to that of Aurizon Network.

For these reasons, the QCA does not consider that the use of railway comparators by the ERA provides a basis to adopt freight rail transportation businesses as comparators for the estimation of Aurizon Network's beta.

#### Australian Competition and Consumer Commission—Hunter Valley Coal Network

Referring to submissions made by stakeholders as part of the Australian Competition and Consumer Commission's (ACCC's) assessment of Australian Rail Track Corporation's (ARTC's) Hunter Valley access undertakings, Aurizon Network submitted that coal producers have been opportunistic with their submissions:

The coal producers have been opportunistic with their comments between regulated rail entities. The majority of members of the QRC are also users of the HVCN and are members of the Hunter Rail Access Task Force (HRATF). On 6 February 2017, the HRATF responded to the Australian Rail Track Corporation 2017 Draft Access Undertaking for HVCN and has considered a WACC of 6.29% (using June 2016 averaging period) as appropriate while the QRC, made up of similar members, has recommended a WACC that is some 1.20% lower.<sup>495</sup>

In particular, Aurizon Network considered that the lower WACC proposed by the QRC for Aurizon Network's UT5 Undertaking is difficult to reconcile with the Hunter Rail Access Task Force's (HRATF) proposed WACC for ARTC.<sup>496</sup>

The QCA has undertaken a comprehensive first principles assessment, supported by theoretical and empirical evidence, to ensure that Aurizon Network's beta estimate reflects its systematic risk—rather than simply undertaking a benchmarking exercise that references other regulatory decisions. The QCA is committed to undertaking a thorough approach to its investigations.

As outlined in Chapter 5, the QCA has not been able to reconcile the systematic risk proposed in the ACCC's draft decision.

#### Methodology used to estimate Aurizon Network's asset beta

Aurizon Network's proposed asset beta estimate is based on statistical analysis undertaken by The Brattle Group. For the identified comparators, The Brattle Group recommended estimating each company's equity beta using data from Bloomberg and applying a methodology with the following features:

- an ordinary least squares regression of the company's historical total stock returns on the historical total returns of the corresponding local market index
- a five-year estimation period
- a weekly sampling interval for returns.<sup>497</sup>

Having estimated the companies' observable equity betas, The Brattle Group applied the Conine formula to de-lever each company's Bloomberg raw equity beta estimate. The Brattle Group used the following parameters to de-lever each company's equity beta estimate:

- a debt beta of 0.12 for all companies

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<sup>495</sup> Aurizon Network, sub. 26: 23.

<sup>496</sup> Aurizon Network, sub. 26: 23.

<sup>497</sup> Aurizon Network, sub. 1: 274; sub. 4: 47.

- the average capital structure proportions for the past three of five years using Q2 balance sheet data from Bloomberg and verified by S&P Capital IQ
- the representative statutory tax rate combined with any state or provincial tax rates for each company's country of incorporation.<sup>498</sup>

In addition to estimating individual equity betas for the firms in each of its comparator samples, The Brattle Group also constructed 'portfolios' of firms by industry and estimated equity betas for these portfolios—'portfolio betas'.<sup>499 500</sup>

Incenta adopted a similar statistical methodology to The Brattle Group for estimating beta. However, for its proposed comparators, Incenta used the average Bloomberg-calculated effective tax rate over the previous 15-year period for de-gearing purposes.<sup>501</sup> Incenta also reviewed whether the proposed five-year estimation period and weekly sampling interval for returns were appropriate for estimating Aurizon Network's beta. The Brattle Group's and Incenta's views on these methodological design issues are discussed below.

#### Weekly sampling interval for returns

In deciding the frequency with which returns are sampled for beta estimation, The Brattle Group submitted that key considerations are accuracy and statistical precision. In deciding the frequency with which to sample returns, The Brattle Group noted:

- Shorter return sampling frequencies create the potential for a downward bias in the betas if the sample of stocks are infrequently traded—as their returns may not vary much at weekly resolution. However, The Brattle Group considered that low weekly trading volume is unlikely to be a concern for the majority of the companies in its samples.
- Use of weekly data provides more confidence in the precision of the estimate in comparison to monthly data, due to more observations over a given estimation window.
- The weekly beta estimates uniformly reflect a better fit to the returns data than the monthly estimates.
- The weekly regression exhibits residuals that are closer to being normally distributed.

The Brattle Group therefore relied on weekly beta estimates to inform its conclusions regarding the systematic business risk of the comparator companies in its industry samples.<sup>502</sup>

In the past, the QCA has relied on monthly intervals to estimate beta. However, Incenta noted that reliance on both weekly and monthly data has increased among regulators, although recent empirical evidence has questioned whether higher frequency return estimates provide the most accurate estimates of systematic risk. For instance, Gilbert et al.<sup>503</sup> reported that, at higher frequencies (days or weeks), the betas of opaque firms will not fully incorporate news, but at lower frequencies (monthly or quarterly), all systematic information will be impounded into the returns of all firms.

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<sup>498</sup> Aurizon Network, sub. 4: 47, 56.

<sup>499</sup> Based on the mean and median asset betas for each industry subsample. The Brattle Group considered that the portfolio betas complement the sample averages and medians, which treat each company's beta as an (equally weighted) independent observation of industry-specific systematic business risk.

<sup>500</sup> Aurizon Network, sub. 4: 48.

<sup>501</sup> Incenta Economics 2017: 73.

<sup>502</sup> Aurizon Network, sub. 4: 49, 52–54.

<sup>503</sup> Gilbert et al. 2014.

Incenta considered that some caution should be exercised when adopting a weekly sampling interval, noting that:

- there may be estimation issues associated with the use of the weekly return interval; and
- the asset beta estimates for regulated energy and water businesses are sensitive to whether weekly or monthly data are applied.

As such, Incenta placed reliance on both weekly and monthly estimates in reaching a preferred estimate of beta.<sup>504</sup>

Given the possibility of estimation issues associated with the use of the weekly return interval, the QCA accepts that consideration of both monthly and weekly estimates of beta may be appropriate for informing an asset beta range for Aurizon Network. The QCA therefore adopts Incenta's approach of taking account of both monthly and weekly estimates of beta.

#### Five-year estimation period

The Brattle Group considered that statistical precision can be improved with the use of more data points. The Brattle Group noted that a longer estimation period incorporates more observations into the estimate. At the same time, The Brattle Group noted that a longer estimation window may incorporate more information that is non-current and might therefore yield a beta estimate that is not predictive of forward-looking systematic risk. Alternatively, if too short an estimation window is used, the estimate may be too sensitive to temporary capital market conditions, which again might yield a beta estimate that is not predictive of forward-looking systematic risk. Thus, The Brattle Group noted the inherent trade-off between adopting an estimation period that is either too short or too long.<sup>505</sup>

The Brattle Group considered that a five-year estimation window strikes the right balance for estimation, noting:

- a five-year window allows real and permanent changes in systematic risk to influence the beta estimates without overreacting to temporary shifts in capital markets
- a five-year window does not rely on data from the height of the GFC
- a shorter three-year estimation window is too volatile.<sup>506</sup>

The QRC noted that asset beta estimates for the relevant sample are materially lower over the more recent five-year period, compared to its estimates for the 10-year period. The QRC considered that this suggests that the degree of risk faced by these regulated businesses has been trending downwards, and that a 10-year estimate is likely to overstate the current asset beta.<sup>507</sup>

Alternatively, Incenta considered that a 10-year period is likely to provide a better estimate of the forward-looking asset beta, as it is likely to be more reliable given that shorter estimation periods are more likely to be influenced by aberrations. Incenta considered that adopting a five-year estimation period would be likely to introduce unnecessary volatility into the regulatory assessment process.<sup>508</sup>

However, noting that regulatory practice elsewhere has had regard to both 5 and 10 years of data, Incenta also estimated annual, five-year asset betas to gain a sense of how variable estimates have been over the past decade. Incenta noted that the asset beta estimates for:

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<sup>504</sup> Incenta Economics 2017: 76.

<sup>505</sup> Aurizon Network, sub. 4: 54.

<sup>506</sup> Aurizon Network, sub. 4: 56.

<sup>507</sup> QRC, sub. 53: 18.

<sup>508</sup> Incenta Economics 2017: 76.

- regulated energy and water businesses using five years of monthly data is below the 10-year estimate
- North American pipeline businesses has recently spiked, which appears to be linked to the fracking revolution and its influence on the price of oil and gas.<sup>509</sup>

The significant difference between the beta estimates for the two previous five-year periods, especially for liquids pipelines, reinforced Incenta's preference for 10-year beta estimates. Incenta considered that data over a period of 10 years is less affected by short-term variations in beta. For this reason, Incenta recommended relying on these estimates.<sup>510</sup>

Given the significant difference between the beta estimates obtained for the sample over the two 5-year periods, the QCA has a preference for estimating beta using a 10-year estimation period. The QCA considers that this will provide a better estimate of the forward-looking asset beta. However, noting that a shorter estimation period mitigates the risk of incorporating non-current information, the QCA recognises there may be value in also considering the five-year estimation period.

While our preference is to adopt a 10-year period to estimate Aurizon Network's beta, 5-year beta estimates were also examined and taken into account in establishing a beta range for Aurizon Network.

### Reliability of the Sharpe-Lintner (SL) CAPM

Aurizon Network and Frontier submitted that the QCA's WACC estimate makes no attempt to correct for the well-accepted 'low beta bias' phenomenon<sup>511</sup>—that is, that the CAPM underestimates the return on equity for firms with equity betas less than one.

Aurizon Network considered that there is extensive evidence that the SL CAPM produces estimates of the return of equity that are systematically lower than actual returns for stocks with a beta less than one and higher than the actual returns for stocks with betas above one. This view was also supported by accompanying submissions from both Frontier and The Brattle Group. Pointing to empirical evidence provided by Black, Jensen and Scholes<sup>512</sup>; Friend and Blume<sup>513</sup>; Fama and MacBeth<sup>514</sup>; Fama and French<sup>515</sup>; Brealey, Myers and Allen<sup>516</sup>; and Da, Guo and Jagannathan<sup>517</sup>, Frontier considered that, in the observable data, the actual relationship between beta and stock returns has a flatter slope than the SL-CAPM predicts, with the SL-CAPM systematically underestimating the required return on low-beta stocks.<sup>518</sup>

Additionally, Frontier stated this bias has been consistently reported over several decades and is discussed in standard finance textbooks.<sup>519</sup> Furthermore, Aurizon Network and Frontier noted that other Australian regulators, including the AER, and the Australian Competition Tribunal, have recognised this bias.<sup>520</sup>

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<sup>509</sup> Incenta Economics 2017: 73–7.

<sup>510</sup> Incenta Economics 2017: 73.

<sup>511</sup> Aurizon Network, sub. 40: 126; sub. 44: 2.

<sup>512</sup> Black, Jensen and Scholes 1972.

<sup>513</sup> Friend and Blume 1970.

<sup>514</sup> Fama and MacBeth 1973.

<sup>515</sup> Fama and French 2004.

<sup>516</sup> Brealey, Myers and Allen 2011.

<sup>517</sup> Da, Guo and Jagannathan 2012.

<sup>518</sup> Aurizon Network, sub. 1: 295; sub. 6: 8–10; sub. 44: 13-16, 21-28.

<sup>519</sup> See Brealey, Myers and Allen 2011 and Berk and DeMarzo 2014.

<sup>520</sup> Aurizon Network, sub. 40: 126–127; sub. 44:3, 13–16, 21–28.

Frontier considered that the QCA's estimation technique results in returns over a very long period of time falling short of realised returns. Aurizon Network suggested that the CAPM is not a reliable model for predicting returns.<sup>521</sup>

Aurizon Network and Frontier suggested that these results are likely due to the SL CAPM failing to consider other factors, such as book-to-market ratio, that are priced into returns. Frontier stated that the ratio of the book value of equity to the market value of equity has been consistently shown to have a positive relationship with realised returns. From the evidence presented, Frontier concluded that either: the CAPM is a model that is incomplete; and/or the estimation technique leads to poor risk measurement.<sup>522</sup>

Frontier considered that, if the equity return continues to be set on the basis of the limited information, the QCA will have left out material, relevant information in estimating Aurizon Network's allowed return.<sup>523</sup>

The Brattle Group submitted that empirical CAPM estimates should inform the allowed rate of return when the regulated entity has a beta less than one, or at least regulators should recognise this downward bias inherent in standard CAPM estimates when setting the allowed return.<sup>524</sup>

Aurizon Network considered that the SL CAPM will underestimate its cost of equity as it has a high book-to-market ratio. Therefore, Aurizon Network said its proposal to continue using the SL CAPM in estimating cost of equity is a conservative approach.<sup>525</sup>

Frontier considered that the 'low-beta bias' can be addressed by selecting a point estimate for beta that is greater than the raw mean estimate of beta derived through empirical application of the SL CAPM to returns data. That is, Frontier considered that a final point estimate of the equity beta must be selected above the raw statistical estimate in order to derive the 'best' estimate of the equity beta.<sup>526</sup>

Castalia considered that there is a strong interest from both service providers and users in having a regulatory framework that is stable and predictable and not one that changes in response to the latest, esoteric, WACC 'fad'. Castalia submitted that, in practice, a regulator would know that any decisions about WACC based on the CAPM would be approximations of the real world.<sup>527</sup>

The QCA has considered Aurizon Network's and Frontier's arguments on these matters. Interpretation of Aurizon Network's and Frontier's proffered empirical evidence requires care. The suggested 'low beta bias' does not necessarily mean that the beta is biased downward, or that the equilibrium expected return from the CAPM is biased downward. Rather, in the current context, the findings indicate that the equilibrium expected return from the CAPM is less than the (subsequent) realised return.

Specifically, the empirical tendency for 'low beta' stocks to outperform (and for 'high beta' stocks to underperform) relative to the CAPM does not necessarily indicate any problem with the CAPM. Rather, one interpretation is that low beta stocks have positive 'alphas', noting that a number of factors can contribute to the performance of a stock.<sup>528</sup> However, whether any of these factors determine equilibrium expected returns is not resolved in the literature. Therefore, the QCA is not of the view that the SL CAPM model is deficient—and that another model is better—at this time.

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<sup>521</sup> Aurizon Network, sub. 6: 8–10; sub. 1: 295.

<sup>522</sup> Aurizon Network, sub. 6: 12, 16.

<sup>523</sup> Aurizon Network, sub. 6: 14.

<sup>524</sup> Aurizon Network, sub. 4: 61.

<sup>525</sup> Aurizon Network, sub. 1: 296.

<sup>526</sup> Aurizon Network, sub. 40: 127; sub. 44: 2–3, 14.

<sup>527</sup> QRC, sub. 21, Annexure 1: 2.

<sup>528</sup> The 'alpha' is the difference between a stock's realised return and its expected return, consistent with the security market line.

As such, the QCA is also not of the view that the cost of equity will be underestimated unless the QCA takes into account additional information, such as the ratio of firm book to market value. Estimates of the cost of equity relating to such factors arise from 'factor models', like the Fama-French model.<sup>529</sup> The model (and related factor models) have not been logically derived from a set of assumptions about markets and investor behaviour (in contrast to the CAPM). The lack of a theoretical basis is problematic, as it has contributed to disagreement over the specification of the model, including the choice of potential explanatory factors. Further, it is unclear whether these proposed factors explain *ex ante* expected returns—the empirical work tends to focus on how well such factor models explain *ex post* realised returns. The QCA also notes that the Australian Energy Regulator (AER) has reached similar conclusions and has given the Fama-French model no role in estimating the return on equity for the regulated firms.<sup>530</sup>

In any case, Aurizon Network's proposal is based on the application of the SL CAPM approach.

The QCA considers Aurizon Network's proposal to apply the CAPM is appropriate to estimate its WACC estimates. The QCA notes that evidence as to the deficiency of the SL CAPM remains inconclusive at this stage.

## Overall return on equity

Aurizon Network expressed the view that its rate of return should be commensurate with the return required by investors, consistent with the risks of the business. Aurizon Network also said that delivering an appropriate rate of return involves not only ensuring that the estimation methods for each of the WACC parameters produce the best estimates, but that it is necessary to consider the 'reasonableness' of the overall outcome having regard to market evidence.<sup>531</sup>

In this context, Aurizon Network submitted a report by Ernst and Young (EY) that provides an empirical analysis of the application of the CAPM by independent experts in estimating the cost of equity, and a comparison of these estimates to the cost of equity estimates from the QCA's regulatory decisions to date.

The EY report particularly focuses on the impact of low bond yields arising from stimulatory programmes since the GFC, and how this phenomenon has been problematic for regulated businesses, as regulators typically use a variable government bond yield for the risk-free rate, but a fixed value for the MRP in estimating the cost of equity. EY said this regulatory practice has resulted in an inappropriate reduction in the allowed cost of equity, and hence required revenues, of regulated businesses.<sup>532</sup>

EY investigated 1,608 independent reports issued from 2008 to 2015. For the comparative analysis, EY selected 201 of these reports because they provided enough information on the calculation of the cost of equity, used the CAPM to derive the cost of equity and used a discounted cash flow (DCF) valuation method to value a company or its underlying assets.<sup>533</sup>

EY acknowledged that the roles of independent experts and regulators are different. EY noted that, while independent experts seek to provide a fair and reasonable valuation of an asset at a point in time, regulators seek to set prices at a point in time for a particular period of time. However, EY said that both seek to

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<sup>529</sup> The Fama-French model is a three-factor model of asset returns, which incorporates the following factors: i) the return on the market; ii) firm size (measured by market capitalisation); and iii) the ratio of book value to market value.

<sup>530</sup> AER 2017d: 203.

<sup>531</sup> Aurizon Network, sub. 1: 245–246.

<sup>532</sup> Aurizon Network, sub. 8: 4.

<sup>533</sup> Aurizon Network, sub. 8: 5, 15.

estimate a cost of equity at a point in time that reflects the requirements of investors. EY's view is that it is not obvious why there should be a discrepancy between the two.<sup>534</sup>

EY compared the market cost of equity in the independent expert reports to the market cost of equity derived from QCA regulatory decisions, assuming a standardised equity beta of 1.0. EY said the independent experts' implied market cost of equity averaged 11.1 per cent over the 2008–2015 period, varying between 10.1 and 12.05 per cent. EY then re-estimated the implied market cost of equity in each of the 201 reports using the QCA's approach to setting the risk-free rate and MRP. EY said its analysis resulted in an average market cost of equity of 9.89 per cent, a difference of about 1.2 percentage points.<sup>535</sup> EY noted that the difference has increased since 2012, ranging from 0.55 per cent in 2008 to 1.87 per cent<sup>536</sup> in 2015, despite an increase in the QCA's MRP estimate from 6 to 6.5 per cent.<sup>537</sup> A summary of EY's findings is reproduced in Table 35.

**Table 35 Summary of EY's calculated (implied) market cost of equity**

<i>Year</i>	<i>Expert implied market cost of equity (%) (A)</i>	<i>QCA implied market cost of equity (%) (B)</i>	<i>Difference (%) (A–B)</i>
2008	12.05	11.49	0.55
2009	11.82	10.76	1.06
2010	11.71	10.97	0.74
2011	11.13	10.27	0.86
2012	10.59	8.83	1.76
2013	10.48	8.99	1.47
2014	10.76	8.93	1.83
2015	10.10	8.24	1.87
2008–2015	11.10	9.89	1.20

For a subset of 24 reports in the infrastructure sector, EY reported that the difference is 1.27 percentage points.<sup>538</sup> EY said the difference would be even higher if imputation credits are incorporated into the analysis. In isolating the sources of the differences, EY noted that the difference:

- was largely driven by the MRP in 2008–2009 (due to the effects of the GFC) and in 2012 (which was likely attributable to a decline in global equity markets)
- since 2010, has become more influenced by the different assumptions used for the risk-free rate, commencing when the QCA began matching the term of the risk-free rate to the term of the regulatory period.<sup>539</sup>

<sup>534</sup> Aurizon Network, sub. 8: 8.

<sup>535</sup> Aurizon Network, sub. 8: 19. The QCA notes that EY identified an average implied QCA market cost of equity of 9.99% on page 2 of its report.

<sup>536</sup> Aurizon Network, sub. 8: 19. It is not clear how these averages are derived. For example, the QCA's analysis of the data provided in Appendix A for 2015 shows an average of 1.56%.

<sup>537</sup> Aurizon Network, sub. 8: 19.

<sup>538</sup> Aurizon Network, sub. 8: 28.

<sup>539</sup> Aurizon Network, sub. 8: 20.

EY noted that, of the 24 independent expert reports in 2015, the independent experts made adjustments in 23 instances to reflect the perceived unsustainability of low bond rates.<sup>540</sup> Experts had the view that the low bond rates were unsustainable and should theoretically result in an uplift in the MRP. EY said this uplift could not be quantified so most experts made direct adjustments to the risk-free rate or added an uplift to the overall WACC. Some added an 'alpha' factor to beta to account for risk factors not captured by beta. Some experts also used long-term averages of the government bond yield as opposed to short-term spot values.<sup>541</sup> However, EY indicated that it excluded these various forms of direct adjustments made to the risk-free rate or the overall WACC when making the comparisons to QCA regulatory decisions.<sup>542</sup>

On the basis of this comparison to market practice, EY concluded that the QCA's application of the CAPM will result in estimates of the market cost of equity that are below those of independent experts, and in many cases materially so. EY concluded that regulated businesses are being denied the opportunity to recover a reasonable allowance for their return on capital and that this would have a detrimental effect on investment.<sup>543</sup>

Aurizon Network considered that the conclusions by EY are further supported by PWC's analysis that showed a relatively stable total market return and the negative relationship between the equity risk premium and the risk-free rate in the United Kingdom.<sup>544</sup>

Aurizon Network also engaged Frontier to evaluate the relationship between the risk-free rate, implied Dividend Discount Model and total market return for Australian listed equities from the AER's dataset. Frontier's analysis demonstrated a stronger inverse relationship between the risk-free rate and the equity market risk premium. Aurizon Network submitted that this suggests that:

- The marginal adjustments made to the equity market risk premium since UT3 do not correspond to the market expectations for total market returns with changes in the nominal risk-free rate over time.
- The statistical relationship between the risk-free rate and the equity market risk premium also indicates that the use of an equity market risk premium of 7.0 per cent with a risk-free rate of 1.90 per cent is not representative of market expectations.<sup>545</sup>

Aurizon Network also submitted a summary report by Deloitte on the findings of a survey of five leading global investment banks involved in large infrastructure transactions over the last two years. The survey focused on the post-tax equity returns required by investors, the relationship between post-tax equity returns and the risk-free rate, and Aurizon Network's risk profile from an investor's perspective.<sup>546</sup>

Deloitte's findings<sup>547</sup> are that:

- High quality regulated assets and infrastructure assets supported by firm, long-term contracts have attracted post-tax equity returns of 7.0 per cent to 9.5 per cent. High quality transport assets have attracted post-tax equity returns between 8.0 and 11.0 per cent.<sup>548</sup>

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<sup>540</sup> Aurizon Network, sub. 8: 20–25. The QCA notes that Appendix A in the EY report listing the 24 independent reports appears to show that adjustments were made in only six instances.

<sup>541</sup> Aurizon Network, sub. 8: 21.

<sup>542</sup> Aurizon Network, sub. 8, Appendix A: 32–36.

<sup>543</sup> Aurizon Network, sub. 8: 31.

<sup>544</sup> Aurizon Network, sub. 40: 34.

<sup>545</sup> Aurizon Network, sub. 40: 34–35.

<sup>546</sup> Aurizon Network, sub. 39: 5.

<sup>547</sup> Deloitte's survey responses were kept confidential and anonymised pursuant to section 239 of the QCA Act (Aurizon Network, sub. 39: 5).

<sup>548</sup> Aurizon Network, sub. 39: 6–7.



- Aurizon Network would be considered higher risk than utilities due to the lack of predictability in its regulatory regime, commodity exposure (and associated asset stranding risk), the environmental impact of coal and the development of renewable energy. Deloitte said that the post-tax equity return required by investors for Aurizon Network would likely sit at the high end of the range for regulated assets or at the lower end of the range for high quality transport assets.<sup>549</sup>
- Equity returns have fallen by a smaller proportion relative to the decline in the yield on Commonwealth Government bonds. Over three years, the Government bond rate has fallen by 81 basis points while post-tax equity returns have fallen by 50 to 75 basis points.<sup>550</sup>

Deloitte's findings suggest that the post-tax return on equity for Aurizon Network should lie between 8.0 per cent and 9.5 per cent. Deloitte concluded that the unique risks faced by Aurizon Network over the long term would place upward pressure on the post-tax equity return required by infrastructure investors.<sup>551</sup>

Aurizon Network submitted that a reasonableness test of the overall return would involve consideration of whether return outcomes from are calibrated against the returns of the relevant comparator businesses. Aurizon Network considered that this would require the rate of return to compare favourably to those regulated essential services for which Aurizon Network has been compared. Aurizon Network said that the QCA's WACC methodology does not accord with the survey evidence prepared by Deloitte.<sup>552</sup>

TCI Fund Management endorsed Deloitte's view that the unique risks faced by Aurizon Network over the long term would place upward pressure on the post-tax equity return required by infrastructure investors. TCI Fund Management stated that this aligns with the commercial views of equity and debt markets. TCI Fund Management submitted that the academic process that has led to a seven per cent equity return is deeply flawed from a market and commercial point of view and will discourage investment by Aurizon Network in the CQCN.<sup>553</sup>

TCI Fund Management submitted that given the inherent long-term risks of a coal related network, the equity return should be at least 8-9 per cent—equity investors cannot support investment where returns are not commercial. TCI Fund Management considered that the evidence from the "real world" is that coal-related networks are harder to finance, carry more risk (which is supported by investment banks and credit rating agency actions and views) and should necessarily be expected to have a higher cost of capital than "high quality regulated assets and infrastructure assets supported by firm, long-term contracts".<sup>554</sup>

IML Investors considered that the QCA's WACC methodology is lower than that required by any real world reasonable investor, and unless revised to will ultimately have the effect of reducing the capital available for companies involved in infrastructure in future.<sup>555</sup>

In contrast, the QRC submitted that the Deloitte report offers highly questionable survey evidence obtained from unnamed investment bankers who offer their view of what return 'investors' expect. No detail on the study has been provided for testing or verification—and some of the claims made to justify the findings are themselves clearly wrong.<sup>556</sup>

Aurizon Network also considered that the return on equity provided by the QCA's methodology is not consistent with market return expectations:

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<sup>549</sup> Aurizon Network, sub. 39: 6–7, 9.

<sup>550</sup> Aurizon Network, sub. 39: 8.

<sup>551</sup> Aurizon Network, sub. 39: 7, 9.

<sup>552</sup> Aurizon Network, sub. 40: 31.

<sup>553</sup> TCI Fund Management, sub. 58: 2–3.

<sup>554</sup> TCI Fund Management, sub. 58: 1–3.

<sup>555</sup> IML Investors, sub. 62: 1.

<sup>556</sup> QRC, sub. 53: 11.

- as evident in the movement of Aurizon’s share price following the release of the draft decision
- it was not considered advantageous by a range of equity analysts — citing observations by equity analysts in the week following the release of the draft decision
- it was not commensurate with the return expectations reflected in market surveys and independent expert reports.<sup>557</sup>

Aurizon Network considered that the impact of the draft decision on the market value of Aurizon Network was evident from the movements in Aurizon Holdings’ share price. Aurizon Network believed that the material reduction (of 5.9 per cent) in AZJ’s share price—from close of business on 15 December 2017 to market close on 18 December 2017—was largely attributable to the draft decision’s misalignment with market and investor expectations. Aurizon Network considered that the draft decision was the sole determinant of any share impact (outside of general market movements), noting the timing of the draft decision, as well as no material information releases relevant to the non-network parts of Aurizon Holdings or macro-economic data. Aurizon Network noted the release of the UT4 Final Decision in October 2016 did not result in such an outcome.<sup>558</sup>

Additionally, Aurizon Network considered that the share price response to the draft decision is reflected in the observations by equity analysts in the week following its release, as demonstrated in the following statement by RBC Capital Markets:

We support management’s view that the draft UT5 decision on WACC is particularly harsh given other WACC determinations for either similar assets (Hunter Valley coal network) and lower risk utility assets in Australia. The QCA determination on WACC in many respects represented them ‘cranking the handle’ of a historical methodology but adjusted for a low (4 year) risk free rate, a lower equity beta of 0.73, lower debt costs somewhat offset by a higher MRP. Nonetheless, the output is to deliver a post tax nominal WACC of just 5.4% which we consider far too low for this type of asset.<sup>559</sup>

In contrast, the QRC did not consider it appropriate for the QCA to focus myopically on meeting the expectations of a single set of market participants, submitting that the QCA:

- is required to consider and assess the regulatory and commercial risks faced by Aurizon Network based on the evidence before it
- should not treat as determinative, or give primacy to, the views of existing shareholders or credit rating agencies
- should seek to balance all of the factors to which it is required to have regard to under the QCA Act.<sup>560</sup>

The QRC submitted that it is not the case that all shareholders are investors in Aurizon Network, nor can their expectations be accurately determined. Additionally, the QRC considered that the changes and ‘adjustments’ proposed by Aurizon Network to respond to the expectations of shareholders and credit agencies are significant, unorthodox and unsound. The QRC supported undertaking a first principles assessment of the risks faced and the return that is commensurate with those risks.<sup>561</sup>

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<sup>557</sup> Aurizon Network, sub. 40: 33.

<sup>558</sup> Aurizon Network, sub. 40: 16–17, 33, 92. Aurizon Network submitted that the Australian Securities Exchange 200 rose during this trading period

<sup>559</sup> RBC Capital Markets 2017.

<sup>560</sup> QRC, sub. 53: 5–6, 11.

<sup>561</sup> QRC, sub. 53: 6, 11.

## QCA analysis

The EY analysis focuses on the risk-free rate and MRP components of the cost of equity, standardising for beta, while Deloitte's survey focused on nominal returns on equity (reported in a survey). On the basis of these reports, Aurizon Network's main point is that the QCA has diverged from independent experts' views on how to treat the recent, historically low risk-free rates, resulting in a materially lower allowed cost of equity for regulated entities.

EY's principal focus is on the difference between independent experts' market cost of equity and the QCA's market cost of equity and that this difference has increased in recent years. The implication is that, relative to independent experts, the QCA's treatment of the risk-free rate and MRP does not respond to changing market conditions. A key piece of evidence presented in support of this view is an annual summary of experts' and the QCA's (average) market cost of equity from 2008 to 2015.

The QCA has examined the EY report. While the QCA does not have access to the underlying experts' reports, and therefore were not able to analyse how EY determined the difference in each case, the QCA has assessed the summary information presented, in particular EY's Appendix A. This appendix lists all of the reports analysed by EY for each year in 2008–2015 and gives EY's calculated difference in the market cost of equity for each one. Taking EY's reported differences in implied market costs of equity as 'correct', the QCA is unable to reproduce the summary results in EY's Table 1 (presented above).<sup>562</sup> A comparison of EY's reported differences and our calculated differences (based on EY's Appendix A data) are in Table 36 below.

**Table 36 Comparison of EY and QCA implied market cost of equity differences**

<i>Year</i>	<i>Expert implied market cost of equity (%) (A)</i>	<i>QCA implied market cost of equity (%) (B)</i>	<i>EY difference (%) (A–B)</i>	<i>QCA calculated difference using EY data (%)</i>
2008	12.05	11.49	0.55	0.50
2009	11.82	10.76	1.06	1.08
2010	11.71	10.97	0.74	0.70
2011	11.13	10.27	0.86	0.83
2012	10.59	8.83	<b>1.76</b>	<b>1.28</b>
2013	10.48	8.99	1.47	1.37
2014	10.76	8.93	<b>1.83</b>	<b>1.40</b>
2015	10.10	8.24	<b>1.87</b>	<b>1.56</b>
2008–2015	11.10	9.89	1.20 <sup>563</sup>	1.04

The differences reported by EY (A–B in the table above) average 1.2 per cent over the 2008–2015 period. However, Appendix A of the EY report provides estimates of the differences for each independent expert that, based on the QCA's analysis, average 1.04 per cent over the same period. It is possible that the latter lower estimate may be explained by direct adjustments or uplifts to the risk-free rate made by the independent experts but which EY removed for the purposes of comparison with the implied QCA cost of

<sup>562</sup> In other words, without debating the merits of the calculations and simply taking the EY Appendix A data, the QCA calculated different average annual differences.

<sup>563</sup> EY's analysis quotes an average 1.2% (p 3) while EY's Appendix A presents an average of 1.12% over all the independent expert reports. The reasons for this discrepancy are not clear.

equity in the appendix. However, the reasons for discrepancies for some of the independent reports are not made transparent in Appendix A or explained in the text.

Without further information, the QCA is concerned that the differences could be the result of transcription or calculation errors. In any case, as the QCA has sourced the data directly from EY's Appendix A, the QCA would expect to be able to reproduce EY's summary information (since the latter is based on Appendix A data). As the QCA cannot reproduce it, and all of the discrepancies are systematically biased in one direction, the QCA has some concerns with the reliability of this report.<sup>564</sup>

Notwithstanding this matter, the QCA's view is that independent experts (surveyed by EY) and global investment banks (surveyed by Deloitte) derive a cost of equity for a fundamentally different purpose than does the QCA—EY agrees with this view.<sup>565</sup> In particular, independent experts and banking analysts use it as an input to derive a discount rate for valuing assets, typically in takeover situations or for major transactions. The QCA notes that 116 of the 201 expert reports (58 per cent) relate to takeovers.<sup>566</sup>

In contrast, the QCA applies the WACC to a specific RAB value to determine efficient revenues and prices for a defined regulatory period (typically five years). The RAB is not revalued each regulatory period but is rolled forward over successive regulatory periods, accounting for inflation, new capital expenditure and disposals, and depreciation. The RAB is generally not subject to short-term market forces and remains relatively stable over time.<sup>567</sup>

Aurizon Network considered that the QCA's position is difficult to reconcile with the process in which all parameters relevant to the return on equity are estimated, including the measurement of asset beta which is a function of price movement. Aurizon Network considered that it is incongruent that the determination of the return on equity can be independent on how market expectations are formed. Aurizon Network submitted that the QCA has rejected the evidence presented by EY based on the presumption that the market expectations are not relevant to the determination of the required return on equity for investors in Aurizon Network.<sup>568</sup>

The QCA has not rejected the EY evidence on the basis that market expectations are not relevant to determining the required return on equity. On the contrary, the QCA considers that market expectations are a relevant consideration. However, the QCA is of the view that independent experts often derive a cost of equity for a fundamentally different purpose than does the QCA. Experts frequently estimate a cost of equity as part of a discount rate for valuing assets in takeover situations or for major transactions (and this is the case with the majority of the EY cases). In contrast, the QCA estimates the cost of equity for regulatory purposes. The two situations involve different sets of market expectations on how that cost of equity and discount rate are formed. The QCA reiterates that EY agrees with this view.

Given the different purposes, it is noted that there is greater variation in independent experts' estimates for the cost of equity. For example, using EY's data for 2015, the independent experts' cost of equity ranged from 8.48 to 12.27 per cent. By comparison, the QCA's 'implied cost of equity' using EY's analysis ranged from 7.83 to 8.71 per cent.<sup>569</sup> Deloitte's survey showed a range from 7.0 to 11.0 per cent.<sup>570</sup> EY noted that, rather than apply a mechanistic approach to determining the cost of equity, independent experts made

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<sup>564</sup> The only year in which the calculated QCA difference is greater than the EY reported difference is 2009 (1.08% vs. 1.06%).

<sup>565</sup> Aurizon Network, sub. 8: 8.

<sup>566</sup> Aurizon Network, sub. 8: 16.

<sup>567</sup> Further, the RAB is subject to optimisation only in specific, exceptional circumstances in order to minimise asset stranding risk.

<sup>568</sup> Aurizon Network, sub. 40: 34.

<sup>569</sup> Aurizon Network, sub. 8: 36.

<sup>570</sup> Aurizon Network, sub. 39: 7.

adjustments either to the return on equity or to the overall WACC. Aurizon Network said these adjustments reflect company or project-specific risk premiums using long-term averages of the risk-free rate, as opposed to short-term spot values.<sup>571</sup>

The generally higher and more variable surveyed costs of equity likely reflect short-term, market-driven valuation risks specific to the relevant companies and their investment projects, some of which may not be relevant to the types of risks faced by Aurizon Network. Where appropriate to do so, relevant, project-specific and company risks are addressed in the regulatory model through various other mechanisms. These include, for example, the RAB roll-forward process noted above, revenue cap adjustments, review events, and cost pass-throughs, among other measures, rather than a premium on the cost of equity. Given the different purposes, and the range of risk allocation and mitigation measures built into the regulatory framework, it is not surprising that there is an observed difference in the derived cost of equity component, and that the regulatory cost of equity is generally lower and more stable.

The QCA does not consider that the EY and Deloitte surveys provide evidence that our forward-looking cost of equity is inappropriate. The concept of adjustments to the risk-free rate or to the overall cost of equity, as practised by independent experts in EY's survey, is not considered appropriate for regulatory purposes. Likewise, the survey-based cost of equity range identified by EY and Deloitte overlooks the various risk allocation and compensation mechanisms built into the regulatory framework. The QCA's current approach to estimating a cost of equity is an integral part of the overall regulatory framework, which is designed to compensate Aurizon Network for the risks that it incurs.

The QCA notes Aurizon Network's submission supporting its view that the QCA's use of an MRP of 7.0 per cent (with a risk-free rate of 1.9 per cent) is not consistent with market expectations. In relation to PwC's analysis, which shows a relatively stable total market return (and negative relationship between the risk-free rate and MRP), the QCA notes this evidence is specific to the UK, not Australia. The QCA has analysed the stability of the return on equity and MRP in Australia over a long period of time. That analysis shows that the MRP is more stable in Australia, although there are statistical limitations of the testing (see section on the MRP, above).

In response to Frontier's analysis that produces a strong negative correlation of the relationship between the risk-free rate and the MRP for Australia, the QCA notes that Frontier's conclusion is based on results from the dividend growth model methodology. As such, this analysis is subject to all of the limitations of that methodology. The QCA considers that it is generally not appropriate to rely on only one method to estimate the MRP. Rather, a range of valid methods are required to ensure as reliable an estimate as possible.

The QCA's decision is that an overall WACC of 5.7 per cent is appropriate to approve for Aurizon Network's UT5 pricing period. In doing so, the QCA has applied judgement to determine an overall WACC such that returns are at least commensurate with the regulatory and commercial risk involved. This decision has been made with consideration given to Aurizon Network's incentives to maintain and operate the CQC in a manner sought by its customers. The QCA considers the overall WACC appropriately balances the interests of Aurizon Network (s. 138(2)(b)), the interests of access seekers and access holders (s. 138(2)(e) and (h)) and has regard to the pricing principles in section 168A of the QCA Act (s. 138(2)(g)). It is also consistent with the achievement of the object of Part 5 of the QCA Act (s. 138(2)(a)).

The QCA notes that an overall WACC estimate of 5.7 per cent would be equivalent to obtaining an overall WACC estimate from a bottom-up estimate of the individual parameters in which the MRP is set at above 7.0 per cent, all else being equal. For a standardised equity beta of 1.0 (as per the EY comparison approach),

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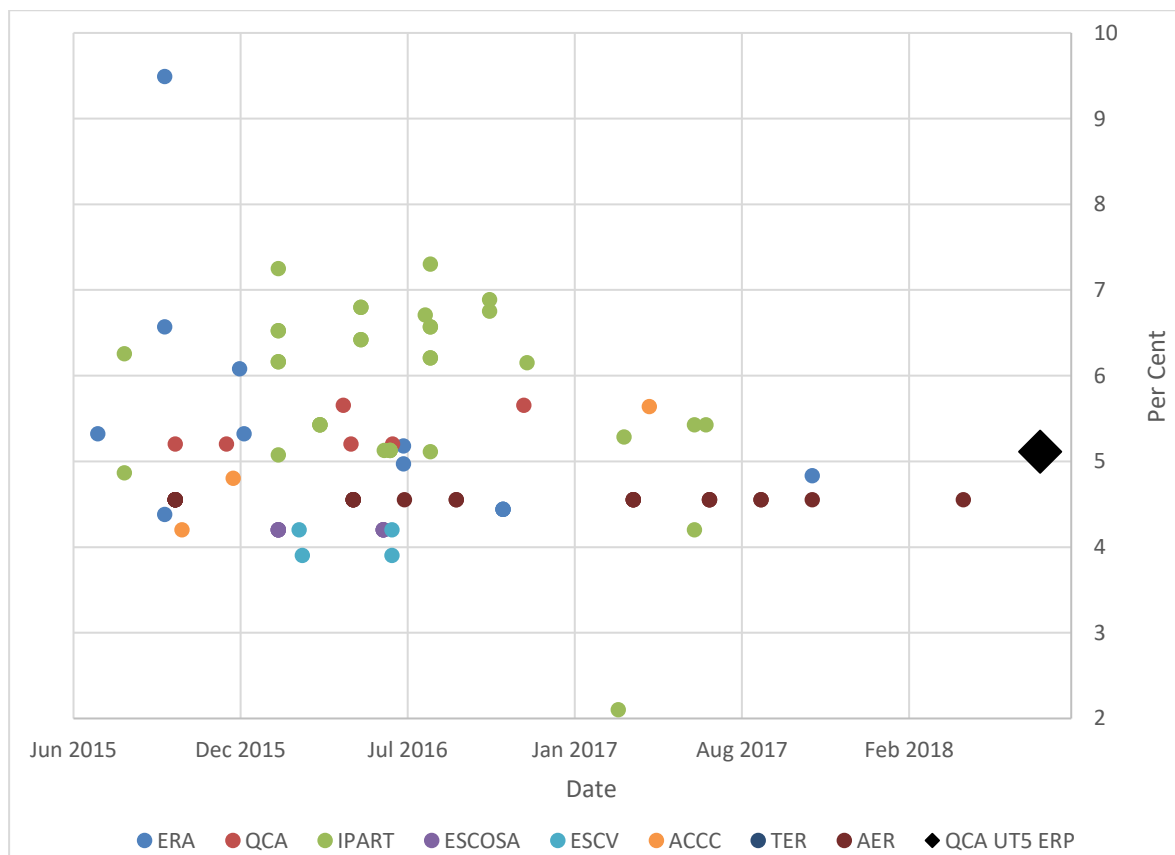
<sup>571</sup> Aurizon Network, sub. 1: 261.

the market cost of equity is therefore above 8.9 per cent, which is higher than EY’s estimated QCA market cost of equity for 2015 (the latest year analysed in the EY report).

Additionally, the QCA’s overall WACC calculation equates to a post-tax nominal return on equity of 7.26 per cent per annum, which is within the range identified in Deloitte’s survey for high quality, regulated infrastructure assets with long-term contracts.

In any case, the QCA notes that an equity risk premium associated with the QCA’s assessed individual WACC parameters—an equity beta of 0.73 and an MRP of 7.0 per cent—is about 509 basis points, which is also within the range of premiums determined by other regulators (Figure 6).

**Figure 6 Equity risk premium estimates from other regulators' decisions**



Source: QCA analysis.

By way of comparison, the AER recently determined an equity risk premium of 455 basis points for TransGrid in May 2018. In addition, and notwithstanding the limitations of experts’ reports, the QCA notes KPMG recently determined an equity premium range of 444–462 basis points for DUET’s energy infrastructure business.<sup>572</sup>

By way of further comparison, the QCA notes that the AER’s return on equity is 6.99 per cent for TransGrid once 'normalised' to account for differences associated with the timing of the AER’s decision.<sup>573</sup> This is lower than the QCA’s return on equity decision by about 27 basis points.

<sup>572</sup> The report was released on 7 March 2017. KPMG’s MRP estimate is 6.0%, and the equity beta range is 0.74–0.77 (KPMG 2017a: 169).

<sup>573</sup> That is, the risk-free rate is re-estimated for Aurizon Network’s proposed averaging period, using the AER’s estimation methodology.

The QCA notes that the AER recently released its draft Rate of Return Guidelines (July 2018), which recommended a WACC methodology that would result in an equity risk premium of 360 basis points. The QCA has not given any weight to the AER's review of its rate of return guideline at this time.

The QCA considers that there are clear limitations in using Aurizon's share price to consider the appropriateness of a regulatory rate of return decision. Movements in share price attributed to the draft decision will reflect the draft decision as a whole. As such, it is difficult to assess to what extent the rate of return may have contributed to share price movements, when considered with other positions taken in relation to Aurizon Network's MAR.

The QCA does not consider that movements in share price are necessarily a reasonable reflection as to whether the QCA's decisions on the MAR are appropriate. Share prices may reflect investor expectations that the entity will be able to achieve a return aligned with its regulatory proposal (in this case the 2017 DAU). This expectation is not necessarily built on whether such a proposal is efficient or appropriate to approve.

Additionally, information disclosed to shareholders as part of a decision, such as the timing of Aurizon Network's averaging period, could affect share price. However, this is not an indication that such an outcome is inappropriate. In any case, the QCA has revisited a number of its positions in this decision, providing for an increase in Aurizon Network's overall MAR in comparison to the draft decision.

In relation to the statement from RBC Capital Markets, its view appears to be formed based on comparisons with other WACC determinations. Comparisons with other regulatory decisions are considered in chapter 5.

The QCA considers that the overall return on equity is consistent with, while not overcompensating Aurizon Network for, the regulatory and commercial risks involved (s. 138(2)(g)), thereby balancing the legitimate business interests of Aurizon Network (s. 138(2)(c)) and the interests of access seekers (s. 138(2)(e)) and access holders (s. 138(2)(h)). The QCA also considers that this decision will provide a return that is enough for Aurizon Network to attract and undertake necessary investment in the network (s. 138(2)(a)).

## Capital structure and credit rating

### Aurizon Network's proposal

For the 2017 DAU, Aurizon Network applied a 55 per cent debt and 45 per cent equity benchmark capital structure and a notional credit rating of BBB+.

### QCA analysis and decision

Aurizon Network noted that a 55 per cent benchmark gearing ratio is consistent with its actual and intended capital management practice and the maintenance of its target BBB+ credit rating. In support of its proposed benchmark credit rating, Aurizon Network noted that it is currently rated BBB+ by Standard & Poor's and Baa1<sup>574</sup> by Moody's. Aurizon Network said, while Moody's placed it on credit watch with a negative outlook in February 2016, Moody's has since confirmed a BBB+ rating, but with a negative outlook.<sup>575</sup>

The QRC supported Aurizon Network's proposal to calculate the WACC based on a target gearing of 55 per cent and a benchmark credit rating of BBB+. The QRC noted that:

- Aurizon has indicated that is consistent with its actual and intended capital management practice

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<sup>574</sup> The Moody's Baa1 rating is equivalent to the Standard & Poor's BBB+ rating.

<sup>575</sup> Aurizon Network, sub. 1: 267.

- the benchmark credit rating is consistent with recent regulatory decisions and Aurizon Network's current and historical, actual credit rating.<sup>576</sup>

In response, Aurizon Network submitted that no analysis or data has been submitted by the QRC to support the maintenance of a BBB+ credit rating.<sup>577</sup>

### Benchmark capital structure

Incenta noted that Australian regulators have applied a benchmark gearing level of 60 per cent to energy and water businesses, which has been underpinned by several recent investigations by the AER.<sup>578</sup>

Incenta also reviewed the capital structures of potential comparator industries (see Table 37).

**Table 37 Capital structure by industry, 2007 to 2016**

	<i>5 year average</i>	<i>5 year median</i>	<i>10 year average</i>	<i>10 year median</i>
Class 1 railroads	20%	20%	22%	24%
Gas and liquids pipelines	36%	39%	35%	34%
Toll roads	48%	46%	50%	52%
Regulated energy and water	39%	40%	41%	42%

Source: *Incenta Economics 2017: 81; Bloomberg.*

Incenta expects that Aurizon Network will exhibit greater (non-systematic) cash flow variability than regulated energy and water businesses owing to such factors as weather and the regulatory revenue cap adjustment (which operates with a 2-year lag). Therefore, Aurizon Network's benchmark gearing level may be expected to be lower than that of regulated energy and water businesses—although the empirical literature on the relationship between cash flow volatility and leverage is somewhat inconclusive. Furthermore, Aurizon Network's actual gearing level is currently, reasonably close to the benchmark, and the business has stated an aim of approximating the benchmark level of 55 per cent gearing. Incenta considered that a benchmark gearing level of 55 per cent is appropriate for Aurizon Network.<sup>579</sup>

The QCA agrees with Aurizon Network, QRC and Incenta that a benchmark gearing level of 55 per cent is appropriate for Aurizon Network.

### Benchmark credit rating

Incenta agreed with Aurizon Network's proposed benchmark credit rating of BBB+.

Aurizon Network commissioned a report by EY to comment on the appropriateness of Aurizon Network targeting and maintaining a current external credit rating of BBB+.<sup>580</sup> EY's report outlined that:

- credit ratings play an important role in communicating the capital strategy, financial risk policy and operating profile of the business to external third party investors
- Aurizon Network has consistently and publicly maintained its commitment to target robust capital and financial risk management policies, which has included maintaining a BBB+ credit rating

<sup>576</sup> QRC, sub. 21: 17.

<sup>577</sup> Aurizon Network, sub. 26: 25.

<sup>578</sup> Incenta Economics 2017: 15–16.

<sup>579</sup> Incenta Economics 2017: 15–16.

<sup>580</sup> Aurizon Network, sub. 34.



- the appropriateness of targeting and maintaining a BBB+ credit rating was supported by empirical evidence
- maintaining a BBB+ credit rating supports continued and cost-effective access to debt capital markets and maximises investor investment appetite through the economic and resources sector cycle.<sup>581</sup>

As such, EY considered that a BBB+ credit rating is appropriate for Aurizon Network and that:

it is important for these credit ratings to be maintained to enable it to be able to perform its business in the most cost effective manner and retain capacity to refinance its debt facilities as and when they become due for renewal.<sup>582</sup>

The QCA adopts a benchmarking approach (not based on actuals) to estimate the regulatory rate of return. Aurizon Network's actual financing arrangements are not necessarily deterministic of an appropriate benchmark credit rating for the purposes of estimating the benchmark WACC for the UT5 regulatory period.

The QCA recognises that maintaining a BBB+ credit rating is important for Aurizon Network. The QCA does not review the appropriateness of Aurizon Network's actual financial management arrangements. Rather, the QCA considers whether the regulatory rate of return is appropriate for Aurizon Network for the UT5 regulatory period having regard to the criteria in the QCA Act. Aurizon Network may implement a financial management strategy that it considers appropriate, regardless of the benchmark parameters in the WACC. Similarly, the benchmark credit rating adopted for the UT5 WACC does not automatically change throughout the regulatory period if Aurizon Network decides to target a different credit rating.

For the purpose of estimating Aurizon Network's WACC for its 2017 DAU, the QCA agrees with stakeholders and Incenta that a credit rating of BBB+ is appropriate for Aurizon Network.

#### Credit metrics considerations

Aurizon Network stated that it is imperative that it satisfies key financeability metrics, as required by the ratings agencies, and maintains its current credit rating. Aurizon Network considered that the QCA should analyse the impact of the regulated revenue parameters, having regard to key credit metrics so that the revenue outcome remains consistent with the maintenance of the benchmark credit rating (BBB+).<sup>583</sup>

Incenta considered whether the credit metrics associated with maintaining a BBB+ credit rating would be satisfied under the regulatory cash flows expected as a result of the QCA's draft decision. Incenta estimated the following benchmark credit metrics:

- $\text{FFO /debt} = \text{funds from operations} / \text{total borrowings}$
- $\text{FFO/interest cover} = (\text{FFO plus interest paid}) / \text{interest paid}$ .

For its credit metrics assessment, Incenta considered that Standard & Poor's approach to assessing Aurizon Network credit metrics is appropriate for estimating these benchmark credit metrics. Incenta advised that its simulated credit metrics were marginally below the BBB+ cut-off that has been identified by Standard & Poor's. However, Incenta noted that its assessment of regulatory cash flows did not incorporate revenues associated with the capital deferrals for WIRP Moura and NAPE being proposed by Aurizon Network, which depresses the outcome of this assessment.

Incenta outlined that if the deferred RAB component were to be isolated from the calculation, it is likely that metrics consistent with a BBB+ credit rating would be achieved.

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<sup>581</sup> Aurizon Network, sub. 34.

<sup>582</sup> Aurizon Network, sub. 34: 2.

<sup>583</sup> Aurizon Network, sub. 1: 248, 267.

In response to the draft decision, Aurizon Network and TCI Fund Management submitted that the FFO/debt ratio will not satisfy Moody's 16 per cent threshold level in any year during the regulatory period, and only just satisfy the Standard & Poor's threshold levels in the final year of UT5.<sup>584</sup> IML Investors considered that the credit assumptions used are inconsistent with reality and leaves Aurizon Network not being able to meet the credit rating assumption used in determining its cost of debt.<sup>585</sup>

Aurizon Network and TCI Fund Management submitted that Moody's has set Aurizon Network's tolerance level at a materially higher threshold than equivalently rated regulated energy network utilities, in recognition of the increased likelihood of cash flow volatility. Aurizon Network considered that the steeper threshold is driven by Moody's view that Aurizon Network has a higher overall risk profile. Aurizon Network said that the QCA must account for this when assessing the benchmark credit rating.<sup>586</sup>

Aurizon Network and TCI Fund Management considered that it is important the QCA satisfy the thresholds, and account for the opinions, of both Moody's and Standard & Poor's. Aurizon Network submitted that it is typically a market requirement for large borrowers to maintain at least two ratings—and that dual credit ratings facilitate ease of access to a variety of capital markets. Aurizon Network said that this would otherwise not support maintenance of the benchmark credit rating, raising the risk of a credit downgrade and potentially higher debt funding costs in the UT5 regulatory period.<sup>587</sup>

Aurizon Network considered that maximum allowable revenues that are insufficient to satisfy the financial metrics necessary to sustain a BBB+ credit rating places significant strain on Aurizon Network's capacity to raise capital. Aurizon Networks submitted that the draft decision's cash flow assumptions would increase the market and transaction costs of debt raising and would increase Aurizon Network's borrowing costs to the upper end of the BBB+ range and close to BBB.<sup>588</sup>

Aurizon Network did not consider that this situation represents reasonable judgement by the QCA and calls into question the economic viability of the overall rate of return.<sup>589</sup>

In contrast, the QRC did not consider that a change to the benchmark credit rating is supported, noting:

- (a) Aurizon Network continues to maintain a credit rating of BBB+ from both Moody's and Standard & Poor's.
- (b) Incenta's analysis is heavily caveated, and is likely to have underestimated the relevant 'financial risk' metric used by Standard & Poor's—Incenta's calculation of revenue for Aurizon Network does not incorporate any non-regulated revenue (for example, GAPE fees, WIRP fees, and non-access revenue) which would be relevant to the rating agency assessments.
- (c) It is clear from the Standard & Poor's rating guidelines that these thresholds are not applied mechanistically. Rather, financial risk metrics are used, along with business risk metrics, to determine an 'anchor' rating. The final rating may differ from the 'anchor' rating based on 'modifiers', which include both qualitative and quantitative factors such as the degree of diversification, capital structure, financial policy, liquidity and management/governance.

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<sup>584</sup> Aurizon Network, sub. 40: 80, 88, 129; TCI Fund Management, sub. 58: 4–5.

<sup>585</sup> IML Investors, sub. 62: 1.

<sup>586</sup> Aurizon Network, sub. 1: 267; sub. 40: 89; TCI Fund Management, sub. 58: 5. Aurizon Network noted that the minimum FFO/Debt threshold set by Moody's is currently 16-18%, which is higher than the Standard & Poor's threshold of 13–15%. Aurizon Network submitted that it requires a FFO to debt ratio above 18% and FFO interest coverage above 4.5 to retain its BBB+ credit rating from Moody's.

<sup>587</sup> Aurizon Network, sub. 40: 80, 88–89, 129; TCI Fund Management, sub. 58: 4–5.

<sup>588</sup> Aurizon Network, sub. 40: 88–89.

<sup>589</sup> Aurizon Network, sub. 40: 129.

- (d) Moody's and Standard & Poor's are unlikely to adjust credit ratings based on short-term changes in credit metrics. Rather, downgrades are only likely where key metrics fall below the applicable thresholds on a consistent or sustained basis.<sup>590</sup>

The QRC considered that there are various features of the regulatory framework that might be seen as a 'positive nuance' to Aurizon Network's credit profile.

As outlined above, the QCA adopts a benchmarking approach (not based on actuals) to estimate the regulatory rate of return. Aurizon Network's actual financing arrangements are not necessarily deterministic of an appropriate benchmark credit rating for the purposes of estimating the benchmark WACC for the UT5 regulatory period. Aurizon Network may implement a financial management strategy that it considers appropriate, regardless of the benchmark parameters in the WACC.

The cash flow assumptions associated with this decision will have implications for Aurizon Network's credit metric assessment, however, the QCA notes that other factors will affect a credit ratings assessment undertaken by the relevant ratings agencies.

The QCA is not in a position to undertake a credit ratings assessment for Aurizon Network based on the methodology implemented by the ratings agencies. The way in which the ratings agencies take into consideration Aurizon Network's exposure to business risk and actual financial management strategies, including its relationship with the parent company Aurizon Holdings, is not known to the QCA. For instance, it is not clear to the QCA why Moody's revised its rating tolerance level to 13 per cent (from 16 per cent) in August 2018.

While Aurizon Network's actual financial management strategy is a relevant consideration for the rating agencies in establishing an appropriate credit rating, it is not necessarily deterministic in considering the appropriateness of Aurizon Network's benchmark credit rating.

As such, the QCA has not sought to assess or comment on the merits or otherwise of Aurizon Network obtaining dual credit ratings from Moody's and Standard & Poor's.

The objective of a credit metrics assessment, in this instance, is to determine whether the regulatory cash flows are within a reasonable range of that for the benchmark entity to meet the benchmark credit rating (a BBB+ rating in this instance).

The QCA has reassessed the credit metrics to reflect the cash flow assumptions associated with this final decision, in considering whether a benchmark credit rating of BBB+ is reasonable for Aurizon Network's 2017 DAU.

The relevant credit metrics have increased, from those assessed by Incenta as part of the draft decision. While informative and not deterministic, the QCA's credit metrics assessment supports the Aurizon Network's benchmark credit rating of BBB+:

- the average FFO/Debt metric for the regulatory period is above the BBB+ rating tolerance level of both Moody's and Standard & Poor's,<sup>591</sup> and
- the average FFO/Interest cover metric for the regulatory period is above 4x.

The QCA considers that the regulatory framework and the associated revenues and free cash flows are at a level that provides an appropriate balance between the interests of Aurizon Network (s. 138(2)(b)), the object to promote efficient investment (s. 138(2)(a)) and the interests of access holders and access seekers.

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<sup>590</sup> QRC, sub. 53: 20–21.

<sup>591</sup> See Moody's Investor Service 2018 and S&P Global Ratings 2018.

## Cost of debt

### Aurizon Network's proposal

Aurizon Network's 2017 DAU cost of debt proposal is outlined in Table 38.

**Table 38 Aurizon Network's cost of debt proposal\***

<i>Parameter</i>	<i>Aurizon Network's proposal</i>
Risk-free rate	2.13%
Debt risk premium	2.47%
Debt-raising and hedging costs	0.262%
<b>Cost of debt (total)</b>	<b>4.86%</b>

Note: \* Aurizon Network proposed indicative cost of debt parameters for the 20-day averaging period of the 20 days to 30 June 2016.

Aurizon Network's cost of debt proposal is based on applying an 'on-the-day' benchmark debt management strategy. This strategy assumes an efficient firm would:

- issue debt with a 10-year term to maturity to reduce refinancing risk and incur transaction costs associated with issuing this debt
- use interest rate swap contracts to convert the base interest rate element of its cost of debt from the raw term to a term that matches the length of the regulatory period (4 years), and incur the associated transaction costs
- use credit default swap (CDS) contracts to convert the 10-year debt risk premium embedded in the average term of debt into a four-year debt risk premium.

However, in practice, it is difficult to hedge the debt risk premium using credit default swap contracts due to the lack of market liquidity in these instruments. Therefore, the cost of debt proposal includes:

- the four-year risk-free rate
- the 10-year debt risk premium
- the transaction costs of the interest rate swap contracts
- the annualised debt-issuing costs arising from 10-yearly debt issues.

Consistent with the QCA's previous cost of debt decision,<sup>592</sup> Aurizon Network proposed to use the PwC simple portfolio econometric estimation methodology (PwC methodology) as the approach for estimating its cost of debt.<sup>593</sup> Aurizon Network proposed to use the indicative averaging period of the 20 business days to 30 June 2016.

Applying the PwC methodology, Aurizon Network proposed a raw debt risk premium (before transactions costs) of 2.47 per cent, based on a linear regression of a sample of BBB+ bonds. Aurizon Network estimated debt issuing transaction costs of 0.262 per cent to compensate it for the costs of issuing domestic and

<sup>592</sup> QCA 2014d.

<sup>593</sup> The simple portfolio econometric approach is a cost of debt estimation methodology that involves applying data filtering criteria and testing, formation of an appropriate portfolio of bonds and a regression of the debt risk premium with respect to term to maturity of debt. The 'simple' portfolio refers to a portfolio of domestic bonds only, and the econometric approach applies a linear form, which was found to perform better than more complex forms (for example, non-linear).

foreign debt. These transaction costs include cross-currency swap costs, interest rate swap costs and periodic debt issuance costs.<sup>594</sup>

Aurizon Network's cost of debt proposal was accompanied by a report by Competition Economists Group (CEG).<sup>595</sup>

For estimating the debt risk premium for the final decision, Aurizon Network proposed that the actual averaging period be confidentially agreed with the QCA.<sup>596</sup> Aurizon Network nominated this period in advance of that period occurring. The proposed averaging period was for the 20 business days up to 30 June 2017.

### QCA analysis and decision

The QCA engaged Incenta to provide independent, expert advice on an appropriate debt risk premium value for Aurizon Network and to inform our assessment of Aurizon Network's cost of debt proposal.<sup>597</sup>

The QCA has assessed Aurizon Network's proposed cost of debt for the UT5 pricing period along with submissions from stakeholders and their consultants, as well as the advice from Incenta.

The QCA's decision is that Aurizon Network's proposed cost of debt parameters are not appropriate. The cost of debt proposed by Aurizon Network will overcompensate Aurizon Network for the risks involved in providing the services, will therefore not be consistent with the promotion of the object of Part 5 of the QCA Act (s. 138(2)(a)) and is not in the interests of access seekers or access holders (s. 138(2)(e) and (h)). The QCA considers a cost of debt of 4.17 per cent (based on the relevant averaging period) is sufficient to compensate investors for Aurizon Network's exposure risk and provide a return commensurate with the regulatory and commercial risks involved, given the way in which risk is addressed in the regulatory framework.

On 13 February 2017, Aurizon Network proposed the averaging period to be the 20 business days immediately prior to the UT5 period. On 10 March 2017, the QCA noted Aurizon Network's averaging period proposal was consistent with established regulatory practice and that the QCA was favourably disposed towards this proposal.<sup>598</sup>

Aurizon Network submitted that the debt risk premium will need to be reassessed for the relevant forward-looking market averaging period, and subsequently requested the QCA consider a revised averaging period.<sup>599</sup>

As outlined above, the QCA's decision is to not accept Aurizon Network's proposal to revise Aurizon Network's proposed averaging period. Our proposed cost of debt estimates for the proposed averaging period are in Table 39.

**Table 39 QCA's cost of debt estimate for the decision**

<i>Parameter</i>	<i>QCA's decision</i>
Risk-free rate	1.90%
Debt risk premium (raw)	2.04%
Debt-refinancing transaction costs	0.108%

<sup>594</sup> Aurizon Network, sub. 1: 279.

<sup>595</sup> Aurizon Network, sub. 5.

<sup>596</sup> Aurizon Network, sub. 1: 279.

<sup>597</sup> Incenta Economics 2017.

<sup>598</sup> QCA 2017a.

<sup>599</sup> Aurizon Network, sub. 40: 129.

<i>Parameter</i>	<i>QCA's decision</i>
Interest rate swap costs	0.125%
<b>Total</b>	<b>4.17%</b>

The reasoning for our decision is in our analysis below. Key matters for consideration in assessing Aurizon Network's cost of debt estimates include:

- the risk-free rate estimate
- the raw debt risk premium estimate
- the benchmark debt-financing transaction costs
- reviewing Aurizon Network's cost of debt estimate
- examining whether a coal risk premium is present.

### Risk-free rate

The QCA considers that a four-year risk-free rate of 1.9 per cent is appropriate for the averaging period ending 30 June 2017.<sup>600</sup> The QCA's analysis of the risk-free rate is contained in the risk free rate section, above.

### Debt risk premium

The QCA considers that a raw debt risk premium of 2.47 per cent is not appropriate, and that a raw debt risk premium of 2.04 per cent for the averaging period ending 30 June 2017 is an appropriate debt risk premium for Aurizon Network's 2017 DAU.

The QCA's analysis examining an appropriate debt risk premium for Aurizon Network is outlined below. Our analysis:

- examines an appropriate benchmark term of debt for Aurizon Network
- reviews the simple portfolio approach and the corresponding sample of bonds used to estimate Aurizon Network's debt risk premium
- examines the application of the PwC methodology as well as alternative regression methods proposed by Aurizon Network, to calculate the debt risk premium.

### Benchmark term of debt

Aurizon Network proposed using a 10-year benchmark term of debt issuance.<sup>601</sup> Aurizon Network considered that estimating the debt risk premium based on a 10-year term to maturity is consistent with the QCA's and commercial practice, having regard to the refinancing risk faced by infrastructure providers that must fund assets with long economic lives.<sup>602</sup>

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<sup>600</sup> Consistent with the QCA's standard practice, the yield is based on interpolating between the yields of the two (nominal) Commonwealth government bonds with maturities closest to the target maturity of four years.

<sup>601</sup> Aurizon Network, sub. 1: 274; sub. 40: 130.

<sup>602</sup> Aurizon Network, sub. 1: 274.

CEG considered that there is considerable regulatory precedence in Australia that supports the use of a 10-year debt term when estimating the return on debt and that there is no evidence supporting a deviation from this term.<sup>603</sup>

The QRC considered that a 10-year debt term is likely to be conservative in favour of Aurizon Network, in light of its established practice of issuing debt at shorter terms.<sup>604</sup>

The QRC considered that the debt risk premium estimate should be based on debt with a five-year term to maturity, as this would more closely align with:

- Aurizon Network's actual debt financing arrangements
- the term of the proposed UT5 regulatory period.

Incenta considered that the weight of available evidence indicates a benchmark 10-year debt term assumption remains appropriate for relatively highly-gearred, regulated infrastructure businesses such as Aurizon Network. Incenta noted:

- PwC's empirical finding<sup>605</sup> that Australian regulated energy firms issue debt with a 10-year (average) term
- recent decisions/pronouncements made by the AER, ERA, ESCOSA and IPART have reaffirmed the application of a benchmark 10-year debt term.<sup>606</sup>

Incenta did not agree with the QRC that a five-year term to maturity for the debt risk premium should be applied, based on the QRC's claim that this reflects Aurizon Network's 'actual debt financing arrangements'. Incenta noted that:

- the regulatory approach is based on benchmarking, which provides Aurizon Network with an incentive to out-perform the benchmark
- Aurizon Network's actual financing practice indicates a weighted average term of debt at issuance that is likely to be closer to 10 years than to five years.<sup>607</sup>

The QCA's decision is that a 10-year benchmark term of debt issuance is appropriate for estimating Aurizon Network's debt risk premium at this time. A benchmark 10-year debt term is consistent with Australian regulatory practice and recognises that utility businesses, in general, will issue debt for longer terms than the regulatory period to manage refinancing risk. The QCA considers that refinancing risk is able to be managed through the issuance of longer term debt and staggering this issuance.

The QCA agrees with Incenta that Aurizon Network's actual debt financing arrangements are not deterministic of an appropriate benchmark term of debt. The QCA adopts a benchmarking approach (not based on actuals) to estimate the regulatory rate of return.

### Simple portfolio approach and the corresponding sample of bonds

Aurizon Network proposed a debt risk premium estimate based on the 'simple portfolio' approach, which includes only domestic corporate bonds in the sample of bonds and excludes bank debt and international bonds.

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<sup>603</sup> Aurizon Network, sub. 5: 18.

<sup>604</sup> QRC, sub. 53: 21–22.

<sup>605</sup> PwC 2013: 20, Table 2.7.

<sup>606</sup> Incenta Economics 2017: 85–86.

<sup>607</sup> Incenta Economics 2017: 120–121.

The QCA considers that a simple portfolio is an appropriate basis for estimating an appropriate debt risk premium for Aurizon Network's 2017 DAU. Our view is that the simple portfolio will provide a good proxy for the debt risk premium estimate, noting that:

- the theory of arbitrage in open capital markets should provide for little difference in the debt risk premium estimates, whether or not foreign-denominated bonds are included in the sample
- use of proxies would be required if bank debt is included in the sample due to a lack of transparency on the terms of domestic bank debt deals—as bank debt is not a traded financial instrument.

While the QCA has adopted the simple portfolio as the basis for estimating Aurizon Network's debt risk premium, consideration has also been given to foreign bond data in the context of a 'cross-check' on the estimate resulting from applying the PwC methodology with domestic bonds. This matter is further discussed below.

In constructing a sample of bonds for Aurizon Network, CEG conducted a Bloomberg search and applied the filtering criteria set out in PwC<sup>608</sup> to identify bonds that are:

- issued in Australia by an entity incorporated in Australia
- at least one credit rating between A– and BBB– (inclusive), as published by Standard & Poor's, Moody's, or Fitch
- denominated in AUD
- senior debt
- not inflation-linked
- fixed rate or floating rate
- issued on or before 30 June 2016
- maturing on or after 30 June 2017.<sup>609</sup>

Aurizon Network considered that CEG's sample selection is consistent with the current PwC methodology, in that it does not include foreign bonds and bonds with options.<sup>610</sup> CEG said its analysis indicated that Incenta, in its debt risk premium estimation for DBCT, included bonds for financial institutions and with maturity options.<sup>611</sup> Given this, CEG said it followed Incenta's sample selection criteria for DBCT and therefore did not exclude bonds issued by financial firms and bonds with maturity options from its overarching sample.<sup>612</sup>

In response, Incenta stated that CEG's report included a number of scenarios that included the bonds of businesses classified as 'Financials' by Bloomberg. Incenta noted this Bloomberg classification includes banks, commercial finance, consumer finance, financial services, trusts, life insurance, property and casualty insurance and real estate. While Incenta said it included 'real estate' bonds<sup>613</sup>, it excluded the other

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<sup>608</sup> PwC 2013: 32–35.

<sup>609</sup> Aurizon Network, sub. 5: 18–19.

<sup>610</sup> Aurizon Network, sub. 1: 276.

<sup>611</sup> Aurizon Network, sub. 5: 19.

<sup>612</sup> Aurizon Network, sub. 5: 19. However, CEG's subsequent econometric analysis (discussed below) examines scenarios that do exclude bonds issued by financial firms and bonds with maturity options.

<sup>613</sup> Incenta retained these businesses in the sample as they typically receive rental streams or take on development risk, and therefore differ from 'financial institutions' such as banks, credit cooperatives and insurance companies. Incenta considered that this was in keeping with the PwC report's characterisation of 'finance industry' as meaning 'financial institutions', and not property trusts.



financials, such as 'banks, credit cooperatives and insurance companies', on the basis that they trade differently than corporate bonds of a comparable credit rating.<sup>614</sup> Incenta noted that:

PwC (2013) "excluded the bonds of financial institutions on the basis of advice from debt market professionals who told [PwC] that the market interprets these bonds as trading differently to what their credit rating would suggest for corporate bonds." In their seminal study of the determinants of bond yields, Elton et al (2001) noted that the term structure of financial bonds differed from that of industrials, and they chose to report the results for these two groups separately. They noted that this was "not surprising because industrial and financial bonds differ both in their sensitivity to systematic influences and to idiosyncratic shocks that occurred over the time period."<sup>615</sup>

CEG submitted that some differences exist in the sample selection search criteria it applied to that applied by Incenta, including:

- The filtering criteria set out in PwC referred to bonds with 'Australian issuance by an Australian entity'. CEG's methodology restricts the sample to bonds issued by companies incorporated in Australia, while Incenta refers to bonds with Australia as its country of risk.
- The filtering criteria set out in PwC excluded bonds where the issuing entity is a 'financial entity'. Incenta interpreted the term financial entity as excluding bonds issued by firms in the financial industry without excluding bonds issued by real estate firms, while CEG has not made any such distinction between real estate firms and other types of firms in the financial industry (that is, CEG excludes bonds of real estate firms from its sample).<sup>616</sup>

Having regard to these matters, Incenta considered that:

- The PwC report did not specify how the concept of 'Australian issuance by an Australian entity' was intended to be operationalised in relation to the search criteria options provided by Bloomberg. Defining the search as issuance in AUD by a company with "Australian country risk" (a term used in Bloomberg's search criteria), is an appropriate means of operationalising the stated principle and can be replicated by others easily.<sup>617</sup>
- While the PwC report did not explicitly state whether or not it viewed real estate businesses as "finance companies" (and did not publish its sample of bonds), Incenta considered that the language used indicated that PwC would not have excluded real estate businesses from its sample. Additionally, Incenta noted that the PwC (2013) report included 12 bonds that Bloomberg classifies as belonging to the "real estate" industry.<sup>618</sup>

Incenta noted that its core bond sample was also based on the PwC selection criteria.<sup>619</sup> For the proposed averaging period, of the 20 business days to 30 June 2017, Incenta initially obtained a 55-bond sample, comprising:

- 32 A- bonds
- 7 BBB+ bonds
- 16 BBB bonds.

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<sup>614</sup> Incenta Economics 2017: 100.

<sup>615</sup> Incenta Economics 2017: 100.

<sup>616</sup> Aurizon Network, sub. 45: 4–5.

<sup>617</sup> Incenta Economics 2018: 4.

<sup>618</sup> Incenta Economics 2018: 5.

<sup>619</sup> See PwC 2013: 33–34.

Out of the 55 bonds, 47 were fixed rate, and 8 were floating rate bonds. The average remaining term to maturity of the bond sample was four years, with the longest average term (4.37 years) being observed for the A– credit rating band.<sup>620</sup>

CEG stated that it was not able to replicate Incenta’s bond samples and developed a different sample of bonds based on Incenta’s stated search criteria. CEG obtained a sample of 53 bonds issued in AUD without options in the Australian market, which excluded:

- an A– rated bond issued by Australian Pacific Airports Melbourne Pty Ltd (UV8008012) that did not show up in CEG’s search because it was callable
- a BBB+ rated bond issued by Coca-Cola Amatil (EJ4333419 Corp), as CEG excluded all bonds issued by Coca-Cola Amatil as opposed to Incenta’s sample excluding Coca-Cola Amatil’s bonds issued in foreign markets.<sup>621</sup>

In response, Incenta acknowledged that:

- the UV8008012 bond should not have been included in its sample; and
- the EJ4333419 Corp bond could have been excluded on grounds of being an outlier.<sup>622</sup>

The QCA considers that a bond sample based on the PwC selection criteria is appropriate, noting that Aurizon Network has proposed to use the PwC methodology to estimate its debt risk premium. The QCA agrees with Incenta’s interpretation of the PwC selection criteria. In particular, based on the reasons given, the QCA considers that real estate businesses should not necessarily be excluded from the sample.

The BBB+ debt risk premium estimates for the 53 bond sample are outlined below.

### Application of the PwC methodology

The PwC methodology applies linear regression to estimate the debt risk premium for a BBB+ credit rating, which reflects the benchmark for Aurizon Network. In order to obtain a sufficient sample size, the PwC methodology recommends constituting a pooled sample of BBB, BBB+ and A– rated bonds (to encompass the BBB+ benchmark credit rating and one notch either side of that rating).

Aurizon Network engaged CEG to provide an estimate of the debt risk premium based on the PwC methodology.<sup>623</sup> CEG collected the historical yields of the bonds identified in its sample and deducted the interpolated Commonwealth Government bond yields from RBA data to obtain the debt risk premiums.<sup>624</sup>

CEG produced linear regression estimates for 10-year BBB+ and BBB debt using these three regression methods:

- pooled regression
- pooled regression with dummy variables for each credit rating
- regressions on both a BBB+ and BBB single credit rating.

The pooled regression approaches provide a larger sample of bonds by broadening the sample beyond Aurizon Network's benchmark credit rating.<sup>625</sup> CEG's linear regression estimates are presented in Table 40.

<sup>620</sup> Incenta Economics 2017: 101.

<sup>621</sup> Aurizon Network, sub. 40: 130–131; sub. 45: 3, 10.

<sup>622</sup> Incenta Economics 2018: 2–4.

<sup>623</sup> Aurizon Network, sub. 1: 276.

<sup>624</sup> Aurizon Network, sub. 5: 19.

<sup>625</sup> Typically, the PwC methodology entails a regression of a pooled sample of BBB, BBB+ and A– rated bonds to encompass the BBB+ benchmark credit rating and one notch either side of that rating. However, CEG

**Table 40 CEG's estimates of debt risk premium with financial bonds and options excluded**

<i>Pooled sample</i>	<i>A-, BBB+, BBB</i>		<i>BBB+, BBB, BBB-</i>		<i>A-, BBB+, BBB, BBB-</i>	
	<i>BBB+</i>	<i>BBB</i>	<i>BBB+</i>	<i>BBB</i>	<i>BBB+</i>	<i>BBB</i>
Pooled	2.29	-	-	2.60	-	-
Dummy variables	2.32	2.47	2.29	2.44	2.23	2.37
<i>Single rating samples</i>	<i>BBB+</i>			<i>BBB</i>		
Single rating	2.47			2.63		

Source: Aurizon Network, sub. 5: 23.

From CEG's analysis, Aurizon Network proposed a debt risk premium of 2.47 per cent, based on the linear regression on the BBB+ single credit rating sample.

For the 20-day averaging period to 30 June 2017, Incenta estimated 10-year BBB+ debt risk premiums by applying the three regression methods:

- regression centred on the BBB+ credit rating using a pooled sample of A-, BBB+ and BBB bonds ('pooled BBB+ regression')
- regression using a pooled sample of A-, BBB+ and BBB bonds, with a dummy variable for each credit rating ('dummy variables regression')<sup>626</sup>
- regression on a sample of bonds from only the BBB+ credit rating band, reflecting the benchmark credit rating for Aurizon Network ('single credit rating (BBB+) regression').

CEG submitted that it was unable to replicate Incenta's debt risk premium estimates due to differences in the sample (as outlined above). However, CEG's debt risk premium estimates were within five basis points of Incenta's estimates for the 20-day averaging period ending 30 June 2017.<sup>627</sup>

As outlined above, Incenta acknowledged that the UV8008012 bond and EJ4333419 Corp bond should not have been included in its initial sample. Incenta updated its estimate based on the 53 bond sample.

Incenta's linear regression estimates are presented in Table 41.

**Table 41 Incenta's estimates of the debt risk premium using the PWC methodology for the proposed averaging period**

<i>Regression method</i>	<i>Estimate</i>
Pooled BBB+ regression	1.81%
Dummy variable regression	2.04%
Single credit rating (BBB+) regression	2.39%

Source: Incenta analysis.

examined a sample with bond ratings of A-, BBB+, BBB and BBB- bonds, as well as two sub-samples—an A-, BBB+ and BBB bond sub-sample; and a BBB+, BBB and BBB- bond sub-sample.

<sup>626</sup> The dummy variables approach assumes that the same term premium per annum applies to each of the credit rating bands, with the credit rating shifting the intercept.

<sup>627</sup> Aurizon Network, sub. 40: 130–131; sub. 45: 3, 12.

The QCA has assessed the merits of these three regression methods for estimating Aurizon Network's debt risk premium for the proposed averaging period. In examining the appropriate application of the PwC methodology, the QCA's analysis:

- reviews methodological issues raised by stakeholders associated with applying the PwC methodology
- examines the results obtained from the three estimation methods for the averaging period, namely the:
  - single credit rating (BBB+) regression
  - pooled BBB+ regression
  - dummy variable regression
- reviews and compares alternative debt risk premium estimates (including third party estimates) with results obtained from the PwC methodology
- examines the sensitivity of the sample to specific bonds, to consider whether the exclusion of any bonds from the sample is warranted.

From this analysis, the QCA's draft decision was that the estimate obtained using the dummy variables regression provides an appropriate estimate of Aurizon Network's raw debt risk premium for the proposed averaging period.

In response, Aurizon Network considered that Incenta's application of the PwC methodology has several shortcomings and that a debt risk premium estimate of 2.0 per cent is unreasonable. Aurizon Network engaged CEG to review the cost of debt. In response, CEG stated that its best debt risk premium estimate is between 2.32 per cent and 2.50 per cent, with the lower and upper bound estimates based on two alternative regression approaches:

- The lower bound of this range is based on a pooled regression of A– to BBB bonds with a dummy for slopes and not intercepts (that is, 'slopes dummy variables regression')
- The upper bound of this range is based on a pooled regression of BBB and BBB+ bonds with no dummy variables (that is, 'pooled BBB/BBB+ regression').<sup>628</sup>

CEG considered that the 'pooled BBB/BBB+ regression' (and including real estate firms in the sample) results in a reliable estimate of the debt risk premium of 2.45 per cent.<sup>629</sup>

The QCA has considered the merits of applying the two alternative regression methods proposed by Aurizon Network and assessed whether they are appropriate approaches for estimating Aurizon Network's debt risk premium. The QCA does not consider that the two alternative regression methods provide appropriate estimates of Aurizon Network's debt risk premium for its 2017 DAU.

The QCA remains of the view that the debt risk premium estimate obtained using the dummy variables regression (2.04 per cent), provides an appropriate estimate of Aurizon Network's raw debt risk premium for the proposed averaging period.

The QCA's detailed analysis is presented below.

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<sup>628</sup> Aurizon Network, sub. 40: 80–81, 130, 132; sub. 45: 2, 22. CEG also considered a sample that excludes real estate firms from the sample, which generates a pooled BBB+/BBB estimate of 2.50% based on 20 bonds.

<sup>629</sup> Aurizon Network, sub. 45: 19.

### Methodological issues associated with the PwC methodology

Aurizon Network noted that Incenta has previously applied all three regression methods in estimating the debt risk premium to inform previous QCA decisions. Referring to CEG's analysis, Aurizon Network expressed concern that the PwC methodology is very sensitive to the specific econometric technique and the composition of the sample. Furthermore, Aurizon Network also considered that the PwC methodology is very sensitive to the inclusion/exclusion of particular bonds in/from the sample. As an example, Aurizon Network considered that CEG's report outlines how the inclusion and exclusion of a seven-year bond issued by Jemena has material impacts on the BBB+ debt risk premium (see below).<sup>630</sup>

#### Effect of seven-year bond issued by Jemena on the debt risk premium estimates

CEG re-estimated the debt risk premiums, excluding the seven-year bond issued by Jemena (LW474837 Corp) to investigate the impact of the Jemena bond on the estimates. CEG considered that this analysis (see Table 42) illustrates the potential impact of a single bond if the PwC methodology is mechanistically applied.<sup>631</sup>

**Table 42 CEG's estimates of debt risk premium with Jemena bond excluded**

<i>Pooled sample</i>	<i>A-, BBB+, BBB</i>		<i>BBB+, BBB, BBB-</i>		<i>A-, BBB+, BBB, BBB-</i>	
	<i>BBB+</i>	<i>BBB</i>	<i>BBB+</i>	<i>BBB</i>	<i>BBB+</i>	<i>BBB</i>
Pooled	2.31 (2.29)	-	-	2.72 (2.60)	-	-
Dummy variables	2.38 (2.32)	2.49 (2.47)	2.36 (2.29)	3.50 (2.44)	2.27 (2.23)	2.39 (2.37)
<i>Single rating sample</i>	<i>BBB+</i>			<i>BBB</i>		
Single rating	3.28 (2.47)			2.63 (2.63)		

Source: Aurizon Network, sub. 5: 30. Note: Numbers in brackets represent estimates obtained from including the Jemena bond.

CEG stated that it can be seen that the single credit rating regression using only BBB+ bonds is sensitive to variations in the data (2.47% vs. 3.28%). Noting that there are only six BBB+ bonds in this sample, CEG considered that the regression is very sensitive to the location of the specific observations.<sup>632</sup>

CEG concluded that a mechanistic application of any one of the variations of the linear regression approach risks giving rise to highly variable/unpredictable results that may end up being inappropriate. CEG is of the view that it would be bad practice to apply these approaches in a mechanistic way without having had the opportunity to assess the dataset first, noting:

- the choice of technique is an empirical matter that is dependent on the observations of the specific dataset
- the debt risk premium estimates derived from the methods could be highly sensitive to the inclusion of certain individual bonds.<sup>633</sup>

<sup>630</sup> Aurizon Network, sub. 1: 276.

<sup>631</sup> Aurizon Network, sub. 5: 30.

<sup>632</sup> Aurizon Network, sub. 5: 31.

<sup>633</sup> Aurizon Network, sub. 5: 4, 15–16.

However, Incenta said that its analysis did not apply the linear regression approaches in a mechanistic manner. Specifically, Incenta considered that, in applying a linear regression approach, it is necessary to examine whether the conditions for applying the underlying methodology are met. These conditions are:

- No material bias in the bond sample—that is, the average implied credit rating of the bond sample used in the pooled regression should approximate the target credit rating;
- No material asymmetry in the debt risk premiums of credit rating bands—that is, the average debt risk premium differential between the bonds in the target band and in the band on either side of the target credit rating band should be approximately equal; and
- No material debt risk premium ‘aberrations’ / ‘influential bonds’—that is, there should be no aberrant or ‘influential’ bonds whose debt risk premiums are: a) materially out of line with the debt risk premium / term relationship for that credit rating band, which becomes more important the smaller the sample size; or b) influential relative to their numbers among the bonds in the sample. The former will increase / decrease the intercept of the estimate, while the latter will influence the slope of the relationship between term and debt risk premium.<sup>634</sup>

When one of these conditions is not met, Incenta’s approach is to investigate ways of overcoming the potential for distorted estimates of the debt risk premium, and to obtain the most appropriate estimate based on the available data. Incenta noted that this has, at times, involved the running of sensitivity analysis that excluded ‘influential’ bonds whose debt risk premiums are:

- materially out of line with the debt risk premium / term relationship for that credit rating band, which becomes more important the smaller the sample size
- influential relative to their numbers among the bonds in the sample.<sup>635</sup>

The QCA agrees with Aurizon Network, CEG and Incenta that a mechanistic application of any of the linear regression approaches should be avoided. Applying a certain regression approach to the specified sampling period could result in an inappropriate debt risk premium for Aurizon Network.

As such, the QCA has assessed the results obtained from three regression approaches for the proposed averaging period. In determining an appropriate estimate for Aurizon Network’s debt risk premium, the QCA has considered the results obtained from the application of: the single credit rating (BBB+) regression; the pooled BBB+ regression; and the dummy variables regression.

The QCA’s analysis also compares these results to estimates published by third party data providers as a ‘cross-check’ and further reference point to inform an assessment of the estimated debt risk premiums from the methods. The QCA has also considered whether the sample is sensitive to the incorporation of certain bonds, which may affect the debt risk premium estimate obtained from the PwC methodology. Our analysis is presented below.

Aurizon Network considered that the potential for change in the implementation of the PwC methodology through time creates doubt as to the predictability and transparency of this method. Aurizon Network noted that a lack of transparency has been cited as the main motivation to depart from independent third party estimates of the debt risk premium, as these providers, such as Bloomberg, do not publish the details of their methodologies. Therefore, Aurizon Network considered that the PwC methodology needs to be transparent but also predictable in its application.<sup>636</sup>

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<sup>634</sup> Incenta Economics 2017: 102.

<sup>635</sup> Incenta Economics 2017: 102.

<sup>636</sup> Aurizon Network, sub. 1: 275–276.

Given that a mechanistic application of the regression methods risks estimating an inappropriate debt risk premium for Aurizon Network, Incenta considered that the flexible application of the PwC methodology over time has provided greater regulatory certainty by not applying the method mechanistically.<sup>637</sup>

While noting Incenta's preference for a flexible application of the PwC methodology, CEG submitted that Incenta has previously acknowledged that there is no perfect solution to the trade-off between the problem of small sample size and other data issues—such as potentially introducing bias when pooling the targeted credit rating with other credit ratings.<sup>638</sup>

The QCA considers that a certain level of flexibility in the application of the PwC methodology is required in order to provide for an appropriate debt risk premium for the relevant averaging period. The QCA is aware that a regression analysis based on a single credit rating is often limited in its application due to the small sample of the bonds available. The QCA is also aware of the potential for introducing bias by increasing the sample size. That is why the QCA supports both a flexible and pragmatic approach to the application of the PwC methodology—in which: the regression methods are considered in line with the results of the other regressions; shortcomings are considered; and the cross-checks are performed, to increase the confidence of those estimates.

#### Single credit rating (BBB+) regression

Noting sampling issues associated with pooled regression methods, CEG suggested that it may be appropriate to carry out linear regression using only bonds in the single target credit rating band (BBB+ bonds). However, CEG noted that there are only 11 bonds in the sample with a BBB+ credit rating, and only six bonds if financial firms and callable bonds are excluded.<sup>639</sup>

CEG obtained an estimate of 2.47 per cent from its sample of six BBB+ bonds, based on its indicative averaging period of June 2016.<sup>640</sup> Drawing from CEG's analysis, Aurizon Network noted that this single rating regression estimate is:

- close to the estimate from the pooled regression (2.51%) when the Australia Pacific Airports (Melbourne Airport) bond is excluded<sup>641</sup>
- closer to (although still materially below) the independent third party estimates produced by Bloomberg, the RBA and Reuters (2.69%, 2.79% and 2.94% respectively)
- based on the same approach (that is, single credit rating regression) recommended by Incenta in its recent report for the QCA in relation to the debt risk premium to apply to DBCT.<sup>642</sup>

The QRC noted that the dummy variable regression method and single credit rating regression method were used in the QCA's DBCT final decision due to the application of a BBB, as opposed to BBB+, benchmark credit rating. The QRC considered that this decision has no application in this instance, as a benchmark credit rating of BBB+ is being maintained by Aurizon Network.<sup>643</sup>

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<sup>637</sup> Incenta Economics 2017: 102.

<sup>638</sup> Aurizon Network, sub. 45: 20–22.

<sup>639</sup> Aurizon Network, sub. 5: 20.

<sup>640</sup> Aurizon Network, sub. 5: 1.

<sup>641</sup> CEG considered that the pooled regression results (that exclude bonds issued by financial firms and bonds with options) are sensitive to the inclusion of the Melbourne Airport bonds.

<sup>642</sup> Aurizon Network, sub. 1: 277.

<sup>643</sup> QRC, sub. 21: 33.

Incenta obtained an estimate of 2.39 per cent for six<sup>644</sup> AUD-denominated BBB+ bonds from applying the single credit rating (BBB+) regression to the updated averaging period (the 20-day period to 30 June 2017). However, Incenta did not consider this estimate to be reliable, as it is based on such a small sample of bond observations.

Incenta disagreed with CEG's suggestion that a sample of only six BBB+ bonds would result in an improved estimate to that obtained using the pooled regression methods. Incenta considered that this is too small a sample size to deliver a reliable and robust empirical estimate of the BBB+ debt risk premium.<sup>645</sup>

Incenta also disagreed that adopting such an approach was consistent with the QCA's approach in the DBCT investigation. Incenta noted that this situation differs to that of the DBCT assessment, where the target credit rating was BBB and there were 25 BBB AUD-denominated bond observations available for the relevant sample.<sup>646</sup>

The QCA considers that the debt risk premium estimate obtained by application of a regression on bonds in a single credit rating (BBB+) is unreliable for the proposed averaging period, given that it is based on only seven bond observations. An estimate based on so few observations will be highly sensitive to variations in the data. This point was made by CEG's Jemena bond analysis (see Table 42), showing that a single bond can materially change the results obtained from a regression with so few bonds—the removal of the Jemena bond from the sample increases the single regression BBB+ bond estimate dramatically.

Further, Incenta's estimate of 2.39 per cent obtained from this methodology appears inappropriate in comparison to 'cross-checks', including third party estimates and where the sample has been expanded to incorporate foreign-denominated bonds and bonds with options (see below).

The QCA agrees with Incenta that the previous DBCT decision is not a precedent for adopting the single regression of BBB+ bonds for Aurizon Network's 2017 DAU. As indicated above, the QCA considers that the application of the PwC methodology needs to be flexible in order to provide for an appropriate debt risk premium for the averaging period—catering for changes in bond market conditions over time and making the best use of the available data at a point in time. While the application of the single credit rating regression might have been appropriate in the circumstances of the DBCT investigation (that is, for the sample of BBB bonds obtained for the relevant averaging period), the QCA does not consider that the single credit rating (BBB+) regression is appropriate for estimating Aurizon Network's debt risk premium for its proposed credit rating and averaging period. This is particularly the case given the very limited number of BBB+ bond observations available.<sup>647</sup>

#### Pooled BBB+ regression

The pooled regression method can overcome the problem of an insufficient number of bond observations in a single credit rating band in order to provide a more reliable estimate of the debt risk premium.

As noted by Aurizon Network, the premise of using a pooled sample is that the higher yields on BBB bonds will be approximately offset by lower yields on A– bonds, thereby providing an unbiased estimate of the yield on bonds rated BBB+.<sup>648</sup> However, this assumption is violated if there is material asymmetry in the

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<sup>644</sup> The proposed averaging period (June 2017) contains a different sample of bonds to that obtained from the indicative averaging period (June 2016) adopted by Aurizon Network.

<sup>645</sup> Incenta Economics 2017: 88.

<sup>646</sup> Incenta Economics 2017: 88.

<sup>647</sup> By comparison, 25 BBB bonds were available for the DBCT analysis (QCA 2016b: 66).

<sup>648</sup> Aurizon Network, sub. 1: 275.



change in the debt risk premium on either side of the benchmark credit rating.<sup>649</sup> Where this is the case, the pooled regression approach can result in sample bias.

Accordingly, Incenta emphasised that it is necessary practice to examine whether the pre-conditions required to apply this method have been met. These conditions are:

- no material bias in the bond sample—the average implied credit rating of the pooled bond sample used in the regression should approximate the target credit rating
- no material asymmetry in the debt risk premiums of credit rating bands—the average debt risk premium differential between the bonds in the target band and the bonds in the band on either side of the target credit rating band should be approximately equal
- no material debt risk premium ‘aberrations’/‘influential bonds’.

Incenta said that when one of these conditions is not met, its approach is to investigate ways of overcoming the potential for distorted estimates of the debt risk premium and to obtain the most appropriate estimate based on the available data.<sup>650</sup>

Observing the bonds in its pooled BBB+ regression, CEG considered that:

- the margins between adjacent credit notches appear to be asymmetric, which could result in biased estimates from the pooled regression
- the slopes of each credit notch also visually appear to be somewhat unequal, with A– bonds appearing to have flatter slopes than bonds within the other credit rating bands
- two possible BBB– outliers can be observed<sup>651</sup>, although CEG considered there is not a good reason to exclude these bonds from the sample.<sup>652</sup>

CEG said that asymmetries in the margins and slopes of adjacent rating notches could result in biased estimates from the pooled regression and pooled regression with dummy variables approaches. As such, CEG concluded that the criteria for departing from the PwC methodology pooled regression estimate are met.<sup>653</sup>

As noted above, Incenta also applied the pooled BBB+ regression for the 20-day averaging period to 30 June 2017. The 53 bonds in the pooled regression produced a 10-year BBB+ debt risk premium estimate of 1.81 per cent.

However, Incenta observed that:

- the weighting of bonds used to derive the pooled regression estimate is materially weighted towards the A– band, indicating a potentially substantial degree of bias towards the A– credit rating category
- an overwhelming majority of the BBB+ debt risk premium observations lie above the regression line.<sup>654</sup>

Incenta concluded that these two observations indicate that the relevant pre-conditions for applying the pooled BBB+ regression are not met.<sup>655</sup> As a result, Incenta considered that, in this instance, the pooled

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<sup>649</sup> In other words, there is asymmetry if the average difference between A– and BBB+ premiums is not equal to the average difference between BBB+ and BBB premiums.

<sup>650</sup> Incenta Economics 2017: 102.

<sup>651</sup> Bonds issued by Glencore Australia Holdings and Alumina Ltd.

<sup>652</sup> Aurizon Network, sub. 5: 19–20.

<sup>653</sup> Aurizon Network, sub. 5: 22–23.

<sup>654</sup> Incenta Economics 2017: 102–106.

<sup>655</sup> Incenta Economics 2017: 106.

regression method was likely to underestimate a benchmark BBB+ debt risk premium. As a result, Incenta did not place reliance on the pooled regression estimate.

Given that the pre-conditions for applying the pooled regression method are not met, the QCA considers it is not appropriate to estimate Aurizon Network's debt risk premium using the pooled regression method for the proposed averaging period. Given the potential sample bias for the averaging period, adopting a 1.81 per cent debt risk premium would likely result in an estimate that is inappropriate for Aurizon Network's 2017 DAU and does not reflect Aurizon Network's efficient debt costs. This conclusion is also supported by the estimates obtained from other regression methodologies and by referencing the 'cross-checks', including third party estimates and where the sample has been expanded to incorporate foreign-denominated bonds and bonds with options.

### Dummy variable regression

The pooled regression with dummy variables approach uses statistical methods to allow for differences in intercepts between credit ratings. That is, it incorporates more information (inserts dummy variables) rather than assuming the pooled sample exhibits symmetry in the debt risk premiums of credit rating bands.

Incenta noted that in devising the PwC methodology, PwC was open to applying the dummy variables method, but found that it provided unreasonable results at the time of its application.<sup>656</sup> Specifically, at the time of the PwC report, the BBB+ debt risk premium estimate using the dummy variables regression was higher than the BBB debt risk premium estimate and also inconsistent with other evidence.<sup>657</sup> It was hypothesised that this might have been caused by a small, and possibly unrepresentative, set of BBB+ bonds in the sample at that time.

From observations of the bonds in its pooled sample, CEG considered that the slopes of each credit notch visually appear to be somewhat unequal—the A– bonds appear to have flatter slopes than bonds with the other credit ratings. CEG submitted that Incenta has previously noted that such asymmetry could also result in biased estimates for the pooled regression with dummy variables, as the dummy variables only accommodate differences in levels but not differences in slopes.<sup>658</sup> As such, CEG considered that these asymmetries could result in biased estimates for the dummy variables regression.<sup>659</sup>

Incenta obtained an estimate of 2.04 per cent applying the dummy variables regression to the 20-day averaging period to 30 June 2017.

In its initial application of this methodology, Incenta observed that:

- the 16 BBB bond observations were 1.6 basis points above the BBB+ function
- the 32 A– bond observations were 21.2 basis points below the BBB+ function.

While the very small differential between the BBB and BBB+ bonds is not expected given the higher risk of BBB rated bonds, Incenta reported that this may be due to the relatively small numbers of BBB and BBB+ bonds, as well as the model specification, which constrains all three functions to a single slope. In any case, Incenta considered that the primary concern is to estimate the BBB+ function.<sup>660</sup>

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<sup>656</sup> PwC 2013: 55.

<sup>657</sup> For example, the estimated debt risk premium for A– bonds and the output of the Bloomberg fair value curve.

<sup>658</sup> Incenta 2016b.

<sup>659</sup> Aurizon Network, sub. 5: 19–20, 23.

<sup>660</sup> Incenta Economics 2017: 107.

Importantly, Incenta noted that the concern that PwC had with the dummy variables approach is no longer present, with the predicted BBB+ debt risk premium using the dummy variables approach sitting between the A– and BBB curves.<sup>661</sup>

For the proposed averaging period, Incenta considered the dummy variables regression provides the most robust estimate, in comparison to the other regression methods discussed above. Furthermore, Incenta noted that its cross-checks with other data sources (discussed below) also reinforce its conclusion. As such, Incenta's preference is to retain all bonds in the sample and use statistical methods to allow for differences in yields between credit ratings in order to maximise the use of the data available.<sup>662</sup>

In response, CEG considered that the estimation methodology applied by Incenta contains certain shortcomings that should be addressed by the QCA.<sup>663</sup> In particular, CEG submitted that there are two key problems with Incenta's dummy variable estimates:

- The sample of bonds used by Incenta shows that the dummy variable model assumption of the debt risk premium curves having the same slope across all credit ratings is false. In particular, the slope of the A– regression line is much flatter, and statistically significantly different, than the slope of the other regression lines, making it inappropriate to include A– bonds in a dummy intercept regression that assumes the same slope for all credit ratings. As a result, the dummy intercept regression method is biased downwards by the smaller slope coefficient of the A– bonds.
- The dummy variable estimates show that the difference between BBB and BBB+ debt risk premiums is only 0.2 basis points, suggesting that the BBB and BBB+ bonds identified from Incenta's search criteria should be pooled.<sup>664</sup>

CEG considered that Incenta's debt risk premium estimate is unreasonable because it is based on a methodology that, given the available data set, is unduly biased by the inclusion of A– bonds.<sup>665</sup>

However, Incenta remained of the view that the dummy variable regression generates a robust BBB+ debt risk premium estimate. Underpinning its model specification is an *a priori* expectation of the same slope for the debt risk premiums of BBB, BBB+ and A– bonds with respect to term. Incenta considered that its underlying assumption, which is based on its experience and observation of the behaviour of bond data, is further supported by the following:

- The broad BBB band and broad A band estimates derived by the RBA imply almost parallel linear functions for the broad BBB and broad A credit rating bands for the proposed averaging period.
- On average, from January 2010 to April 2018, the slopes of the RBA's broad A and BBB curves were approximately the same, with the A curve having a slightly higher, but not statistically significantly higher, slope. By contrast, the intercept of the BBB curve is statistically significantly higher than the intercept of the A curve.<sup>666</sup>

Noting the small size and idiosyncratic nature of the sample of bonds being analysed, Incenta did not think the statistical evidence presented by CEG was convincing to warrant a change in approach, noting:

- CEG's finding that the slope of BBB and BBB+ bonds with respect to term is greater than A– bonds appears to be sensitive to (and a function of) the behaviour of bonds in the sample with short terms to

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<sup>661</sup> Incenta Economics 2017: 108.

<sup>662</sup> Incenta Economics 2017: 88.

<sup>663</sup> Aurizon Network, sub. 45: 3; sub. 40: 130.

<sup>664</sup> Aurizon Network, sub. 40: 131; sub. 45: 1, 6, 13, 16–17.

<sup>665</sup> Aurizon Network, sub. 45: 2.

<sup>666</sup> Incenta Economics 2018: 8–12.

maturity. If all bonds with a term of less than two years are removed, the differences in the slopes between credit ratings are no longer statistically significant.

- Similarly, when the Coca-Cola Amatil bond (EJ4333419 Corp) is excluded from the sample (as discussed above), the differences in the slopes between credit ratings are no longer statistically significant. That is, for the 53 bond sample, there is no evidence that either the slopes or intercepts between credit ratings are different by an amount that is statistically significant.
- There are no BBB+ or BBB bonds with a term of more than seven years (and only three with terms between five and seven years) in the sample, whereas there are four A– bonds with terms between eight and 10 years.

While agreeing that the finding of a 0.02 basis point differential between the BBB and BBB+ functions is anomalous on *a priori* grounds, the idiosyncratic factors of each bond are not likely to cancel each other out in a relatively small sample size, the way that ordinarily occurs with larger samples. Incenta did not consider that the statistical finding of a 0.02 basis point differential between the BBB and BBB+ functions provides a strong reason for changing the model specification. Rather, *a priori* reasoning—an expectation that, other things being equal, BBB bonds would require a higher yield than BBB+ bonds, as the former have a greater risk of default—should be the primary driver of model specification in this instance.<sup>667</sup>

Incenta considered that—given the small sample of bonds, the idiosyncratic nature of some of those bonds and the materially different interpretations of that evidence depending on the choices that are made with respect to model specification—it is important to draw upon additional information where possible to road test the results.

The QCA considers that the dummy variables regression provides the most appropriate estimate of Aurizon Network's debt risk premium for the proposed averaging period. This regression method overcomes deficiencies identified in applying the single credit rating (BBB+) regression and the pooled BBB+ regression for the proposed averaging period, including:

- the unreliability of the single BBB+ rating regression due to it being based on only seven bond observations
- the imbalance in the relative number of A– bond observations in the pooled regression sample.

The QCA recognises the two matters outlined by CEG with respect to the dummy variables regression estimates. However, the slope of the A– regression does not appear to be statistically significantly different to the slopes of the BBB+ and BBB regressions for the 53 bond sample. In any case, the outcomes identified by CEG are likely due to a small sample of bonds and idiosyncratic nature of some of the bonds in the sample. As such, based on the evidence provided, the QCA is not of the view that the debt risk premium estimate obtained from the dummy variables regression is inappropriate (or unduly biased by the inclusion of A– bonds) for Aurizon Network's 2017 DAU.

While the dummy variables regression estimate is supported by *a priori* reasoning, the small sample of bonds and the idiosyncratic nature of some of those bonds suggests that care needs to be taken in adopting the estimates provided from this regression approach. The QCA considers it essential that the analysis also considers estimates obtained from relevant 'cross-checks' as a further reference point to inform an assessment of the estimated debt risk premiums from this regression method.

A debt risk premium estimate of 2.04 per cent is supported by the cross-checks undertaken by Incenta, including where the sample has been expanded to incorporate foreign-denominated bonds and bonds with options, and third party estimates. This analysis is presented below.

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<sup>667</sup> Incenta Economics 2018: 11–12.

As such, the QCA considers that the dummy variables regression provides an appropriate estimate of Aurizon Network's debt risk premium for the proposed averaging period.

Nevertheless, the QCA has also considered the reasonableness of Aurizon Network's proposal to use alternative regression methods to estimate the debt risk premium for the 2017 DAU.

#### Alternative regression approaches proposed by CEG

CEG estimated a range for the debt risk premium with the lower and upper bound of this range based on two alternative regression approaches:

- a slope dummy variable regression
- a pooled BBB/BBB+ regression.

The QCA has considered the merits of using these two regression approaches to estimate Aurizon Network's debt risk premium.

#### Slope dummy variable regression

CEG considered that if A– bonds are to be pooled with the BBB and BBB+ bonds, it is critical that a dummy for slopes is used because it is clear from the data that the main source of difference is the slopes of the credit rating regressions (not the intercepts).<sup>668</sup>

Specifically, a visual assessment of the regressions suggests that the A–, BBB+ and BBB bonds have similar intercepts but the BBB+ and BBB bonds have very different debt risk premium slopes than the A– bonds. Aurizon Network submitted that the slope of the A– regression line in the figure is much flatter than the slopes of the other regression lines, with evidence that the slopes also diverge as the years to maturity for a bond falls. CEG advised that the A– slope is statistically significantly different to that of the pooled BBB and BBB+ regression. This assessment suggests that the (intercept) dummy variable regression is not appropriate for this dataset but a slope dummy variable regression may be.<sup>669</sup>

CEG concluded that this clearly makes it inappropriate to use A– bonds in a pooled regression that assumes the same slope for all credit ratings. To do so will bias down the estimated BBB+ slope and, as a result, bias down the 10-year BBB+ estimate.<sup>670</sup>

As such, CEG considered that A– bonds can either be excluded completely or be assigned a slope dummy variable. CEG's analysis suggested that the A– slope dummy variable is statistically significant, while the A– intercept dummy variable is not. Therefore, CEG considered it more appropriate to omit the A– intercept dummy variable while retaining the A– slope dummy variable, noting that retaining both A– dummy variables generates debt risk premium estimates that are numerically equivalent to excluding A– bonds from the regression.<sup>671</sup>

However, Incenta did not consider that the regression specifications applied by CEG are appropriate for interpreting the bond sample.

Incenta did not consider it appropriate or best practice to select variables for empirical exercises based purely on their statistical significance rather than on the basis of an a priori hypothesis formulation, particularly where the analysis is being performed on small samples. In any case, Incenta did not find the statistical evidence that CEG identified for the slope of the A– function being different to the slope of the

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<sup>668</sup> Aurizon Network, sub. 45: 19; sub. 40: 132.

<sup>669</sup> Aurizon Network, sub. 45: 14, sub. 40: 132.

<sup>670</sup> Aurizon Network, sub. 45: 16–17; sub. 40: 132.

<sup>671</sup> Aurizon Network, sub. 45: 1.

BBB+ and BBB functions to be convincing. Rather, Incenta's analysis showed CEG's results to be sensitive to (and a function of) the behaviour of bonds in the sample with short terms to maturity. In particular:

- the statistical significance of the A– slope dummy disappears when the Coca-Cola Amatil bond (EJ4333419 Corp) is removed from the sample
- the statistical significance of the difference reduces further if all bonds with a term of less than two years are excluded (which is consistent with the ERAWA's practice), which demonstrates the sensitivity of CEG's results to the position of bonds with short terms—which have very little relevance for the target BBB+ bond term of 10 years.<sup>672</sup>

Incenta noted that the practical consequence of CEG excluding the A– intercept dummy and including only a dummy variable for the slope of A– bonds is that the A– bonds have little (or no) influence on the slope of the BBB+ and BBB functions. Given there are few long-dated BBB and BBB+ bonds (and none with a term of more than 7 years), an estimate of a 10-year BBB+ debt risk premium that considers only these bonds implies a material extrapolation is being made from the range of the data being considered. In contrast, the (intercept) dummy variables regression harnesses the much greater information available from the A– bonds as to the debt risk premium for long term bonds.<sup>673</sup>

As outlined above, the QCA does not agree with CEG that the 'intercept dummy variables' regression (that is, the dummy variable regression assessed above) will necessarily bias down the estimated BBB+ slope and, as a result, bias down the 10-year BBB+ estimate for Aurizon Network's 2017 DAU. Additionally, noting the small size and idiosyncratic nature of the sample of bonds being analysed, the QCA agrees with Incenta that:

- it is not necessarily best practice to select variables for empirical exercises based purely on their statistical significance rather than on an a priori hypothesis formulation
- the statistical evidence that CEG identifies for the slope of the A– function being different to the slope of the BBB+ and BBB functions is not convincing.

Noting the characteristics of the bond sample,<sup>674</sup> the QCA is of the view that the 'intercept dummy variables' regression provides the additional benefit of retaining the slope information from the long-term A– bonds in the regression to calculate the 10 year BBB+ debt risk premium.

In any case, the QCA has considered the reasonableness of the proposed slope dummy variable regression approach, by reviewing and comparing the resulting estimates with alternative debt risk premium estimates. In contrast to the estimate obtained using the 'intercept dummy variables' regression, a debt risk premium estimate of 2.32 per cent is not supported by the cross-checks undertaken by Incenta (see below).

For these reasons, the QCA does not consider it appropriate to use the proposed slope dummy variable regression approach.

#### **Pooled BBB/BBB+ regression**

CEG submitted that the difference between the dummy regression estimates of the BBB and BBB+ debt risk premiums is not statistically significant (0.2 basis points). CEG considered that this is a critical finding and suggests that the BBB and BBB+ bonds can reasonably be pooled to arrive at an estimate of BBB+ yields. CEG said that, if one accepts the results of the dummy variable model then one must, in good conscience,

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<sup>672</sup> Incenta Economics 2018: 13–15.

<sup>673</sup> Incenta Economics 2018: 14.

<sup>674</sup> There are no BBB+ or BBB bonds with a term of more than 7 years, and only 3 with terms between 5 and 7 years, in the sample.

recommend pooling BBB and BBB+ bonds because this regression suggests that there is no statistical or economic difference between these bonds.<sup>675</sup>

CEG submitted that the single-rating BBB+ regression generates a 10-year estimate that is slightly higher than the corresponding single-rating BBB estimate, but this difference is very small and is not statistically significant. Pooling the BBB and BBB+ bonds results in a sample of 23 bonds.<sup>676</sup> CEG noted that, when BBB and BBB+ bonds are pooled, the resulting 10-year debt risk premium regression line is, naturally, very similar to the BBB and BBB+ regression lines. The pooled regression has a slope and intercept that is between the BBB and BBB+ slopes and intercepts. CEG considered that pooling BBB and BBB+ bonds has the material advantage of increasing the sample size without the need to include A– bonds, which clearly have a different intercept and slope to those of the BBB and BBB+ bonds.<sup>677</sup>

CEG concluded that the inclusion of each credit rating notch in a pooled regression must be assessed on its own merits. CEG said that the analysis it performed shows that adding BBB bonds to BBB+ bonds will reduce variance without any material increase in bias.<sup>678</sup>

CEG argued the pooling of BBB and BBB+ bonds represents a flexible response to the qualities that are observable in the bond data. In particular, CEG considered it reflects a reasoned assessment of the trade-offs between the weaknesses of the various regression models. Specifically:

- the single BBB+ credit rating approach has too small a sample size to be reliable
- the differences between BBB+ and A– bonds means that inclusion of the latter in the pooled regression and dummy variable approaches both suffer from material bias – reflecting both asymmetry in sample sizes across credit ratings and, in the case of the latter, the difference in slopes and levels
- by contrast, the similarity between BBB+ and BBB bonds makes pooling of these bonds an appropriate response to the lack of BBB+ bonds.<sup>679</sup>

The QCA does not agree with CEG that the pooling of the BBB and BBB+ bonds represents a reasoned assessment of the trade-offs between the weaknesses of the various regression models.

As noted by CEG as justification for adopting the pooled BBB+/BBB regression approach, the single credit rating (BBB+) regression has too small a sample size to deliver a reliable and robust empirical estimate of the BBB+ debt risk premium. Therefore, the QCA does not consider that a presence of no statistical difference between the BBB+ and BBB bonds provides sufficient justification for pooling the bonds to produce a BBB+ estimate. Given the individual BBB and BBB+ bond samples do not provide for a reliable estimate of the corresponding debt risk premiums, it does not follow that pooling of these two samples will necessarily provide a reliable representation of a BBB+ debt risk premium estimate. It may simply be the case that the statistical difference between the BBB+ and BBB bonds is further evidence of the unreliability of the BBB+ regression.

Furthermore, as stated by Incenta, for the sample of 53 bonds there is no evidence that either the slopes or intercepts between credit ratings are different by an amount that is statistically significant (once the Coca-Cola Amatil bond (EJ4333419 Corp) is removed from the sample). Incenta considered that the logic applied by CEG would suggest this result justifies applying a pooled sample with no dummy variables. Such

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<sup>675</sup> Aurizon Network, sub. 40: 131; sub. 45: 15.

<sup>676</sup> CEG noted that this sample size is two less than that contained in Incenta's preferred sample containing 25 bonds for the DBCT decision.

<sup>677</sup> Aurizon Network, sub. 40: 131–132; sub. 45: 1, 15–17.

<sup>678</sup> Aurizon Network, sub. 40: 133; sub. 45: 22.

<sup>679</sup> Aurizon Network, sub. 40: 132; sub. 45: 20.

an approach would yield a BBB+ debt risk premium estimate of 1.80 per cent.<sup>680</sup> However, Incenta is clear that it has not applied such an approach because its *a priori* views support including dummy variables for the intercepts.

While CEG has noted that certain assumptions for adopting a dummy variable regression approach have not been met in this instance, it is clear that CEG's proposal does not meet the pre-conditions required to apply a pooled regression method. With the exclusion of A- bonds from the sample, there is an obvious material bias in the bond sample, with the average implied credit rating of the pooled bond sample used in the regression biased toward a lower credit rating than the target BBB+.

From these initial considerations, it is clear that by the very nature of CEG's proposed alternative regression methodology, the weighting of bonds used to derive the pooled BBB+/BBB regression estimate is materially weighted towards the BBB band, indicating a potentially substantial degree of bias towards the BBB credit rating category.

As outlined by Incenta, the QCA would expect that, other things being equal, BBB bonds would require a higher yield than BBB+ bonds as the former have a greater risk of default.<sup>681</sup>

The pooled statistic seeks to estimate a BBB+ debt risk premium using observations in more than one credit rating sample (BBB, BBB+ and A- bond samples). Indeed, combining credit rating sample statistics to calculate a pooled estimate in the manner proposed by CEG will provide a biased estimate as the individual bond samples do not provide an unbiased estimate of the shared population parameter—the BBB+ debt risk premium.

Therefore, the QCA considers that the CEG's proposed pooled BBB+/BBB regression methodology is both unreliable and biased toward the BBB credit rating category.

In any case, the QCA has also assessed the reasonableness of the proposed pooled BBB+/BBB regression approach, by reviewing and comparing the resulting estimates with alternative debt risk premium estimates. A debt risk premium estimate of 2.45 per cent is not supported by the cross-checks undertaken by Incenta (see below).

In relation to third party estimates, CEG reported the BBB debt risk premium estimates from the third-party sources for the averaging period (see Table 43), all of which are below the best estimate obtained from using the pooled BBB+/BBB regression approach. This supports the assertion that the resulting estimate may be biased upward toward the debt risk premium for a BBB credit rating.

As noted by CEG, including foreign currency bonds reduces the estimated debt risk premium at 10 years by around 15 to 30 basis points, depending on the regression in question. Furthermore, CEG submitted that including bonds with options further reduces the estimate by a similar magnitude.<sup>682</sup>

From the analysis above, the QCA considers that the proposed pooled BBB+/BBB regression approach will not deliver a reliable and robust empirical estimate of the BBB+ debt risk premium. This methodology will provide a debt risk premium that is biased upward toward the debt risk premium for a BBB credit rating. Further, the estimate of 2.45 per cent obtained from this methodology appears inappropriate in comparison to 'cross-checks', including third party estimates, and where the sample has been expanded to incorporate foreign-denominated bonds and bonds with options.

For these reasons, the QCA does not consider it appropriate to use the proposed pooled BBB+/BBB regression approach.

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<sup>680</sup> Incenta Economics 2018: 15.

<sup>681</sup> Incenta Economics 2018: 12.

<sup>682</sup> Aurizon Network, sub. 45: 24.



### Other debt risk premium estimates

To provide for a check on the estimate of 2.04 per cent for Aurizon Network's debt risk premium, this section compares the results obtained from the PwC methodology against debt risk premium estimates obtained from other sources. These include:

- estimates published by third party data providers
- alternative functional forms
- estimates obtained using an expanded sample, which includes foreign bonds and bonds with optionality.

### Third party estimates

To enable a comparison of estimation results, CEG considered the following third party sources of 10-year<sup>683</sup> debt risk premium estimates as part of its analysis:

- Bloomberg AUD Australia Corporate BBB+ BBB BBB– BVAL Yield Curve
- Reuters BBB rating AUD credit curve
- RBA estimates of average BBB debt risk premiums for non-financial Australian corporates.

The initial debt risk premium estimates obtained by CEG from these third parties (as at 30 June 2016) were all above its proposed estimate of 2.47 per cent using the single credit rating (BBB+) regression (see Table 43). CEG submitted that the debt risk premium estimates obtained using the PwC methodology have typically been lower—and seldom materially above—the third party estimates.<sup>684</sup>

Following the proposed averaging period, CEG reported the BBB debt risk premium estimates from the third party sources for the averaging period (see Table 43). CEG submitted that the mean of the BBB debt risk premium estimate from these sources is 2.31 per cent and that two of the three sources are within the range of CEG's best estimate. CEG noted that these cross-checks fall above Incenta's best estimate.<sup>685</sup>

**Table 43 CEG's third party estimates for a BBB+ debt risk premium**

<i>Source</i>	<i>Initial estimate (as at 30 June 2016)</i>	<i>Averaging period estimate (as at June 2017)</i>
Bloomberg BVAL	2.69%	2.34%
RBA (BBB)	2.79%	2.18%
Reuters (BBB)	2.94%	2.42%

Source: Aurizon Network, sub. 1: 276; Aurizon Network, sub. 45: 2.

However, Incenta did not agree that the estimates obtained using the PwC methodology have typically resulted in lower estimates than estimates from third party providers. Incenta reported that CEG's analysis has assumed that the broad BBB estimates (comprising the BBB–, BBB and BBB+ bands) proxy for a BBB+ estimate, when the average credit rating of the sample used by the respective curves is typically BBB.<sup>686</sup>

Incenta submitted that the only practical way to cross-reference its estimates to the third party fair value curves produced by the RBA and Bloomberg is to interpolate the broad BBB and broad A fair value curves

<sup>683</sup> CEG extrapolates each third party series to 10 years (where necessary) using the AER's extrapolation methodology (Aurizon Network, sub. 5: 24).

<sup>684</sup> Aurizon Network, sub. 5: 23–24.

<sup>685</sup> Aurizon Network, sub. 40: 133; sub. 45: 2, 23.

<sup>686</sup> Incenta Economics 2017: 21.

that they publish in order to obtain a BBB+ yield (as these providers do not publish a BBB+ yield curve). Given that there are two credit rating notches between the BBB and A credit rating bands, Incenta applied a weighting of 0.67:0.33 to the observed, third party BBB and A debt risk premiums (respectively) at 10 years to obtain an interpolated BBB+ debt risk premium. This approach for interpolating the third party estimates assumes there is no inherent bias in the RBA or Bloomberg estimates.<sup>687</sup>

On the assumption that the samples are unbiased (relative to the central BBB and A credit rating bands), Incenta obtained an interpolated (average) debt risk premium of 2.02 per cent. The interpolated Bloomberg estimate of 2.06 per cent defined the upper end of the BBB+ range and the interpolated RBA estimate of 1.99 per cent defined the lower end of the range.<sup>688</sup>

The QCA considers that the third party debt risk premium estimates calculated by Incenta support a debt risk premium of 2.04 per cent. In particular, the debt risk premium estimate obtained from the dummy variables regression sits in the estimated range of 1.99 per cent (Bloomberg) to 2.06 per cent (RBA) of third party estimates.

As outlined above, CEG made the observation that Incenta's pooled regression results show that BBB+ and BBB debt risk premium estimates are neither statistically nor economically significantly different. CEG submitted that this observation suggests that using third-party BBB estimates is an appropriate proxy for the benchmark BBB+ estimate, as opposed to Incenta's weighted average approach of BBB and A third-party estimates. CEG said that Incenta's method assumes that each credit rating notch has the same premium to the next highest credit rating notch.<sup>689</sup>

As outlined above, the QCA does not think that the statistical evidence provided by CEG is convincing. The QCA considers that CEG's proposed pooled BBB+/BBB regression methodology is both unreliable and biased toward the BBB credit rating category. The QCA is not of the view that using third party BBB estimates is an appropriate proxy for the benchmark BBB+ estimate.

Additionally, CEG considered that using third party BBB estimates is consistent with PwC, which previously considered the Bloomberg BBB curve as an alternative to an econometric estimate of the benchmark BBB+ debt risk premium.<sup>690</sup>

As noted previously, the extrapolated 10 year Bloomberg BBB FVC estimate (which by convention has been accepted as the BBB+ estimate) is 325 basis points.<sup>691</sup>

However, Incenta considered that CEG is reading too much into the statements in PwC about the Bloomberg curve. Incenta does not believe the PwC report can be read as saying that the Bloomberg BBB fair value curve provides an acceptable estimate of the BBB+ debt risk premium. The PwC statement was a summary of the AER's method of deriving an estimate of the 10-year BBB+ debt risk premium. The statement did not contain an endorsement of the AER's method, or an endorsement of the Bloomberg curve irrespective of how the method that Bloomberg applies to fit the curve or the composition of the sample may change.<sup>692</sup>

CEG submitted that Incenta did not appear to have adjusted the RBA third party estimates to account for the fact that the effective tenor is generally materially shorter than the 10-year target tenor.<sup>693</sup>

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<sup>687</sup> Incenta Economics 2017: 109.

<sup>688</sup> Averaging the BBB estimates produces an estimate of 2.26%, while the respective A rating estimate is 1.55%.

<sup>689</sup> Aurizon Network, sub. 45: 2, 23.

<sup>690</sup> Aurizon Network, sub. 45: 2, 8.

<sup>691</sup> PwC 2013: 42.

<sup>692</sup> Incenta Economics 2018: 14.

<sup>693</sup> Aurizon Network, sub. 45: 9.

However, Incenta confirmed that it did adjust the RBA's third party estimates of 'effective 10-year yields' for the BBB and AAA credit rating bands to the 'target tenor' of 10 years using the Lally extrapolation method that is applied by the AER.<sup>694</sup> On average, the extrapolation added 10.8 basis points per annum to the yield, which was then raised further by conversion of the semi-annual rates to effective annual rates.<sup>695</sup>

#### Foreign bonds and bonds with optionality

Aurizon Network submitted that, if the PwC methodology is adopted, the sample of bonds should be broadened to include foreign bonds issued by Australian entities, as well as bonds with optionality (applying the adjustments for optionality consistent with the ERA). Aurizon Network considered that the inclusion of bonds issued by Australian entities offshore:

- broadens the sample size and reduces the risk of estimation error
- is consistent with Aurizon Network's actual circumstances, where it needs to issue debt in domestic and global markets in order to efficiently meet its capital needs.<sup>696</sup>

CEG considered that the application of the PwC methodology to a broader sample could result in debt risk premiums that are less sensitive to issues pertaining to small sample sizes.<sup>697</sup>

Incenta considered that there is merit in considering the results obtained with an expanded sample, in the context of providing another cross-check of the results obtained using the PwC methodology (that is, in addition to the cross-check from referring to estimates published by Bloomberg and the RBA).<sup>698</sup>

In this context, Incenta noted that the tasks of deriving option-adjusted yields and AUD-equivalent yields for foreign-denominated bonds are relatively low-cost and straightforward compared with the period of PwC's original report. More importantly, Incenta found that, in most cases, the actual adjustment required to the yield of bonds with such features is relatively minor. Accordingly, Incenta was therefore less concerned than PwC about the potential for analyst-induced error. Incenta also noted that several Australian regulators currently either have regard to the RBA's third party fair value yields (which are based, in part, on foreign-issued bonds), or directly employ yield data that incorporates Australian bonds issued in foreign currencies.<sup>699</sup>

Incenta considered that, while there is currently a sufficient number of Australian-denominated bonds without embedded options to undertake a rigorous empirical estimate of the BBB+ credit rating band, expanding the sample to include both foreign currency-denominated bonds issued by Australian firms and AUD-denominated bonds with options serves as a useful cross-check.<sup>700</sup>

To incorporate an expanded sample, Incenta adopted the ERA's method of bond yield adjustment, which incorporates Bloomberg's option-adjusted spread (OAS) facility. Incorporating these additional bonds into the sample increased the pooled sample size by a further 64 bonds, to 146 bonds. Applying values of 1, 2 and 3 to bonds with credit ratings of A-, BBB+ and BBB respectively, the weighted average credit rating for the expanded sample suggests a slight bias towards A- (1.93).

In relation to the expanded sample, CEG identified nine additional bonds that were not included in Incenta's expanded sample.<sup>701</sup> Incenta reassessed the bonds and considered that three of the bonds did not meet its

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<sup>694</sup> CFC 2014.

<sup>695</sup> Incenta Economics 2018: 16.

<sup>696</sup> Aurizon Network, sub. 1: 277, 279.

<sup>697</sup> Aurizon Network, sub. 5: 34.

<sup>698</sup> Incenta Economics 2017: 89–91.

<sup>699</sup> Incenta Economics 2017: 89–91.

<sup>700</sup> Incenta Economics 2017: 89–91.

<sup>701</sup> Aurizon Network, sub. 45: 10–11.

criteria for inclusion, but six of the bonds should have been included (increasing the expanded sample to 152 bonds<sup>702</sup>):

- Three BBB+ bonds (AN7512055, AN89778743 Corp and AN8979139 Corp) were excluded as they were issued during the averaging period and did not have a full period of observations.
- Six bonds identified by CEG are callable floating rate bonds, which Incenta acknowledged should have been included in the expanded sample—three of these bonds are BBB rated and three bonds are A-rated.<sup>703</sup>

Incenta undertook a single credit rating (BBB+) regression and a dummy variables regression using the expanded sample. The results of these regressions for the proposed averaging period are in Table 44. Incenta did not undertake a pooled BBB+ regression for the expanded sample, since the dummy variable approach provides plausible estimates based on a large sample of bonds, and there are 37 BBB+ bond observations with which to undertake a single credit rating regression.<sup>704</sup>

**Table 44 Incenta's estimates of the debt risk premium for the expanded sample**

<i>Method</i>	<i>Number of bonds in sample</i>	<i>Estimate</i>
Single credit rating (BBB+) regression	37	2.04%
Dummy variable regression	151	2.0%

Source: *Incenta Economics 2017*.

Incenta's key finding is that the estimate obtained from the expanded sample is very similar to the estimate of 2.04 per cent—regardless of the estimation method, the estimates lie within  $\pm 5$  basis points of 2.04 per cent.<sup>705</sup>

Incorporating foreign bonds and bonds with optionality into the sample broadens the sample size. While this does not necessarily reduce the risk of estimation error (as this will depend on the nature of the data), including foreign currency-denominated bonds issued by Australian firms and AUD-denominated bonds with options attached provides a useful cross-check for Aurizon Network's debt risk premium estimate.

In response to Aurizon Network's assertion that this arrangement is consistent with its actual circumstances, the QCA does not consider that Aurizon Network's actual debt-financing arrangements are directly deterministic of an appropriate sample for estimating the debt risk premium—the debt risk premium is estimated based on an efficient benchmark firm that sources debt consistent with a 'simple' bond portfolio (discussed further in the section on transactions costs).

Following the draft decision, CEG submitted that it did not see any material advantages in terms of reduced variance from widening the 23 BBB and BBB+ pooled bond sample size, suggesting there may potentially be material costs in terms of increased bias.<sup>706</sup>

On the assumption that the benchmark is the issuance of AUD debt without options then the inclusion of foreign currency and bonds with options can only be justified to the extent that the benefits in terms of reduced variance (due to larger sample size) are outweighed by the costs in terms of increased bias (due to different yields on non AUD bonds and non-AUD bonds with

<sup>702</sup> CEG's expanded sample did not include bond EJ4333419 Corp issued by Coca-Cola Amatil (as discussed above) and bond EI4595803 issued by Goodman Funding (due to it having a negative 20% spread estimated using Bloomberg's OAS function). Incenta retained bond EI4595803 in its sample as a negative spread was not obtained for the bond at the time when Incenta ran its regression.

<sup>703</sup> Incenta Economics 2018: 6.

<sup>704</sup> Incenta Economics 2017: 109–110.

<sup>705</sup> Incenta Economics 2017: 113.

<sup>706</sup> Aurizon Network, sub. 40: 133.

options). Given that there are 23 BBB and BBB+ AUD bonds without options it is not clear that there are material advantages in terms of reduced variance from widening the sample while it is the case that there is potentially material costs in terms of increased bias.<sup>707</sup>

As noted above, the QCA does not agree with CEG that the pooling of BBB and BBB+ bonds represents a reasoned assessment of the trade-offs between the weaknesses of the various regression models. The QCA considers that CEG's proposed pooled BBB+/BBB regression methodology is both unreliable and biased toward the BBB credit rating category.

Noting that Incenta proposed the use of Bloomberg's OAS function to remove the impact of optionality on bond yields, CEG considered that the resulting yield estimates will be reliable as long as Bloomberg's OAS feature provides reliable estimates of the impact of optionality on bond yields. CEG was not aware of there being a comprehensive analysis of the accuracy of the Bloomberg's OAS feature.<sup>708</sup>

In response, Incenta noted that it has not tested whether Bloomberg's OAS feature provides a reliable estimate of the impact of optionality on bond yields, nor is it aware of any tests of the accuracy of this Bloomberg feature. However, Incenta noted that the ERAWA and Bloomberg apply the OAS feature to adjust the yields of callable bonds in their samples, and that CEG applies it in its own work and has been a consistent proponent of the use of bonds with embedded options—including in its advice to Aurizon Network for its 2017 DAU proposal.

Aurizon Network also submits that the sample of bonds should be broadened to include foreign bonds issued by Australian entities, as well as bonds with optionality (applying the adjustments for optionality consistent with the ERA).<sup>709</sup>

Noting that Incenta has not tested whether Bloomberg's OAS feature provides a reliable estimate of the impact of optionality on bond yields, the QCA considers that results obtained from the expanded sample should be interpreted with caution. In this instance, the QCA is only considering the information as part of its cross-checking exercise. The QCA notes that the use of the expanded sample was originally proposed in CEG's report to Aurizon Network.

CEG noted that including foreign currency bonds reduces the estimated debt risk premium at 10 years by around 15 to 30 basis points, depending on the regression in question. Furthermore, CEG submitted that including bonds with options further reduces the estimate by a similar magnitude.<sup>710</sup>

The QCA considers that the estimates obtained from the expanded sample support a debt risk premium of 2.04 per cent—the dummy variables regression estimate was four basis points lower (2.0%) than, and the single credit rating (BBB+) estimate was the same (2.04%) as, this estimate. The fact that there was little difference in the debt risk premium estimates whether or not foreign-denominated bonds are included in the sample is consistent with the theory of arbitrage in open capital markets. Therefore, the QCA considers that these findings provide further support that 2.47 per cent is not an appropriate debt risk premium, and that 2.04 per cent is an appropriate debt risk premium, for Aurizon Network for the proposed averaging period.

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<sup>707</sup> Aurizon Network, sub. 45: 24.

<sup>708</sup> Aurizon Network, sub. 45: 8.

<sup>709</sup> Aurizon Network, sub. 1: 275.

<sup>710</sup> Aurizon Network, sub. 45: 24.

### Alternative functional forms

Incenta also tested different functional forms for the debt risk premium, specifically the Nelson-Siegel (NS) and the Nelson-Siegel-Svensson (NSS) functional forms.<sup>711</sup> These functional forms have been applied by the ERA (NS and NSS) and the New Zealand Commerce Commission (NSS only). Incenta's analysis found:

- Applying alternative functional forms to the domestic bond sample using the pooled BBB+ regression approach produced estimates of 1.57 per cent and 1.60 per cent respectively for the NSS and NS forms.
- Applying alternative functional forms to the expanded sample using the dummy variables regression approach produced estimates of 1.99 per cent and 2.01 per cent respectively for each of the NSS and NS forms.
- Applying alternative functional forms to the expanded sample using the single credit rating (BBB+) regression approach obtained estimates of 2.02 per cent for both the NSS and NS forms.<sup>712</sup>

The QCA considers that the estimates obtained from the alternative functional forms also support the QCA's view that 2.47 per cent is not an appropriate debt risk premium, and that 2.04 per cent is an appropriate debt risk premium for Aurizon Network for the proposed averaging period.

### Sensitivity of the sample to specific bonds

From its analysis, CEG considered that the pooled regression results that exclude bonds issued by financial firms and bonds with options are sensitive to the inclusion of two Australia Pacific Airports (Melbourne Airport) bonds. CEG noted that the Melbourne Airport bonds:

- are the A– bonds with the lowest yield in the sample (excluding bonds issued by financial firms and bonds with maturity options)
- include a bond with a maturity greater than seven years—as there are only two bonds in the entire sample with a maturity greater than seven years, the Melbourne Airports bonds therefore have a lot of weight in the pooled regression.<sup>713</sup>

CEG considered that excluding the Melbourne Airport bonds increases the pooled estimate from 2.29 per cent to 2.51 per cent, which is above CEG's single credit rating (BBB+) regression estimate of 2.47 per cent (see Table 45).<sup>714</sup>

**Table 45 CEG's estimates of the debt risk premium with financial bonds and options excluded and Melbourne Airport bonds excluded**

<i>Pooled sample</i>	<i>A–, BBB+, BBB</i>		<i>BBB+, BBB, BBB–</i>		<i>A–, BBB+, BBB, BBB–</i>	
	<i>BBB+</i>	<i>BBB</i>	<i>BBB+</i>	<i>BBB</i>	<i>BBB+</i>	<i>BBB</i>
Pooled	2.51	-	-	2.60	-	-

<sup>711</sup> The Nelson-Siegel (NS) and Nelson-Siegel-Svensson (NSS) models are used by central banks to estimate and forecast the term structure of interest rates. The Nelson-Siegel model is a three-factor model that has sufficient flexibility to capture a range of monotonic, humped and S-type shapes typically observed in yield data. The Nelson-Siegel-Svensson model increases the flexibility of the Nelson-Siegel model by modelling an additional (fourth) factor, which is a second hump-type shape. For further discussion, see Nelson and Siegel 1987 and Svensson 1994.

<sup>712</sup> Incenta Economics 2017: 104, 113.

<sup>713</sup> Aurizon Network, sub. 5: 23.

<sup>714</sup> Aurizon Network, sub. 5: 23.

<b>Pooled sample</b>	<b>A-, BBB+, BBB</b>		<b>BBB+, BBB, BBB-</b>		<b>A-, BBB+, BBB, BBB-</b>	
	Dummy variables	2.44	2.61	2.29	2.44	2.32
<b>Single rating sample</b>	<b>BBB+</b>			<b>BBB</b>		
Single rating	2.47			2.63		

Source: Aurizon Network, sub. 5: 23.

Incenta considered that, at the time of CEG's estimation (June 2016), these two long-dated Melbourne Airport bonds had the potential to bias the estimate downwards. However, since this period, two additional, long-dated A- bonds with yields and terms to maturity not far from the two long-dated Melbourne Airport bonds were issued. Incenta considered that the presence of these additional bonds now makes it unnecessary to exclude any of them from the sample—and there is now no basis for treating any of them as outliers. Thus, Incenta retained all of these bonds in its sample.<sup>715</sup>

Incenta noted that excluding the two long-dated Melbourne Airport bonds increases its dummy variable regression estimate by 10 basis points. Additionally, Incenta reported that removing the two long-dated Melbourne Airport bonds has no perceptible influence on the BBB+ estimate obtained from the expanded sample.<sup>716</sup>

Therefore, the QCA considers that it is not appropriate to exclude the Melbourne Airport bonds without options from the bond sample for the June 2017 averaging period used to estimate Aurizon Network's debt risk premium.

### Benchmark debt financing transaction costs

Aurizon Network considered that an efficient allowance for debt-issuing and hedging costs should account for costs associated with domestic and foreign bond issues, given that Aurizon Network needs to access global markets to meet its capital requirements. Aurizon Network submitted that it has around 50 per cent of its debt outstanding in foreign currencies, which is likely to increase as the Australian debt market does not provide enough liquidity for longer-dated issues.<sup>717</sup>

Aurizon Network proposed to derive its efficient debt-issuing and hedging transaction cost allowances based on a one-third domestic debt and two-thirds foreign debt split. Aurizon Network considered this reflects its current view on the most efficient composition of its debt portfolio over the 2017 DAU regulatory period, having regard to its benchmark gearing level and domestic bond market constraints.<sup>718</sup>

Aurizon Network proposed three types of transaction cost allowances, including:

- debt-issuing costs
- cross-currency swap costs
- interest rate swap costs.

For its debt-issuing transaction cost allowance, Aurizon Network proposed a weighted average based on both domestic debt issues and foreign debt issues. Aurizon Network stated that the QCA's benchmark allowance for debt-raising costs of 0.108 per cent is derived with reference to domestic bond issues only.

<sup>715</sup> Incenta Economics 2017: 88–89.

<sup>716</sup> Incenta Economics 2017: 88–89.

<sup>717</sup> Aurizon Network, sub. 1: 278.

<sup>718</sup> Aurizon Network, sub. 1: 278; sub. 40: 133.

Aurizon Network noted that PwC, in its report to the QCA, reported that foreign bond issues attract 2.3 to 3.1 bps higher transaction costs. Therefore, Aurizon Network considered that an allowance of 0.108 per cent understates its efficient debt-raising costs.<sup>719</sup>

For the foreign debt issues, Aurizon Network stated that it uses cross-currency swaps to manage the exchange rate risk associated with foreign debt issues. Aurizon Network considered that an allowance should be provided for the efficient costs of cross-currency swaps, given that this is standard and efficient commercial practice.<sup>720</sup>

Additionally, Aurizon Network submitted that it will need to enter into interest rate swaps to convert the floating base rate to a 10-year fixed rate, to hedge the interest rate risk on the floating rate debt. Aurizon Network noted that Incenta has previously recommended to the QCA that the transaction cost to implement a four-year interest rate swap is around 4.3 bps per annum.<sup>721</sup>

Accounting for debt-raising costs, cross-currency swap costs and interest rate swap costs, Aurizon Network proposed total debt transactions costs of 0.262 per cent.

The QRC noted that it is unable to provide detailed comments on the appropriateness of the debt-raising and hedging costs given the breakdown of these costs has been redacted. The QRC considered that no specific allowance should be made for cross-currency swaps. The QRC considered that it seems highly unlikely that it would be appropriate to materially increase the debt-raising cost allowance from UT4, given that this decision was accepted as appropriate only a few months ago.<sup>722</sup>

In response, Aurizon Network submitted that the QCA's UT4 allowance for debt issuance costs is not a sufficient allowance for the efficient costs incurred on foreign bond issuances. Aurizon Network submitted that debt issuance costs and cross-currency swap costs are two distinct and unrelated costs:

- debt issuance costs refer to the fees incurred in the debt issuance process, such as legal counsel fee, credit rating fee and investment bank charge
- cross-currency swap costs are incurred in managing the exchange rate risk associated with foreign debt issues, and is a standard and efficient commercial practice.<sup>723</sup>

Aurizon Network considered that an efficient benchmark cross-currency swap cost should be estimated and form part of the approved debt-raising transaction costs for the UT5 regulatory period.<sup>724</sup> Aurizon Network maintains that the transaction costs and marketing of debt for coal exposed sectors is greater than the average firm and that debt issuance costs will fall within the range of 0.18 per cent and 0.26 per cent.<sup>725</sup>

The QRC noted that PwC proposed a range of 9.9 to 10.8 basis points for debt-issuing costs, with the high end of that range adopted. The QRC, therefore, considered that arguably the higher cost of foreign corporate bonds are accounted for in this estimate. The QRC noted that the DBCT final decision determined it appropriate to apply a methodology for estimating DBCTM's debt allowances, which also sources international debt, which is consistent with the method applied in Aurizon Network's UT4 decision. The QRC submitted that there is no reason to consider that picking a single point estimate for all regulated firms to provide regulatory certainty is no longer appropriate.<sup>726</sup>

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<sup>719</sup> Aurizon Network, sub. 1: 278.

<sup>720</sup> Aurizon Network, sub. 1: 278.

<sup>721</sup> Aurizon Network, sub. 1: 278.

<sup>722</sup> QRC, sub. 21: 33–34.

<sup>723</sup> Aurizon Network, sub. 26: 27; sub. 40: 134.

<sup>724</sup> Aurizon Network, sub. 40: 134.

<sup>725</sup> Aurizon Network, sub. 40: 81.

<sup>726</sup> QRC, sub. 21: 34.



To the extent that the QCA is considering departing from that approach, the QRC considered that it should obtain an updated market quotation for interest rate swap costs to support such a departure.<sup>727</sup>

Noting that Aurizon Network's rate of return is estimated using a benchmarking approach, the QCA considers that Aurizon Network's actual debt financing arrangements are not deterministic of an appropriate estimate for benchmark debt-financing transaction costs.

Moreover, Aurizon Network has proposed an estimate of its benchmark debt risk premium based on the simple portfolio approach, rather than on the complex portfolio approach. A debt risk premium based on the complex portfolio approach assumes that debt is issued in different markets and with different forms of debt—domestic corporate bonds, international bonds and bank debt. With this approach, benchmark assumptions are required for the proportions of debt that are issued in these different markets, as well as the term of that debt.<sup>728</sup>

In developing its cost of debt methodology for the QCA, PwC previously derived the expected term of debt for bond issues in each market by observing the term across all issues by Australian firms in those markets, and weightings for the different forms of debt by observing the practice of utilities. Based on its empirical analysis, PwC considered plausible weightings for a complex portfolio approach to be:

- a 50 per cent weighting to domestic corporate bonds, which had an average term to maturity at issuance of 12.1 years
- a 25 per cent weighting to international bonds, which had an average term to maturity at issuance of 10.7 years
- a 25 per cent weighting to bank debt, which had an average term of issuance of 4.9 years.<sup>729</sup>

However, the QCA notes that Aurizon Network has not proposed to estimate its debt risk premium using the complex portfolio approach, including considering appropriate weightings or a yield estimate for bank debt.

As indicated above, the QCA considers that the simple portfolio approach proposed by Aurizon Network to estimate debt risk premium is appropriate. The simple portfolio approach requires only an estimate of the debt risk premium of the benchmark term of debt for the benchmark credit rating for issues in the Australian corporate bond market. This approach is consistent with the methodology used to estimate Aurizon Network's debt risk premium for its 2016 Undertaking.

Given that the simple portfolio approach is based on the Australian corporate bond market, benchmark debt-financing transaction costs should only be derived with reference to domestic bond issues. It is not appropriate that benchmark debt-financing transaction costs incorporate transaction costs associated with foreign bond issues. As such, the debt-issuing costs should be derived with reference to domestic bond issues, and the QCA does not consider it appropriate to provide an allowance for cross-currency swap costs.

For these reasons, the QCA's decision is that a debt-issuing cost allowance of 10.8 basis points per annum for Aurizon Network's UT5 Undertaking is appropriate.

Given the regulatory period is shorter than the benchmark term of debt, it is assumed that an efficient regulated firm would have the incentive to align its debt with the term of the regulatory period, in order to match the regulatory benchmark. The interest rate swap contracts manage interest rate risk by converting

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<sup>727</sup> QRC, sub. 21: 34.

<sup>728</sup> Consistency between the simple portfolio and complex portfolio approaches requires that the weighted average term of debt at issuance be the same under each approach.

<sup>729</sup> QCA 2014d.

the base rate of the 10-year cost of debt such that the term matches that of the regulatory period (for example, four years).

Incenta therefore estimated the transaction costs of implementing interest rate swap contracts for the proposed averaging period by calculating the interest rate swap margins. For the principal profile, Incenta derived the swap from 10-year fixed to floating, and then the swap from floating into four-year fixed, and the spread breakdowns:

- the execution spread—an estimate of the buffer that a bank levies for fluctuations in the market while the back-to-back transactions are placed
- the risk spread (credit and capital costs)—an estimate of the charge that a bank makes for the risk of the counterparty defaulting.<sup>730</sup>

Based on Reuters data and key regulatory benchmark characteristics, as at 30 June 2017, Incenta estimated the benchmark cost of interest swap contracts associated with financing to be 12.5 basis points.<sup>731</sup>

The QCA's decision is that an interest rate swap cost allowance of 12.5 basis points per annum for Aurizon Network's UT5 Undertaking is appropriate.

### Reviewing the cost of debt estimate

Given the sensitivity of the different regression methods for estimating the debt risk premium and the variability in the outcomes observed through time, Aurizon Network considered that it is only possible to test whether the PwC methodology provides an appropriate estimate of the debt risk premium by analysing the outcome from its application for a specific time period. Therefore, Aurizon Network considered that the choice of method for setting the debt risk premium for the averaging period should be reviewed following that period to determine whether the PwC methodology provides an appropriate estimate of the debt risk premium.<sup>732</sup>

Aurizon Network considered that the performance of each technique should be evaluated, having regard to which technique produces the most robust and reliable estimate of the return on debt over the relevant period, as well as having regard to the independent, third party estimates.<sup>733</sup>

CEG considered that the most appropriate approach to be applied to the dataset cannot be determined without first carrying out analysis on the actual dataset.<sup>734</sup> CEG considered that it would be prudent for Aurizon Network to first carry out analysis of the actual bond sample after its averaging period is over before proposing its debt risk premium estimate.<sup>735</sup>

Aurizon Network submitted that consideration could be given to reverting to the use of independent third party data sources to avoid the situation where the results are sensitive to the model form and sample used. Aurizon Network noted that, with the exception of the QCA and ERA, all other Australian regulators currently rely on independent third party estimates.<sup>736</sup>

The QRC submitted that providing Aurizon Network with the opportunity to reconsider whether it wants to apply that methodology once the averaging period has passed defeats the very point of having an averaging period set independently of knowing the outcome. The QRC stated that the QCA should not allow such

<sup>730</sup> Incenta Economics 2017: 115.

<sup>731</sup> Incenta Economics 2017: 115–116.

<sup>732</sup> Aurizon Network, sub. 1: 275.

<sup>733</sup> Aurizon Network, sub. 1: 277.

<sup>734</sup> Aurizon Network, sub. 5: 20.

<sup>735</sup> Aurizon Network, sub. 5: 4.

<sup>736</sup> Aurizon Network, sub. 1: 277.

reconsideration to occur so that Aurizon Network cannot game the outcome. The QRC considered that the Bloomberg methodology should either be utilised instead of, or in combination with, the PwC approach in seeking to derive an appropriate estimate for the debt risk premium.<sup>737</sup>

The QCA has examined an appropriate debt risk premium for Aurizon Network based on the proposed averaging period. The QCA has had regard to the estimation method that provides the most robust and reliable estimate of the debt risk premium for the proposed averaging period, including with reference to independent third party estimates.

As such, the choice of method for estimating the debt risk premium for the averaging period was reviewed following the proposed averaging period to determine whether the PwC methodology provides an appropriate estimate of the debt risk premium. Therefore, the QCA does not consider that it is necessary to revert to the sole use of independent, third party data sources for these reasons, nor has Aurizon Network proposed to do so.

As indicated previously, the QCA considers that Aurizon Network's proposal to use the PwC methodology to estimate its debt risk premium for the 2017 DAU is appropriate.

### Evidence from debt markets

CEG considered that debt risk premiums on Aurizon Network's bonds are materially higher than the debt risk premiums on other BBB+ rated bonds. CEG considered that this likely reflects a 'coal premium' being priced in by debt investors who are concerned about Aurizon Network's ability to recover its fixed and sunk investments serving the expanded coal sector.<sup>738</sup> CEG made two observations from comparing the historical debt risk premium of Aurizon Network's EJ889313 Corp bond against that of Bloomberg's BVAL broad-BBB benchmark curve:

- the debt risk premium of the Aurizon bond is broadly similar in level compared to the BVAL broad-BBB benchmark
- while the debt risk premium of the Aurizon bond is similar in level with the BVAL benchmark, it can be seen that there are periods in which the former Aurizon's debt is perceived to be higher risk, as evidenced by the elevated debt risk premium of the Aurizon bond after the spike on 9 February 2016, which is consistent with the experiences of other coal carriers in the same timeframe.<sup>739</sup>

Incenta agreed that the debt risk premium of the AUD-denominated Aurizon bond spiked in February 2016 relative to the BBB+ benchmark, which occurred in the weeks following the release of Moody's 1 February 2016 review of Aurizon Network for a possible downgrade. However, Incenta noted that, while in January 2016, the seaborne metallurgical coal contract price had fallen to its lowest point of USD 81 per metric ton, this market outlook changed substantially in subsequent months. Incenta reported that the contract price for metallurgical coal increased to USD 84 at the end of April 2016, then to USD 200 in October, and to USD 285 by January 2017.<sup>740</sup>

Incenta constructed an interpolated Bloomberg BBB+ benchmark from Bloomberg's published yields for the broad BBB and A credit rating bands, and compared the daily interpolated debt risk premium of this synthetic BBB+ benchmark against Aurizon Network's debt risk premium for the period from 15 September 2014 to 30 June 2017. Incenta reported that, in comparison to the BBB+ benchmark, at different times Aurizon Network's debt risk premium has been:

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<sup>737</sup> QRC, sub. 21: 33.

<sup>738</sup> Aurizon Network, sub. 5: 38.

<sup>739</sup> Aurizon Network, sub. 5: 42.

<sup>740</sup> Incenta Economics 2017: 95.

- 40 basis points to 50 basis points below (July 2014 to March 2015)
- approximately equal to (April 2015 to February 2016)
- 100 basis points or more above (February 2016 to January 2017).<sup>741</sup>

Incenta noted that more recently (February to March 2017), the AUD-denominated Aurizon Network bond once again began to trade at a discount to the BBB+ benchmark. Incenta considered that it is apparent the differential is linked to the price of metallurgical coal—while the coal price remained above USD 100, the Aurizon bond oscillated near the BBB+ benchmark. Incenta expects that the recent closing of the gap has been due to positive export coal market news, particularly the fact that coal prices have rebounded strongly.<sup>742</sup> In conclusion, Incenta found no evidence of a permanent ‘coal premium’ in the market’s pricing of Aurizon Network’s bonds.

CEG also considered that other railway operators internationally with significant coal operations have suffered significant increases in debt risk premiums in recent periods. CEG noted that out of the four railways in North America with the highest percentage of coal-related revenues, the following three companies have a BBB+ credit rating:

- CSX Corp
- Canadian Pacific Railway
- Norfolk Southern Corp.

CEG submitted that the average debt risk premium on the bond closest to a 10-year residual maturity, as issued by each of these businesses, increased on average by 27.6 per cent between January 2015 and January 2016.<sup>743</sup>

CEG also noted that Transnet in South Africa and Aurizon in Australia are the other railway owners with high reliance on coal traffic. CEG calculated an increase in debt risk premiums of 76.4 per cent and 28.3 per cent for these businesses respectively, from January 2015 to January 2016. CEG considered that it is reasonable to conclude that the increase in Aurizon Network’s observed debt risk premium is consistent with a generalised debt market view that infrastructure providers serving the coal market attract a material risk premium compared to other similarly rated businesses. CEG considered that the increases in debt risk premiums cannot be sufficiently explained by movements in the general market.<sup>744</sup>

CEG considered that a coal premium could possibly be implemented by estimating the benchmark debt risk premium for a BBB rating, which is one notch higher than its actual credit rating.<sup>745</sup>

Incenta did not agree with CEG's coal premium analysis. For the three North American BBB+ rated Class 1 railway businesses listed, Incenta reported that coal revenues amounted to only 10 per cent (Canadian Pacific Railway Ltd), 17 per cent (Norfolk Southern Corp) and 19 per cent (CSX Corp) of their total revenues. Incenta considered that these companies are general freight businesses that include some highly volatile traffic, such as motor vehicles.<sup>746</sup> Incenta also said that, with respect to coal traffic, export coal (particularly metallurgical coal) is a negligible component of Norfolk Southern Corp and CSX Corp revenues, observing:

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<sup>741</sup> Incenta Economics 2017: 95.

<sup>742</sup> Incenta Economics 2017: 95.

<sup>743</sup> Aurizon Network, sub. 5: 39.

<sup>744</sup> Aurizon Network, sub. 5: 39, 45.

<sup>745</sup> Aurizon Network, sub. 5: 18.

<sup>746</sup> Incenta Economics 2017: 97.

... the majority of the coal transported by these US Class 1 railroads is thermal coal for use in domestic power stations. This component of North American railway traffic has been falling in recent years owing to the substitution of gas and renewable energy sources.<sup>747</sup>

In any case, Incenta considered it more instructive to compare the movements in the debt risk premiums of the comparator businesses against those of an appropriate underlying benchmark. For US Class 1 railways, Incenta considered the relevant benchmark to be the US BBB+ (Industrials) fair value debt risk premium. Incenta's analysis showed that the relative debt risk premiums of North American Class 1 railways have recently risen against the relevant BBB+ benchmark, which does not appear to be coal-related, since coal railings have increased with the international coal price. Incenta considered that, if the North American railways have consistently higher debt risk premiums, it is more likely to reflect the fact that they have high operating leverage and transport goods with higher cyclical demand. The relative performance of US Class 1 railway company bonds is therefore not likely to provide any evidence that is directly relevant to Aurizon Network.<sup>748</sup>

In relation to Transnet, Incenta's analysis showed that the fall in coal prices caused a spike in its bond's debt risk premium in January 2016, which occurred when coal prices reached their lowest point. However, Incenta noted that this effect was short-lived, since the higher debt risk premium dissipated once coal prices began to move upwards in June 2016. The premium throughout 2017 has been at approximately the level it was prior to the temporary spike. Hence, Incenta considered that there is no evidence of a permanent 'coal premium'.<sup>749</sup>

The QCA agrees with Incenta that there is no evidence of a permanent 'coal premium.' In any case, while raised by CEG, Aurizon Network's submission did not emphasise the 'coal premium' issue. Further, it did not incorporate an estimate of its value when proposing a debt risk premium. The QCA does not consider it appropriate to incorporate a 'coal premium' as part of Aurizon Network's debt risk premium estimate for the proposed averaging period.

## Gamma

### Aurizon Network's proposal

Aurizon Network proposed a gamma of 0.25, calculated using an estimated distribution rate of 0.7 and an estimated utilisation rate of 0.35.<sup>750</sup>

Aurizon Network proposed 0.7 for the distribution rate on the basis of Australian Tax Office (ATO) data (that is, total credits distributed and total credits created). Aurizon Network said 0.7 is commonly applied by regulators, practitioners, academics and previously supported by the QRC. Aurizon Network considered our concern with the reliability of the ATO data to be unfounded and our approach of relying on the average distribution rate of the top 20 listed firms to be inappropriate.<sup>751</sup>

Aurizon Network proposed an estimate of 0.35 for the utilisation rate. Aurizon said the utilisation rate must be assessed from the perspective of investors based on market values, consistent with every other WACC parameter. Aurizon Network said this view is consistent with the Tribunal's findings in recent merits review cases (noting that the Tribunal arrived at a different decision in the SA Power Networks (SAPN) case).<sup>752</sup>

<sup>747</sup> Incenta Economics 2017: 97.

<sup>748</sup> Incenta Economics 2017: 98.

<sup>749</sup> Incenta Economics 2017: 129.

<sup>750</sup> Aurizon Network, sub. 1: 281.

<sup>751</sup> Aurizon Network, sub. 1: 280.

<sup>752</sup> Australian Competition Tribunal 2016a, *Application by SA Power Networks [2016] AComp T 11*, 28 October [182].

Given a market value basis of estimation, Aurizon Network submitted that SFG Consulting's estimate of 0.35, based on dividend drop-off analysis, is the best estimate available.<sup>753</sup>

In rejecting our approach to estimating gamma, Aurizon Network's consultant, Frontier, said the Federal Court's recent decision supports interpreting and estimating the utilisation rate consistent with the role of gamma in the regulatory framework. Frontier said the Federal Court's construction of the regulatory task can only lead to a market value estimate of gamma that does take into account evidence that investors value imputation credits (that they redeem) less than the full face value amount.<sup>754</sup>

While maintaining its position that a gamma estimate of 0.25, based on a market value concept, remains appropriate, Aurizon Network recognised the QCA's preference for a utilisation-based approach. On the latter basis, Aurizon Network submitted a revised gamma estimate of 0.31, comprising a utilisation rate of 0.45 and a distribution rate of 0.71.<sup>755</sup> The utilisation rate estimate of 0.45 is based on removing public sector equity from the QCA's current estimate of 0.55. The distribution rate estimate of 0.71 is based on the maximum distribution rate that can be obtained from the ATO tax data.<sup>756</sup>

Aurizon Network submitted that, if the QCA decides not to address Aurizon Network's and Frontier's concerns with the gamma methodology, the QCA should apply a gamma value of 0.37, based on a utilisation rate of 0.45 and a distribution rate of 0.83.<sup>757</sup> Aurizon Network further submitted that an appropriate upper bound on gamma would be 0.4, on the basis that this estimate has been subject to the most scrutiny in the Australian regulatory context, including testing before the Australian Competition Tribunal and Federal Court.<sup>758</sup>

### QCA analysis and decision

The Australian tax system allows companies to provide their shareholders with credits (dividend imputation credits) to reflect company taxes paid on profits that are distributed as dividends. Shareholders then use these credits to reduce their own tax liabilities. Therefore, imputation credits effectively reduce a company's cost of capital.

Under the Officer model, the value of dividend imputation credits is captured by a parameter known as 'gamma', which is the product of the:

- distribution rate—the ratio of distributed imputation credits to company tax paid
- utilisation rate (theta)—the value-weighted average over the utilisation rates of imputation credits of all investors in the market.

Consistent with Aurizon Network's proposal, the QCA has used a post-tax, nominal form for the cost of capital and takes account of the tax deductibility of debt and the tax credits available under the dividend imputation system in the cash flows of the firm.

### Utilisation rate

For the reasons discussed below, the QCA does not consider the utilisation rate proposed by Aurizon Network to be appropriate having regard to the factors in s. 138(2) of the QCA Act.

Rather, the QCA considers that an appropriate estimate of the utilisation rate is 0.55, based primarily on the equity ownership of Australian listed companies. This estimate reflects a slight increase in the estimate

<sup>753</sup> Aurizon Network, sub. 1: 280–281.

<sup>754</sup> Aurizon Network, sub. 32: 12.

<sup>755</sup> Aurizon Network, sub. 40: 22, 138.

<sup>756</sup> Aurizon Network, sub. 40: 138.

<sup>757</sup> Aurizon Network, sub. 40: 138.

<sup>758</sup> Aurizon Network, sub. 40: 138.

of the proportion of foreign ownership in Australian listed equities since 2013, which generated an estimate of 0.56.<sup>759</sup>

Among the approaches to estimating the utilisation rate (for example, equity ownership approach, redemption approach, dividend drop-off studies, Lally's conceptual test, and practitioner behaviour), the QCA considers that the equity ownership of Australian listed companies most closely aligns with the aforementioned definition of the utilisation rate in the Officer model.<sup>760</sup>

Aurizon Network argued that the interpretation and valuation for the utilisation rate should be based on market values.<sup>761</sup> Aurizon Network said that it is not the role of the regulator to determine what it considers the market should have priced according to a theoretical model. Rather, it is more appropriate for the regulator to infer what is required by the market from traded market prices and to provide a return that aligns with the market's expectations.<sup>762</sup> Frontier stated that the utilisation rate must be a market value, consistent with all of the other parameters of the cost of equity and cost of debt.<sup>763</sup>

Frontier cited the Federal Court's recent decision on the PIAC-Ausgrid appeal to support its views.<sup>764</sup> Specifically, Frontier said the Federal Court held that the approach to interpreting and estimating gamma must be consistent with the role of gamma in the regulatory framework. Frontier considered that this exercise can only lead to a market value estimate of gamma that accounts for the evidence that investors value the credits that they redeem less than the full face value amount. Frontier said that applying this 'regulatory context' approach set out by the Federal Court affirms that gamma must be estimated in terms of the market value of credits relative to the allowed return on equity they are replacing.<sup>765</sup>

The QCA does not agree with Aurizon Network and Frontier. While Frontier refers to a 'regulatory context' approach set out by the Federal Court, Frontier fails to mention that a principal point made by the Federal Court is that the relevant context relates to a value in a statutory model (rather than a market value):

[752]...We also note that the nature of gamma is an estimate to be used in a model.

[753] The present context relates to a statutory model rather than the value of something which exists. In our opinion the Tribunal was distracted by the apparent simplicity of the concept of market studies and data into mistaking what was to be estimated as real in a market rather than as estimates within a model.

[754] This is what led the Tribunal into error at [1081]–[1082] in concluding that the value of gamma is (only) what is claimed or utilised as demonstrated by the behaviour of the shareholder recipients of the imputation credits.<sup>766</sup>

Given this context, a relevant finding of the Federal Court is that it was not an error of construction for the AER to focus on utilisation rather than on implied market value.

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<sup>759</sup> The QCA notes that a recent estimate of the utilisation rate by the AER places significant reliance on the equity ownership approach, some reliance on the tax statistics approach, but with limited reliance placed on market value studies (AER 2018: 399). This is consistent with our findings that considerably lower weight should be given to redemption and dividend drop-off studies. Similarly, the QCA placed only limited reliance on the other methods considered in our estimate of the utilisation rate (Lally's conceptual test and other supporting evidence) due to conceptual and measurement difficulties with these methods.

<sup>760</sup> The assessment involves a weighting of the estimates from these various methods. For discussion of these matters, refer to the QCA's Market Parameters decision (QCA 2014c: 24–29).

<sup>761</sup> Aurizon Network, sub. 1: 299–301.

<sup>762</sup> Aurizon Network, sub. 1: 301.

<sup>763</sup> Aurizon Network, sub. 32: 23–25.

<sup>764</sup> *Australian Energy Regulator v Australian Competition Tribunal (No 2)* [2017] FCAFC 79.

<sup>765</sup> Aurizon Network, sub. 32: 12, 18–19.

<sup>766</sup> *Australian Energy Regulator v Australian Competition Tribunal (No 2)* [2017] FCAFC 79: 216 at [752–754].

The QCA does not accept the contention that the utilisation rate should be defined as a market-value concept. Rigorous derivations of the Officer CAPM unambiguously demonstrate that the utilisation rate (theta) is a complex weighted average of the utilisation rates of individual investors in the market (that is, the extent to which imputation credits could be redeemed with the ATO).<sup>767</sup> As our approach is based on the Officer model, the QCA therefore adopts a definition of the utilisation rate that arises from a rigorous derivation of that model. The QCA notes that Aurizon Network supports the Officer model. The QCA considers that applying the Officer model in totality reflects common practice and, for the reasons outlined above, is appropriate.

The QCA's definition of the utilisation rate, and therefore its approach, is supported by expert opinion. As observed by CFC, under certain conditions the utilisation rate will equal the market value of the credits.<sup>768</sup> However, CFC noted that this does not change the definition of the utilisation rate being the weighted average over individual investors' utilisation rates.<sup>769</sup> As the utilisation rate is defined in this way, it follows logically that estimates from market value studies are only one type of estimator of the utilisation rate.<sup>770</sup>

Also, the QCA does not agree with Frontier's consistency argument that the utilisation rate must be a market value to be consistent with other components of the cost of equity (and cost of debt). Simply because some parameters in the cost of equity are market values does not mean all of them are such values. For example, the cost of equity includes an estimate of the value of imputation credits. This value is, in part, determined by the distribution rate. The distribution rate is clearly not a 'market' value, but a numerical value.

Further, the cost of equity is not observable and therefore must be estimated by reference to a model. That model is the CAPM (in particular the Officer version), and the basis of the model is a set of assumptions. Again, rigorous derivations of the model demonstrate that the definition of the utilisation rate involves a weighted average over individual investors' utilisation rates. Accordingly, one cannot impose a definition of the utilisation rate (for example, define it as a market value) without changing the model. To do so would be inconsistent with the model's underlying assumptions and therefore inappropriate.

Aurizon Network and Frontier raised two arguments in relation to estimating the utilisation rate.

The first is that, under a utilisation-based estimation approach, the QCA places 100 per cent weight on the equity ownership estimate but gives no weight to the tax statistics in forming its estimate. Aurizon Network and Frontier said that the tax statistics can be used to directly estimate gamma by dividing redeemed credits by created credits to obtain a tax statistics based estimate of 0.31. Citing Hathaway (2017), they said that this estimate of the utilisation rate is unaffected by ATO data concerns as it does not involve the distribution data.<sup>771 772</sup>

As indicated in the draft decision, the QCA does not think that this approach is appropriate for several reasons. Estimating gamma directly in this way means that both the utilisation and distribution rates are

<sup>767</sup> Lally and van Zijl 2003; Monkhouse 1993.

<sup>768</sup> CFC 2017a: 7.

<sup>769</sup> Furthermore, CFC said these conditions are generally not met, which causes the market value of imputation credits to diverge from the utilisation rate.

<sup>770</sup> Frontier suggests that the market value of imputation credits can be estimated as a weighted average of investors' utilisation rates only under certain restrictive conditions. As these are conditions are unrealistic, Frontier concludes that the weighted average of investors' utilisation rates is not a useful estimator (Aurizon Network, sub. 7: 21–25). The QCA considers that Frontier's error here is to imply that the weighted average of utilisation rates is the estimator while the market value of the credits is the parameter subject to estimation. However, the reverse is the case—the market value of the credits is an estimator, and the weighted average utilisation rate is the parameter subject to estimation.

<sup>771</sup> Hathaway 2017, *Letter to Energy Networks Australia*, December.

<sup>772</sup> Aurizon Network, sub. 40: 135; sub. 46: 6–7.



based on the same set of companies because the ATO only supplies data on redeemed credits for all companies.<sup>773</sup> However, ‘all companies’ includes unlisted firms, and given the distribution rate is defined as a firm-specific parameter, it is not, in general, desirable to include unlisted firms in the data for this estimate.<sup>774 775</sup>

In addition, an estimate of the utilisation rate component of gamma would still be required under this alternative approach for estimating the MRP. Under this approach, the estimate of the utilisation rate is: utilised credits divided by distributed credits. Therefore, applying this approach consistently across the model does not avoid the unreliable distribution rate data.

Finally, the ATO has recently advised the AER that: ‘The ATO is of the view that the Taxation Statistics data should not be used for detailed time series analysis of the imputation system.’<sup>776</sup> For these reasons, the QCA disagrees with Aurizon Network’s proposal to estimate the utilisation rate using the ATO data.

Aurizon Network’s second argument about estimating the utilisation rate is that the QCA’s estimate of 0.55 is biased upward by the inclusion of public sector equity. Excluding this public sector equity, consistent with the AER’s 2017 TransGrid draft decision, reduces the estimate to 0.45.<sup>777</sup>

However, the principal reason for the difference in those two estimates is not related to the exclusion of public equity. Rather, the difference arises because the AER’s previous estimate of 0.45 was derived prior to the update of equity ownership data by the Australian Bureau of Statistics.<sup>778</sup> Updating the data and excluding public equity supports an estimate of 0.55.

Further, the QCA notes that since the TransGrid draft decision, the AER has updated its estimate of the utilisation rate under the equity ownership approach and reports a range of 0.52–0.58 for listed equity. The midpoint is 0.55, which is consistent with our current estimate.<sup>779</sup>

Table 46 provides our consideration of further, detailed arguments relating to the utilisation rate.

**Table 46 QCA consideration of issues relating to the utilisation rate**

<i>Issue</i>	<i>QCA analysis</i>
Frontier said the QCA, in using an estimate of 0.56 for the utilisation rate, assumes a one-to-one correspondence between the proportion of shares held by Australian investors and the market value associated with imputation (e.g. if 80% of shares are held by Australian residents then the QCA assumes a distributed credit would be worth \$0.80). <sup>780</sup>	<p>The QCA considers this is an inaccurate characterisation of our approach—no such assumption has been made.</p> <p>Our approach is based on the Officer model. Accordingly, the QCA applies a definition consistent with that model. As explained, the correct definition of the utilisation rate is the weighted average of the utilisation rates of individual investors in the market.</p> <p>If the Officer model is valid, there will be a one-to-one correspondence between theta (i.e. the weighted</p>

<sup>773</sup> Handley 2014: 38–39.

<sup>774</sup> Unlisted firms tend to be owned by individuals who have an incentive to reduce dividends to limit the amount of tax paid at higher marginal personal rates. As a result, the dividend policy and distribution rate of these firms would likely differ from those of the benchmark regulated firm.

<sup>775</sup> The QCA notes Aurizon Network’s and Frontier’s references to our use of a market-wide, or average, distribution rate and address this issue in the next section.

<sup>776</sup> ATO 2018.

<sup>777</sup> Aurizon Network, sub. 46: 15.

<sup>778</sup> The equity ownership data is from the National Accounts of the Australian Bureau of Statistics. The Finance and Wealth publication recently incorporated revisions as a result of a historical review by the ABS that was undertaken across the National Accounts.

<sup>779</sup> AER 2018a: 16, Table 3.

<sup>780</sup> Aurizon Network, sub. 7: 11.

<i>Issue</i>	<i>QCA analysis</i>
	<p>average utilisation rate) and the market value of the credits. However, this is not an assumption.</p> <p>Further, any phenomenon that undermines the validity of the model will cause these two values to diverge from each other. A principal example is the differential taxation of dividends and capital gains in Australia.</p>
<p>Frontier said that our approach to estimating the utilisation rate makes theoretical assumptions about investor characteristics in order to make an empirical estimate. In contrast, our approach to estimating every other WACC parameter references traded market prices.<sup>781</sup> By implication, our approach to estimating the utilisation rate is inconsistent.</p>	<p>While it is appropriate to use market prices in estimating some parameters within the Officer model, this does not imply that it is appropriate to do so for all parameters.</p> <p>Further, CFC observes that, under the Officer model, not every term (e.g. the utilisation rate) is defined as a market value—it is the application of the discount rate (which is a market rate) that converts these estimates into market values.<sup>782</sup></p>
<p>Frontier also said that a market value estimate of theta (from dividend drop-off studies) is consistent with Lally's theoretical framework. Frontier presents a formula and rearranges it to show that what is relevant is the extent to which imputation credits are capitalised into the stock price and that dividend drop-off studies seek to estimate this effect.<sup>783</sup> Thus, Frontier said that an estimate of the market value of credits would also reflect an estimate of the complex weighted average.</p>	<p>The QCA does not agree with this point. As explained by CFC, the formula presented by Frontier is problematic for several reasons:</p> <ul style="list-style-type: none"> <li>• The assumptions underlying the model preclude the tax arbitrage activity that is likely to affect estimates of the utilisation rate from dividend drop-off studies.</li> <li>• Cash dividends are not valued at 'face value', and the coefficient on the imputation credit term in the formula has not been adjusted to reflect the most likely cause—the differential taxation of dividends and capital gains.<sup>784</sup></li> </ul>
<p>Frontier said that, under the QCA's theoretical approach, three additional assumptions are made:</p> <ul style="list-style-type: none"> <li>• Every credit that is redeemed has a value (to the investor who redeems it) equal to the full face amount.</li> <li>• All investors are equally risk-averse.</li> <li>• All investors (domestic and foreign) have no wealth other than that which they invest in Australia.<sup>785</sup></li> </ul> <p>Frontier said these assumptions are required because the data on investor wealth and risk-aversion is unavailable.<sup>786</sup> However, Frontier said these assumptions are implausible and relaxing them would result in a lower estimate of the complex weighted average.</p>	<p>The QCA does not agree with Frontier's claims. A proper analysis of these assumptions (and the effects of relaxing them) leads to different conclusions. Relaxing the first assumption leads to a new model, and relaxing the third assumption leads to a higher (not lower) estimate of the utilisation rate (i.e. one).</p> <p>Specifically, the QCA notes that:</p> <ul style="list-style-type: none"> <li>• The first assumption seems to relate to transaction costs. Recognition of these costs would not change the definition of the utilisation rate but require replacement of the Officer model by a more complex variant. This issue arises regardless of how the utilisation rate is estimated. Furthermore, CFC noted this assumption is particularly innocuous because transaction costs are very small.</li> <li>• The effect of the second assumption is to induce an overestimate of the utilisation rate, and CFC estimated this effect at about 0.06. Therefore, relaxing it would lower the utilisation rate. However, when compared to the difficulties of using other methods to estimate the utilisation rate, such as</li> </ul>

<sup>781</sup> Aurizon Network, sub. 7: 11.

<sup>782</sup> CFC 2017a: 6.

<sup>783</sup> Aurizon Network, sub. 7: 26.

<sup>784</sup> CFC 2017a: 10–11.

<sup>785</sup> Aurizon Network, sub. 7: 23.

<sup>786</sup> Aurizon Network, sub. 7: 23.

<i>Issue</i>	<i>QCA analysis</i>
	<p>dividend drop-off studies, the problems with the latter are much greater.</p> <ul style="list-style-type: none"> <li>The third assumption is wrong, but the problem is the result of the model embodying an empirically false assumption. This problem is not avoided by estimating the utilisation rate from dividend drop-off studies. In particular, the resulting estimate of the utilisation rate is likely to be reduced by the presence of foreign investors, and therefore a parameter estimate reflecting the presence of foreign investors is inserted into a model that assumes there are no such investors.<sup>787</sup></li> </ul>
<p>Frontier said that the best available market value estimate of theta is the 0.35 estimate of SFG Consulting, as this estimate has been assessed by the Australian Competition Tribunal for its fitness for use in the regulatory setting.<sup>788</sup></p>	<p>The QCA does not consider that dividend drop-off estimation should be the primary method for estimating the utilisation rate. As previously discussed, estimates of the utilisation rate from these types of studies are likely to be highly unsatisfactory—they are likely to be biased in an unknown direction and highly variable, depending on the type of empirical model, the criteria applied for sample selection and the treatment of outliers.<sup>789</sup></p>
<p>Frontier added that the dispersion in estimates of the utilisation rate from empirical studies has been erroneously used to support the conclusion that the QCA should measure something else other than value.<sup>790</sup></p>	<p>The QCA does not agree with Frontier's argument. As stated previously, rigorous derivations of the Officer CAPM unambiguously define the utilisation rate as the weighted average of the utilisation rates of individual investors. Under certain conditions, the utilisation rate will equal the market value of the credits; however these conditions are not met in general.</p>

For the reasons above, the QCA not consider that it is appropriate for the utilisation rate to be estimated using dividend drop-off analysis. Rather, the QCA considers that the appropriate estimate of the utilisation rate should be based on the equity ownership of Australian listed companies. The QCA considers that Aurizon Networks' estimate of the utilisation rate is not appropriate for the reasons set out above, and an appropriate estimate of the utilisation rate at this time is 0.55.

### Distribution rate

For the reasons set out below, the QCA also considers that the distribution rate proposed by Aurizon Networks is not appropriate. Rather, after considering Aurizon Networks' proposal and stakeholders' submissions, the QCA considers it appropriate for the distribution rate to be based on the average distribution rate of the 20 largest ASX companies, with the data sourced directly from their financial statements. This estimation approach is consistent with our past practice.<sup>791</sup> This section explains the reasons for our decision and also provides our responses to matters raised by stakeholders.

Aurizon Network did not agree with our approach to estimating the distribution rate. In particular, Aurizon Network's concerns relate primarily to the following three key issues, namely that the QCA has:<sup>792</sup>

<sup>787</sup> CFC 2017a: 8–9.

<sup>788</sup> Aurizon Network, sub. 7: 11–12.

<sup>789</sup> CFC 2017a: 14.

<sup>790</sup> Aurizon Network, sub. 7: 28.

<sup>791</sup> Our approach is consistent with that used during the approval of Aurizon Network's 2016 Undertaking and as set out in our Market Parameters decision (QCA 2014c: 26–27).

<sup>792</sup> Aurizon Network, sub. 7: 36–37; sub. 46: 8–9; 11–12.

- misunderstood the issues raised in relation to the ATO data—Aurizon Network claimed that the estimate based on the franking account balance (FAB) data is reliable and appropriate
- estimated the 'wrong thing', specifically a distribution rate for a group of multinational firms that differ from the benchmark efficient firm with respect to their:
  - foreign profits—as credits can be attached to dividends that are paid out of foreign profits, a higher proportion of foreign profits will result in a higher distribution rate, all else equal
  - dividend payout rate—as credits can only be distributed by attaching them to dividends, a higher dividend payout rate will result in a higher distribution rate, all else equal
- assumed that all credits distributed by the top 20 firms are immediately available for shareholders to redeem.

In addition to these conceptual issues, Aurizon Network and Frontier raised a number of issues with the empirical work on the distribution rates for the firms in the 20-firm sample. They said that the methodological issues identified should be addressed before consideration is given to placing any weight on the estimates from this approach.<sup>793</sup>

### The ATO data

Aurizon Network noted that the QCA has previously rejected using the ATO data due to discrepancies between distribution rate estimates arising from two different approaches, which should produce the same estimate. The two approaches are the 'dividend method' and the 'FAB method' (also known as the 'tax method'), and they rely on different ATO datasets.<sup>794</sup>

In particular, Frontier cited distribution rate estimates of approximately 0.7 from the FAB method and 0.5 from the dividend method, based on research by Hathaway.<sup>795 796</sup> Frontier said that the QCA appears to have misunderstood the ATO data, and it is not appropriate for us to reject estimates from both methods simply because one produces an unreliable estimate:

...two approaches have been considered for using the ATO data to estimate the distribution rate — the FAB approach and the dividend approach. One produces a direct estimate that is based on reliable data that has never been questioned and the other approach produces a lower estimate using different data and the application of some assumptions. The fact that the two estimates differ is not a reason to reject them both.<sup>797</sup>

However, following his original analysis, Hathaway subsequently produced a second report, which updates his previous analysis.<sup>798</sup> In this second report, Hathaway includes tax data for the 2011–12 financial year, which the ATO published in 2014. Hathaway identifies a \$100 billion discrepancy between the ATO's FAB data and the dividend data and states that either there is "not enough dividend data to match the tax/FAB

<sup>793</sup> Aurizon Network, sub. 40: 136; sub. 46: 13.

<sup>794</sup> The ATO data includes the net company taxes paid to the ATO for each year, the net dividend imputation credits attached to dividends for each year, and the aggregate franking account balances of companies at each year end (the company taxes paid to the ATO less the imputation credits attached to dividends, since the commencement of dividend imputation). The dividend estimate of the distribution rate is the net imputation credits attached to dividends as a proportion of company taxes paid to the ATO. The FAB (or tax) estimate is net company taxes paid to the ATO (that is, each dollar of company tax paid creates a dollar of imputation credits) net of the increase in the Franking Account Balance, as a proportion of net company taxes paid to the ATO.

<sup>795</sup> Aurizon Network, sub. 7: 35.

<sup>796</sup> As far as the QCA is aware, Hathaway 2013 is the first researcher to estimate and report the distribution rates from these two methods based on detailed analysis of the ATO data.

<sup>797</sup> Aurizon Network, sub. 7: 37.

<sup>798</sup> Hathaway 2014.

data or the increase in the FAB is too low".<sup>799</sup> He also considers a number of plausible explanations for this discrepancy but is unable to reach a firm conclusion on the reason for it. However, in contrast to his 2013 report, Hathaway reaches the opposite conclusion about the reliability of the estimates from the FAB method:

...Hence the FAB data indicate a net \$337.4 billion of credits have been distributed and a gross \$428 billion was distributed.

The gross distribution seems highly improbable and is quite inconsistent with the recorded franking credit income. It represents a gross payout ratio of 88% of all company tax as franking credits for the period 2004–12. This is in stark contrast to the gross 66% distribution recorded by the payment of franked dividends. We conclude that the FAB data are a concern.<sup>800</sup>

Further, in his conclusion in relation to the two materially different estimates of the distribution rate arising from these two datasets and methods, Hathaway states:

The difference between these two estimates is caused by the unexplained \$100 billion difference between tax and dividend data. We lean to accepting the dividend-based data over the FAB-based data at present.<sup>801</sup>

Therefore, a highly qualified researcher, who is the first source of these estimates, has examined both sets of ATO data in detail at different points in time, but has reached opposite conclusions about which set of data is more reliable.

NERA also identifies a number of possible problems (and potential biases resulting from them) with the ATO data, and some of these problems relate to the data used for the FAB method. For example, these include the potential for the distribution rate to be overestimated due to undistributed imputation credits of bankrupt companies being deleted (and therefore, treated as distributed) and for the rate to be either overestimated or underestimated due to companies failing to report their franking account balances. Further, and like Hathaway, NERA also obtains two different estimates (70% and 53%) from the FAB and dividend methods respectively, but they should yield the same estimate.<sup>802</sup>

As a result, the QCA considers that there are valid reasons for questioning the reliability of both sets of the ATO data and the estimates that arise from them, and that it is not appropriate to estimate the distribution rate from the data because of those reliability issues.

In summary, the QCA's position is that the appropriate method for estimating the distribution rate should instead be based on market-wide data and reflect listed equity only. While the distribution rate is a firm-specific parameter, pragmatic considerations support using market-wide data to obtain the best estimate.<sup>803</sup> Further, that data should be from listed firms only, as listed firms are, in general, widely held and are likely to have dividend policies that are more similar with those of the benchmark regulated firm.<sup>804</sup> Also, the QCA notes a number of privately-owned, regulated firms in Australia are listed firms, or

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<sup>799</sup> Hathaway 2014: 26.

<sup>800</sup> Hathaway 2014: 30.

<sup>801</sup> Hathaway 2014: 45.

<sup>802</sup> NERA 2013: 5–6, 9.

<sup>803</sup> For a detailed discussion, see CFC 2016: 33–34.

<sup>804</sup> Unlisted firms tend to be owned by individuals who have an incentive to reduce dividends to limit the amount of tax paid at higher marginal personal rates. Therefore, the dividend policy, and therefore distribution rate, of these firms would likely differ from those of the benchmark regulated firm. Further, there are likely to be impediments to efficient investment in unlisted companies. These impediments include high transactions costs, lack of relevant information, and limited divisibility and marketability of unlisted assets.

subsidiaries of listed firms. This preference for an estimate based on listed equity (only) is supported by Dr Lally and the AER's advisor, Associate Professor John Handley.<sup>805</sup>

For the reasons given previously, the QCA does not consider the ATO data to be reliable. However, an alternative data source is available, which is firms' audited financial statements, and this data is highly reliable.<sup>806</sup> Given a market-wide estimate is desirable, the relevant issue then becomes how to constitute the sample in order to obtain as reliable an estimate as possible.

Aurizon Network and Frontier said that the distribution rate is a firm-specific parameter and accordingly, that the QCA should be seeking to estimate the distribution rate for the benchmark efficient firm. They said that, in contrast, our proposed estimation approach seeks to estimate the rate across the market and that this approach is inconsistent with the advice of Dr Lally and the AER.<sup>807</sup>

The QCA agrees that the distribution rate is defined as a firm-specific parameter. However, the QCA notes Dr Lally's advice that, when estimating this parameter, there are sound reasons for using a market-wide estimate.<sup>808</sup> Namely, both firm-specific and industry-wide estimates are subject to various problems, and using a market-wide estimate is more reliable. The QCA also notes that the AER favours a market-wide estimate on the basis of statistical reliability, and the QCA concurs with this view.<sup>809</sup>

As our objective is to determine a market-wide distribution rate, then the QCA is seeking estimates of the distributed imputation credits and the company tax paid to the ATO, both on a market-level basis for listed firms. To obtain as reliable an estimate of these parameters as possible, the QCA requires as large a sample (in market value terms) as is practical (given time and cost limitations). Therefore, the logical starting point for constituting such a sample is identifying the largest firms—in terms of market capitalisation—listed on the Australian Stock Exchange (ASX), as they will be the most influential firms in determining these two parameters.<sup>810</sup> In contrast, it would be a substantially inferior approach to assess the distribution rates of a different subset of firms listed on the ASX if that subset only comprises a small sample size (for example, 5 per cent of the ASX's total value).

However, Aurizon Network and Frontier have criticised this alternative approach, stating that the financial statements approach is flawed and estimates 'the wrong thing'.<sup>811</sup> Frontier said that this approach will lead to an inappropriate estimate of the distribution rate for the benchmark efficient entity, to the extent that top 20 firms differ from the benchmark with respect to:

- access to foreign profits
- the dividend payout rate.<sup>812</sup>

#### **Benchmark firm—foreign profits**

With respect to the foreign profits aspect, Frontier said:

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<sup>805</sup> CFC 2016: 34; Handley 2014: 28–29, 52.

<sup>806</sup> The financial statement data has three features that virtually guarantee protection against the problems in the ATO data: i) the financial statement data is audited; ii) the researcher is able to personally identify the source data (the figures of interest for specific companies) rather than having to rely on the aggregation procedures undertaken by the ATO; and iii) the financial statement data is internally consistent (that is, there are no unexplained discrepancies) (Lally 2014a: 29).

<sup>807</sup> Aurizon Network, sub. 40: 135–136; sub. 46: 10–11.

<sup>808</sup> Lally 2013b: 41–42.

<sup>809</sup> AER 2013: 163–164; 2018: 436–437.

<sup>810</sup> The market capitalisation of the top 20 firms on the ASX was about 56% as at 1 June 2017; therefore, the sample size is large. Data downloaded from <http://www.asx200list.com/> on 29 June 2017.

<sup>811</sup> Aurizon Network, sub. 7: 36.

<sup>812</sup> Aurizon Network, sub. 46: 12.

The 20 companies in the Lally sample are predominantly very large multinationals with a material amount of foreign-sourced income. This foreign income can be used to distribute imputation credits, so that the distribution rate is higher than it could be for a firm that did not have access to foreign income to assist in the distribution of imputation credits. Since the firms that are regulated by the QCA are (by definition) purely domestic firms, they have no access to foreign income. Consequently, estimating the distribution rate for a firm with no foreign income by using a sample of 20 firms with substantial foreign income is inappropriate.<sup>813</sup>

Accordingly, Aurizon Network and Frontier stated that it is inappropriate to base an estimate on a sample of firms with access to foreign income because the benchmark efficient entity, by definition, has 100 per cent domestic income, and firms regulated by the QCA are purely domestic firms without access to foreign income.<sup>814</sup>

However, the QCA does not consider the definition of the benchmark firm to be determinative on this point. This is because, even if it is deemed appropriate to exclude foreign income, Aurizon Network's proposed approach (which relies on the ATO data) does not avoid this 'problem'—the ATO data obviously contains a number of Australian firms with income from foreign operations.

Further, the only way to completely avoid the issue is to select a sample of firms that is sufficiently large but without any foreign operations. Doing so would require recourse to examining firms' financial statements rather than the ATO data, but examining the financial statements of all firms would be time and cost-prohibitive. Given this limitation, the better approach is to sample a subset of high-value firms—as these firms will maximise the sample size (that is, they will have the greatest impact on measures of distributed credits and tax paid to the ATO)—and then test whether or not these firms have distribution rates that are likely to materially bias the distribution rate in one direction or the other. This is the approach of CFC.<sup>815</sup>

This conclusion relates to Aurizon Network's and Frontier's specific concern, which is that the top listed firms have high proportions of foreign operations that they claim inappropriately increase the distribution rates of these firms. In support of this claim, Frontier presents a numerical example showing that, for any dividend payout rate, a firm with foreign income is able to distribute a higher proportion of credits that it creates than a purely domestic firm. The second piece of information Frontier presents is a table sourced from NERA that contains distribution rates estimated for different sets of companies:

- top 20, ASX-listed      0.84
- public, not top 20      0.693
- all public              0.755
- private                 0.505
- all companies         0.676.

On the basis of its numerical example and the information in this table, Frontier stated:

In our view, the evidence clearly supports the proposition that large multinationals are able to distribute a higher proportion of the imputation credits that they create, relative to the average Australian firm. Since large multinationals have access to foreign profits and the benchmark efficient firm does not, it is not appropriate to use them to estimate the distribution rate.<sup>816</sup>

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<sup>813</sup> Aurizon Network, sub. 7: 32–33.

<sup>814</sup> Aurizon Network, sub. 46: 9.

<sup>815</sup> CFC 2016: 35–37.

<sup>816</sup> Aurizon Network, sub. 7: 34.

The QCA first notes that Frontier's preferred estimate of 0.7 appears drawn from its Table 3, specifically the estimate for public companies but not top-20 companies. In excluding the top 20 firms from its estimate, Frontier said that all firms in the top 20 have substantial foreign operations and presented empirical evidence on this point. Specifically, Frontier stated that the average proportion of revenue attributable to foreign revenue of the top 20 firms over the last five years is 41 per cent. Frontier said:

The average proportion across the 20 companies is approximately 59% Australian revenue and 41% foreign revenue. By contrast, the benchmark efficient entity has 100% domestic revenue, by definition. To the extent that these 20 companies are able to use foreign revenue to assist in the distribution of imputation credits, the estimate of the distribution rate will be over-stated.<sup>817</sup>

In addition, Frontier said that the average proportion of foreign revenue for the ASX200 firms not included in CFC's sample of 20 firms is 25 per cent. Frontier noted that, while this proportion of foreign revenue is lower than that of firms in CFC's sample, it is still higher than for the benchmark efficient firm (which has 0% foreign revenue by definition). Frontier stated that, while expanding the sample to include all listed companies, or expanding it to include all listed and unlisted companies, would help mitigate the problem, it would not eliminate it. As a result, Frontier concluded that such an estimate would remain an upper bound on an appropriate estimate.<sup>818</sup>

The QCA does not agree with this analysis and the conclusions drawn. The important point is whether the (average) higher distribution rate is a direct result of top 20 firms having access to foreign income—to the extent that they do—relative to other listed companies (not top 20). Frontier's last statement (quoted above) simply *assumes* that the reason the distribution rates of the top 20, listed firms are higher is due to their foreign operations.

The QCA does not consider it appropriate to rely on an untested assumption to draw the conclusion that these firms should be excluded from the analysis. The QCA notes that, in its final determination on Powerlink's allowed revenues, the AER recently reached the same conclusion on this point:

Ultimately, the service providers have not shown the imputation payout ratio is higher due to foreign income or if any increase due to this is material. They have simply asserted that because these firms have foreign source income, and because this may allow these firms to pay a higher imputation payout ratio (without using things like dividend reinvestment plans), these firms should be excluded from the calculation of the dividend payout ratio.<sup>819</sup>

The AER's position is also supported by the SAPN Tribunal:

SAPN asserts that by having regard to the distribution rate of listed companies the AER was in error. The principal reason advanced is that the BEE [Benchmark Efficient Entity] is assumed to have only domestic earnings, whereas many large listed companies have foreign earnings which do not generate imputation credits. Then, if the dividend payout ratio (dividends/earnings) is the same as for the BEE, the distribution rate of imputation credits (credits distributed/credits generated) will be higher. That argument, does not, however, allow for the possibility that such companies with foreign earnings have a lower dividend payout ratio.<sup>820</sup>

So the relevant question is whether their foreign operations increase (if at all) these companies' distribution rates—the QCA maintains the position from the draft decision that Frontier has not sought to empirically assess this question.

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<sup>817</sup> Aurizon Network, sub. 46: 9–10.

<sup>818</sup> Aurizon Network, sub. 46: 10.

<sup>819</sup> AER 2017a: 144.

<sup>820</sup> Australian Competition Tribunal 2016a, *Application by SA Power Networks [2016] AComp T 11*, 28 October [182].



In contrast, CFC has considered this empirical question and subsequently assessed how foreign operations affect the distribution rate. CFC examined the data of the seven largest tax-paying firms (of the top-20, listed on the ASX) and found that the proportion of their profit from foreign operations is negatively correlated with their distribution rate; that is, as the proportion of profit from foreign operations increases, their distribution rates decrease, rather than increase—this effect is opposite than that claimed by Frontier.

To further test this claim, CFC removed the two firms (BHP and Rio Tinto) in the 20-firm sample with the highest proportion of revenue from foreign operations, and the effect is to increase the aggregate distribution rate from 0.83 to 0.92. CFC concluded that this outcome reinforces its point that the appropriate distribution rate for a firm without foreign operations is more than 0.83.<sup>821</sup>

CFC also provided a plausible explanation for this relationship. Specifically, firms with a material proportion of profit from foreign operations retain a larger proportion of their cash flow in order to finance these foreign operations. The effect is to reduce their dividends, and therefore their distribution rates, by more than the incremental profits from these operations increase dividends in the same year.<sup>822</sup> Frontier has not provided a response on this point.

CFC's conclusion is consistent with the conclusion of the SAPN Tribunal, which said that the AER was not unreasonable, or incorrectly exercised its discretion, in considering estimates of distribution rates for listed firms:

More generally, dividend payout ratios and distribution rates can be expected to vary between companies based on ownership characteristics and need/preferences for internally generated capital. Unlisted companies vary markedly. At one extreme there are small companies owned by individuals on high marginal tax rates who may prefer earnings retention to generate concessional tax on long-term capital gains or to defer the additional tax which would need to be paid on franked dividends. At the other extreme, large foreign-owned Australian registered companies may also prefer retention and reinvestment of earnings rather than distribution of dividends and attached franking credits which would be wasted.<sup>823</sup>

Frontier subsequently challenged one aspect of CFC's analysis, by noting that it focuses only on a subset of large firms with foreign operations and that a correct comparison should be between firms with foreign operations and firms without them.<sup>824</sup> However, CFC considered that a superior approach is to examine the distribution of firms, as its previous analysis does. This analysis shows that a significant sub-sample of firms have proportions of foreign income ranging from 6 per cent to 60 per cent.<sup>825</sup> Accordingly, the extent of extrapolation required to estimate the distribution rate in the absence of any foreign income is relatively minor.

The QCA agrees with CFC's analysis. The QCA considers that the best estimate of the distribution rate for the market in aggregate, subject to the restriction that the sample involves listed equity only, is achieved by examining the distribution rates of listed companies with the largest tax payments to the ATO. While all of these companies have foreign income, some have low proportions of foreign income, which is sufficient.

The QCA does not agree that Frontier's alternative approach, which is to assume that foreign operations increase the distribution rates of these firms and, on the basis of that untested assumption, remove them from the sample that is most likely to produce the best estimate, is appropriate. Further, the QCA notes that, despite criticising CFC's approach for relying on firms with foreign operations, Frontier's approach does not attempt to control for this factor.

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<sup>821</sup> CFC 2018: 32.

<sup>822</sup> CFC 2016: 35–36.

<sup>823</sup> Australian Competition Tribunal 2016a: [183]–[184].

<sup>824</sup> Aurizon Network, sub. 7: 34.

<sup>825</sup> CFC 2016: 36.

### Benchmark firm—dividend payout rate

Frontier also said that the top 20 firms vary materially from the benchmark efficient entity on the basis of their dividend payout rates. For example, over the 2000–13 period, large mining firms had low dividend payout rates while Telstra had a very high payout rate. As a result, it is impossible for all of the top 20 firms to have a dividend payout rate that matches the benchmark efficient entity. Further, to the extent those firms have a materially higher dividend payout rate than the benchmark firm, they will be able to distribute more credits.<sup>826</sup>

The QCA agrees that it is improbable that all firms in the sample will have dividend payout rates that match those of the benchmark firm. However, the QCA also notes that this is also the case for Frontier’s preferred sample of firms (that is, all equity or listed equity excluding the top 20 firms) when using the ATO data.

CFC suggested that the natural candidates for selection—in terms of matching the benchmark firm in its dividend payout rate—are the energy network firms that the AER uses to estimate the optimal gearing and beta for the regulated firms: APA Group, AusNet Services, DUET Group, Envestra (now Australian Gas Networks) and Spark Infrastructure. CFC’s analysis of the three of these firms for which financial statements are available (and provide sufficient information) shows that two of the firms (AusNet Services and DUET Group) have a distribution rate of 1.0, while a third (APA Group) should have a distribution rate of 1.0. CFC said this limited evidence supports the contention that the distribution rate for a benchmark firm should be at least 0.83.<sup>827</sup>

In summary, Aurizon Network and Frontier critiqued the top-20 firms approach on the basis that firms in the sample differ from the benchmark efficient firm in two respects: access to foreign profits and the dividend payout rate. While the QCA acknowledges that these features are relevant considerations, our view is that the arguments presented do not demonstrate a material problem with the estimate of the distribution rate using the top-20 firms approach.

### Availability of credits—delayed and trapped credits

Aurizon Network’s third concern is that using the top-20 firms to estimate the distribution rate implicitly assumes that all credits distributed by these firms are immediately available to the end shareholder to redeem (and that this assumption is unreasonable). Frontier said that any credits distributed to other companies or trusts will be retained by those intermediate firms until they pay a dividend or make a distribution. Frontier stated that, while it was unaware of data on the extent to which credits are delayed or trapped, it concluded that there must be some effect, and the estimate of 0.83 is therefore an upper bound.<sup>828</sup>

The QCA agrees that delayed or trapped credits are a possibility. However, analysis indicates that the materiality of the effect is likely to be very minor for two reasons. First, ‘delay’ matters only to the extent that distributions from source companies grow over time, and this impact is likely to be very small. Second, the extent to which shares in Australian companies are owned by other companies or trusts is relatively small. Our analysis indicates that the net effect of these considerations on any delayed or trapped credits and their impact on the overall distribution rate is likely to be immaterial.<sup>829</sup> Aurizon Network has not presented any contrary analysis.

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<sup>826</sup> Aurizon Network, sub. 46: 10, 12.

<sup>827</sup> CFC 2018: 33.

<sup>828</sup> Aurizon Network, sub. 46: 8–9.

<sup>829</sup> For example, suppose there is a lag of two years between the time of release of credits from source companies to the time of release of these credits from the intermediaries to end users. If the growth rate in distributions is 5% per year for those two years, then the credits received by end users in a year will be 91% of those distributed from the source companies to the intermediaries in that same year; that is: *credits*

### Empirical estimation issues

Aurizon Network and Frontier stated that they have identified a number of empirical questions in relation to the 20-firms estimate and that these should be resolved before placing any weight on such an estimate.<sup>830</sup> Frontier sought to reproduce Dr Lally's (CFC's) 20-firms estimate.<sup>831</sup> Frontier said it was unable to replicate the distribution rate figures and identified discrepancies that it categorised into five broad areas:

- inconsistencies in the year being reported
- potential exchange rate differences
- changes in the definition of the Franking Account Balance
- changes in company structure over time
- figures in the Lally report (2014) differing from figures in the financial reports for no apparent reason.

Given these identified matters, Frontier then made a number of corrections.<sup>832</sup> While reiterating its view that an estimate from this approach should not be used, Frontier reported that its resulting estimate from applying it is 0.79.<sup>833</sup>

The QCA asked CFC to review its analysis and estimate in light of Aurizon Network's and Frontier's submission on this matter. While CFC identified several errors in its analysis, correcting them resulted in the same (rounded) estimate of 0.83.<sup>834</sup> CFC said that the difference between its estimate of 0.83 and Frontier's estimate of 0.79 is attributable to a number of problems with Frontier's analysis, principally:<sup>835</sup>

- omission of some companies without good cause
- underestimating dividends by omitting those dividends paid under dividend reinvestment plans
- errors in determining franking account balances, due to conflating the franking account balance with the maximum fully franked dividends that could be paid, incorrectly including the effect of some events after balance date, and use of annual average rather than year-end exchange rates when converting \$US to \$AU.

CFC has provided the details of its analysis and calculations, as well as relevant data, in the appendix to its report.

The QCA notes that CFC's (and Frontier's) analyses of the distribution rate relate to the 2000–2013 period and are now five years out of date. Accordingly, CFC has also updated its estimate of 0.83, by extending the

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*received by end users / credits released by source companies* =  $1/(1.05)^2 = .91$ . If intermediaries hold 10% of all shares then credits received by end users in a given year would be 99% of those released by the source companies to the intermediaries in that same year, as follows: *credits received by end users / credits released by source companies* =  $[\.1 + .9(1.05)^2]/[1(1.05)^2] = .99$ .

<sup>830</sup> Aurizon Network, sub. 40: 136; sub. 46: 13.

<sup>831</sup> Frontier draws an estimate of 0.84 from Lally (2014). However, subsequent to that report, Lally corrected an adding error, which reduced this estimate to 0.83 (CFC 2015b).

<sup>832</sup> These detailed issues are discussed in Frontier's appendix (Aurizon Network, sub. 46: 18–27).

<sup>833</sup> Aurizon Network, sub. 46: 25–27.

<sup>834</sup> These errors involve amending some figures due to the inclusion of data from 2013 financial statements, in cases where those statements were not available at the time Lally undertook the analysis in 2013; and the inclusion of dividends paid by Rio Tinto Plc that were previously incorrectly omitted (CFC 2018: 35).

<sup>835</sup> CFC 2018: 35.

analysis of these companies to 2017. The effect of updating the analysis is to increase the distribution rate to 0.88. The QCA notes that CFC's work has been largely replicated by AER staff.<sup>836</sup>

CFC considered the updated estimate of 0.88 to be a lower bound because the top-20 firms include firms with foreign operations, and the effect of foreign operations seems to be to depress the distribution rate. For example, removal of the two firms with the highest proportion of foreign income (BHP and Rio Tinto) increases the distribution rate from 0.88 to 0.95.<sup>837</sup> Therefore, an updated distribution rate of 0.88 might be conservative. In this context, the QCA notes CFC's finding that three of the five energy network firms (for which data is available) that the AER uses for benchmarking have a distribution rate of 1.0.<sup>838</sup>

### Conclusion on the distribution rate

For the reasons above, the QCA remains of the view that Aurizon Network's proposed approach to estimate the distribution rate (based on unreliable ATO data) is not appropriate and that our approach to estimating the distribution rate is appropriate. The QCA finds no persuasive arguments in submissions that lead us to conclude that placing weight on the ATO data at this time is appropriate.

Our view is that the top-20 listed firms provide a more reliable estimate of the distribution rate for the benchmark firm. The available data and analysis support a distribution rate of 0.88. Accordingly, the QCA considers the best estimate of the distribution rate available to us at this time is 0.88.

### Recent litigation: further commentary

The QCA disagrees with the contention by Aurizon Network and Frontier that the QCA should follow the decision of the Tribunal in the PIAC-Ausgrid case on an appropriate estimate for gamma. The reasons for our views on this matter were discussed in detail in our final decision on DBCTM's 2015 draft access undertaking.<sup>839</sup>

The QCA also notes that a recent decision by the Federal Court, on judicial review of the Tribunal's determinations in the PIAC-Ausgrid case, found that the Tribunal had misconstrued and misunderstood the meaning of the statutory expression 'the value of imputation credits' in rule 6.5.3 of the National Electricity Rules (NER).<sup>840</sup>

The Federal Court found that the expression 'the value of imputation credits' is '... to be construed as a whole, in its context and having regard to the subject matter of the exercise'. In this case, the NER required consistency in the way the relevant building blocks interacted in the context of the determination of a regulated return using a post-tax revenue model based on a nominal vanilla WACC. The context related to a statutory model, and the Tribunal mistook '... what was to be estimated as real in a market rather than as estimates within a model'.

Although this case concerns a statutory provision of the NER, and is therefore not binding on the QCA's considerations of Aurizon Network's draft access undertaking, the QCA believes it nevertheless provides support for our approach to the definition and estimation of gamma given the similarity of context.

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<sup>836</sup> AER 2018b: 67.

<sup>837</sup> CFC 2018: 35.

<sup>838</sup> The three firms are AusNet Services, DUET Group and APA Group.

<sup>839</sup> QCA 2016b.

<sup>840</sup> Australian Energy Regulator v Australian Competition Tribunal (No 2) [2017] FCAFC 79; Australian Energy Regulator v Australian Competition Tribunal (No 3) [2017] FCAFC 80.

## Conclusion

In conclusion, the QCA acknowledges there are alternative views and interpretations for estimating gamma and its components, and the QCA has made some updates to its previous estimate of the appropriate distribution rate.

However, in our view, Aurizon Network's proposed gamma is not appropriate as it does not represent the best estimate of the value of dividend imputation credits to equity investors, will under-state the value of imputation credits to equity investors, thereby resulting a return on equity that will overcompensate Aurizon Network. Such an approach does not appropriately balance the legitimate interests of Aurizon Network and access seekers or access holders. In our view, and based on the reasoning above, the QCA considers that a gamma of 0.48, comprising a distribution rate of 0.88 and a utilisation rate of 0.55, is appropriate to be applied in the draft access undertaking.

## APPENDIX G: STAKEHOLDER SUBMISSIONS—EXPOSURE TO RISK

Specific stakeholder submissions relating to Aurizon Network’s exposure to risk are outlined and considered in Table 47. Where submissions relate to establishing an appropriate comparator for Aurizon Network’s exposure to systematic risk, these stakeholder submissions are considered as part of the QCA’s beta assessment, outlined in Appendix F.

**Table 47 Stakeholder submissions relating to Aurizon Network’s exposure to risk**

<i>Submission</i>	<i>QCA response</i>
<b><i>Exposure to volatility in coal markets and short-term counterparty risk</i></b>	
<p>Aurizon Network submitted that the global coal market has been subject to cyclical market conditions characterised by a sustained decline and significant volatility in coal prices since 2009. Aurizon Network outlined key drivers for volatility in the metallurgical and thermal coal markets that are further discussed in Chapter 6. Aurizon Network considered that this volatility in coal prices highlights the uncertain and inherently volatile nature of the coal market.<sup>841</sup></p> <p>IML submitted that it seems to have been forgotten that coal mining is an inherently risky business activity—price can fluctuate substantially. IML considered that Aurizon Network is fully exposed to the downside of volume risk.<sup>842</sup></p>	<p>The QCA acknowledges that the seaborne coal market has experienced price volatility in recent times. However, the key consideration is the extent to which Aurizon Network is exposed to such volatility.</p> <p>The risks associated with coal mining, including that associated with commodity price fluctuations, are not borne by Aurizon Network.</p> <p>The regulatory framework and characteristic of the CQCN coal haulage market allocate short-term demand risk to other parties in the industry. Additionally, the competitiveness of coal producers in the CQCN to supply the seaborne coal market limits Aurizon Network’s exposure to short-term demand and counterparty risk.</p> <p>Aurizon Network is not exposed to volume risk as the regulatory framework allocates this risk to access holders via the revenue-cap arrangement. The QCA also notes that despite periods of falling coal prices there has been no corresponding reduction in overall coal exports.</p>
<p>The QRC submitted that Aurizon Network faces little, if any, risk after taking into account the various risk mitigation measures and the low risk profile inherent in its commercial position as a monopoly infrastructure provider to customers who have made significant sunk investments. The QRC considered the regulatory environment has made Aurizon Network immune to any perceived risks relating to the coal market.<sup>843</sup></p> <p>The QRC submitted that while there have been some evident fluctuations in the price of coal, the utilisation of the CQCN has not been adversely impacted. The QRC presented figures, which were included in Aurizon Holdings’ investor presentation, showing that metallurgical and thermal coal exports have not varied significantly despite recent fluctuations in coal prices.<sup>844</sup></p> <p>Furthermore, the QRC considered that a comparison of Aurizon’s share performance to that of miners and coal producers supports the notion</p>	<p>Aurizon Network will inevitably be exposed to risk in its role of providing access to the declared service. However, the QCA notes that the regulatory framework and characteristic of the CQCN coal haulage market limit Aurizon Network’s exposure to short-term demand risk.</p> <p>The QCA also notes that despite the falling coal prices there has been no corresponding reduction in overall coal exports.</p> <p>The QCA considers that there are limitations in using Aurizon’s share price to consider the extent to which Aurizon Network is exposed to fluctuations in coal market conditions. Aurizon’s share price is impacted by many factors.</p>

<sup>841</sup> Aurizon Network, sub. 1: 16, 245; sub. 21: 248.

<sup>842</sup> IML Investors, sub. 62: 1.

<sup>843</sup> QRC, sub. 21: 20–21, 23.

<sup>844</sup> QRC, sub. 21: 23, 25.

<p>that Aurizon Network is insulated from fluctuations in coal market conditions.<sup>845</sup></p> <p>The QRC did not consider that price instability should be seen as reflective of heightened cash flow and asset risk for its regulated network.<sup>846</sup></p>	
<p>Synergies considered that while prices for both metallurgical and thermal coal rebounded sharply in the second half of 2016, prices have since been moderating, and market forecasters do not expect the price gains to be maintained long term.<sup>847</sup></p>	<p>This view is consistent with RMI’s forecast (outlined in Chapter 6) that coal prices have fallen back from their high point in January 2017 and are now stabilising.</p> <p>RMI considered that market factors will effectively provide a floor for the seaborne market and should reduce price and demand volatility in the seaborne coal market.</p> <p>However, RMI considered that the price floor will be very attractive to Queensland exporters who have lower costs of production and higher quality coals.</p>
<p>Aurizon Network outlined how market conditions have had implications for its customer base, noting that:</p> <ul style="list-style-type: none"> <li>• some producers have been selling down their coal operations or scaling back production</li> <li>• some producers have entered voluntary administration</li> <li>• some mines have been put into care and maintenance or have experienced change in ownership</li> <li>• Australian metallurgical coal production was understood to have operated at a negative cash margin</li> <li>• the credit rating profiles of its customers have materially deteriorated.</li> </ul> <p>In order to remain cost competitive, producers sought to respond to price pressures by driving greater productivity and operating at volumes driven by unit cost reduction.</p> <p>Aurizon Network noted that the industry structure has changed following the downturn in coal price—the recent trend has been the divestment of mining projects by some of the larger companies to smaller entities, some with no previous mining experience. Aurizon Network considered that this increases its credit exposure.<sup>848</sup></p>	<p>Market conditions have had implications for coal producers and the structure of this market.</p> <p>However, the risks facing individual customers of Aurizon Network is not indicative of the extent to which Aurizon Network is exposed to the cyclical nature of the industry, whether through volume risk or counterparty risk. In this regard, risk must be considered in relation to the underlying drivers for demand and supply in the relevant market—in this instance, the coal haulage market and the demand for seaborne coal.</p> <p>As outlined in Chapter 2, the competitiveness of coal producers in the CQCN to supply the seaborne coal market limits Aurizon Network’s exposure to demand and counterparty risk to market volatility.</p> <p>The CQCN has continued to demonstrate consistent annual growth in coal exports and railings, subject to the impacts of exceptional weather events, reducing volatility of exports to the seaborne coal market and demand for coal haulage services. The continued competitiveness of producers to supply the market will be a key determinant of sustained demand for coal haulage services in the CQCN.</p>
<p>Aurizon Network submitted that, being subject to revenue cap regulation, the risk that it faces is not symmetric. Aurizon Network considered that regulation limits the upside risk while leaving Aurizon Network exposed to downside risk.<sup>849</sup></p>	<p>The QCA notes that the revenue cap framework, in combination with other mechanisms in Aurizon Network’s regulatory framework (e.g. take-or-pay contracts), truncates both upside and downside risks, providing Aurizon Network with stable regulatory returns.</p> <p>Given the medium- to long-term outlook for demand from the CQCN, the downside risk is minimal.</p>

<sup>845</sup> QRC, sub. 21: 28.

<sup>846</sup> QRC, sub. 53: 4.

<sup>847</sup> Aurizon Network, sub. 35: 12.

<sup>848</sup> Aurizon Network, sub. 1: 17–18, 254–255.

<sup>849</sup> Aurizon Network, sub. 1: 253.

<p>Synergies submitted that while the application of economic regulation does modify the way in which market risks impact on Aurizon Network in the short-term, including through the revenue cap mechanism, regulation cannot change the nature of the underlying market risks that Aurizon Network faces.<sup>850</sup></p>	<p>The QCA agrees that Aurizon Network’s actual exposure to risk is directly influenced by both:</p> <ul style="list-style-type: none"> <li>• the way in which risk is addressed in the regulatory framework</li> <li>• the characteristics of the market in which it operates.</li> </ul> <p>As outlined throughout this decision, the QCA has considered the underlying market risks that Aurizon Network faces.</p>
<p>Synergies considered that the exclusion of AT<sub>1</sub> from the revenue cap mechanism means Aurizon Network retains some exposure to volumes.<sup>851</sup></p> <p>Aurizon Network submitted that while AT<sub>1</sub> is intended to reflect the costs of those maintenance activities that are variable with gross tonnes, in practice there can be considerable lag between changes in volumes and changes in maintenance activity levels. Therefore, in periods of low volumes maintenance costs can be high while revenue recovery from the AT<sub>1</sub> tariff is low.<sup>852</sup></p>	<p>The AT<sub>1</sub> component of Aurizon Network’s reference tariffs recovers the incremental maintenance costs associated with providing access to the CQCN. These incremental costs should not be incurred by Aurizon Network if railings do not materialise.</p> <p>Aurizon Network has not identified the variable costs that should be excluded from the revenue-cap arrangements. Rather, Aurizon Network has proposed AT<sub>1</sub> rates to reflect changes in incremental costs.</p> <p>As such, the QCA disagrees that this application of the revenue cap exposes Aurizon Network to short-term volume risk.</p> <p>To the extent that there are lags between changes in volumes and changes in maintenance activity levels, the regulatory framework provides for Aurizon Network to recover efficient maintenance costs forecast to be incurred regardless of the railing volumes in the following years.</p>
<p>In contrast to the contract-based pricing frameworks supported by ship-or-pay obligations typically prevailing in supply chain infrastructure, UT5 assumes short-term earnings risk where the take-or-pay is not sufficient to cover any revenue shortfall. This amount of shortfall is also impacted by deductions for Network Cause and system capacity losses arising from force majeure events. Additionally, this take-or-pay protection does not extend to the provision of overhead power system services.</p> <p>Aurizon Network acknowledges that this volatility is reduced as part of the annual price reset process which allows prices to be recalibrated to revised forecasts. However, this process merely seeks to replicate the revenue profile associated with a fixed price path and ship-or-pay contracts typically observed in supply chain export infrastructure such as gas pipelines and ports. As such, this mechanism involves the transfer of risk between users and not between Aurizon Network and users when compared to contract based pricing.<sup>853</sup></p>	<p>To the extent that there is a timing difference in the recovery of revenues, Aurizon Network is compensated for this in terms of the regulatory framework through revenue-cap arrangements, review events and other cost pass through mechanisms.</p> <p>Relevantly, the QCA’s assessment of Aurizon Network’s 2017 DAU is that the allocation, mitigation and compensation provided to Aurizon Network for its exposure to risk is appropriate, given the way in which risk is addressed in the regulatory framework.</p>
<p>Aurizon Network submitted that the earnings outcomes over the last five years have been distorted through successive transitional tariff arrangements and true-up processes which are not representative of the underlying forward looking risks. As such, EBIT, EBITDA and ROA comparisons</p>	<p>In the absence of evidence being provided by Aurizon Network that excludes and/or identifies these impacts, the QCA has relied on a range of available information to inform itself—including advice from independent experts.</p> <p>Incenta supplemented the first principles analysis by examining empirical evidence to consider whether it supported the first</p>

<sup>850</sup> Aurizon Network, sub. 35: 23.

<sup>851</sup> Aurizon Network, sub. 35: 22.

<sup>852</sup> Aurizon Network, sub. 40: 36.

<sup>853</sup> Aurizon Network, sub. 40: 35–36.



<p>are unreliable for assessing underlying business risks, despite this data being used to make inferences on risk.<sup>854</sup></p>	<p>principles' findings. Incenta emphasised that, while informative, undue weight should not be placed on the ROA-GDP relationships presented.</p>
<p>Aurizon Network proposed to retain a revenue cap for the 2017 DAU. Anglo American submitted that the form of regulation and its components should be the subject of a complete review well in advance and in anticipation of UT6.<sup>855</sup> Aurizon Network considered that this is outside the scope of an undertaking review.<sup>856</sup></p> <p>Aurizon Network said that demand risk is largely outside of the control of Aurizon Network's management, with below-rail delays and cancellations representing only a small proportion of system losses. In this respect, demand risk is most efficiently allocated to users of the service and cannot reasonably be allocated to Aurizon Network as the access provider.<sup>857</sup></p>	<p>The QCA considers that the revenue-cap arrangements proposed by Aurizon Network are appropriate to approve.</p> <p>The QCA notes that these matters are within the scope of its investigation. The QCA must consider Aurizon Network's 2017 DAU afresh, having regard to the statutory assessment criteria.</p> <p>Relevantly, the QCA's assessment of Aurizon Network's 2017 DAU is that the allocation, mitigation and compensation provided to Aurizon Network for its exposure to risk is appropriate, given the way in which risk is addressed in the regulatory framework.</p>
<p>The QRC submitted that volumes remain high due to take-or-pay contractual structures that result in marginal producers continuing production, as they are economically better off railing. Further, the long-term nature of contracts and mine capital investment decisions means that the decision as to whether to continue to produce is not made on the basis of spot or short-term prices.<sup>858</sup></p> <p>Synergies stated that, in times of capacity scarcity, mining companies have a strong incentive to enter into long-term capacity contracts, to provide certainty that they can transport their product to market. The existence of take-or-pay contracts for rail and port services will have contributed to the miners' decision to continue production in the short term, notwithstanding the low coal price.<sup>859</sup></p>	<p>The QCA notes that CQCN coal producers may have an incentive to maximise production even at low prices.</p> <p>The strong position that CQCN coal producers occupy in the seaborne coal market, combined with take-or-pay contractual arrangements, minimise volume risk for coal haulage services.</p>
<p>Synergies reported that Aurizon Network's contracted volumes will substantially reduce in the coming years, and there are currently no contracted volumes from FY2029 onwards. Synergies considered that it is likely Aurizon Network's contract coverage will reduce in the coming years, noting that Aurizon Network is reporting that its customers are seeking new access contracts for shorter terms.</p> <p>Synergies considered that in an environment where demand has moderated, and capacity is no longer scarce, there will not be the same imperative for coal producers to enter into long-term commitments.</p> <p>Reducing their commitment to long-term take-or-pay contracts will be consistent with miners' desire</p>	<p>Long-term contracts are a feature of the contracting framework as it applies to the CQCN. Aurizon Network has not provided evidence that contracts will not be renewed/recontracted, nor provided measures to address this issue.</p> <p>The QCA considers that Aurizon Network's railing volumes are likely to increase due to the competitive position that Aurizon Network's captive users occupy on the global seaborne coal cost curve, as well as the way in which Aurizon Network's regulatory framework allocates volume risk. As such, the QCA does not consider that Aurizon Network is vulnerable to cyclical market conditions.</p> <p>Furthermore, the competitiveness of CQCN producers and long-term market outlook for CQCN coal does not suggest a structural change in the coal export market will materially affect the risk of long-term demand deterioration in the foreseeable future, based on the evidence provided.</p>

<sup>854</sup> Aurizon Network, sub. 40: 32.

<sup>855</sup> Anglo American, sub. 18: 25.

<sup>856</sup> Aurizon Network, sub. 26: 8.

<sup>857</sup> Aurizon Network, sub. 40: 36.

<sup>858</sup> QRC, sub. 21: 26.

<sup>859</sup> Aurizon Network, sub. 35: 18–19.

<p>to adopt operating and contracting arrangements that allow greater flexibility to adjust production to reflect changes in international market conditions. Synergies considered that this represents a shift of risk to Aurizon Network with increasing volume uncertainty.<sup>860</sup></p>	
<p>Aurizon Network considered that it is necessary to continue to review its commercial and regulatory risks as its operating and market environment continues to evolve and change into the future.<sup>861</sup></p>	<p>The regulatory framework provides a number of mechanisms to permit Aurizon Network to address risk.</p> <p>The QCA assesses Aurizon Network’s exposure to risk as part of its investigation into a draft access undertaking. Additionally, Aurizon Network is also able to submit changes to the regulatory arrangements as part of a DAAU application.</p> <p>The QCA expects Aurizon Network to review its commercial and regulatory risks in the context of its operating and market environment.</p>
<p>Aurizon Network submitted that the costs associated with force majeure events are relatively immaterial as a proportion of the total cost base—with recovered revenues associated with cyclone related damage representing only 0.6% of total actual revenue earned since 2010. Aurizon Network considered that it is not reasonable to draw inferences on risk through a number of discrete unprecedented observations on significant low probability events.<sup>862</sup></p>	<p>The QCA has not commented on the materiality of risks associated with force majeure events, but rather observed that the regulatory framework contains various mechanisms that enable Aurizon Network to address such risks, should they eventuate.</p>
<p>Aurizon Network outlined that the regulatory framework also includes pass-through of transmission network service provider costs—which vary due to the changes in the regulated prices of its service provider. Aurizon Network considered that it is reasonable for these costs to be passed through to consumers of the service, as Aurizon Network is unable to negotiate the price of the regulated service.</p> <p>Aurizon Network submitted that the pass through costs associated with electricity prices are not relevant to the consideration of the risk of providing the declared service as the supply of electricity is not included within the declaration.<sup>863</sup></p>	<p>The QCA considers that the pass-through of transmission network service provider costs, as proposed by Aurizon Network, is appropriate to approve.</p> <p>The QCA notes that Aurizon Network’s 2017 DAU proposes a cost-pass through mechanism for EC charges, the declaration is not relevant in this context.</p> <p>Moreover, the QCA has included operating cost allowances that relate to the supply of electricity. The QCA has not sought to exclude these costs from Aurizon Network’s allowances.</p>
<p>Aurizon Network considered that inflation is addressed in the regulatory framework through a number of mechanisms including adjustments to the maintenance and operating cost allowances. However, the extent to which these mechanisms insulate Aurizon Network from price risk are highly dependent on how the firm’s costs and use of inputs are aligned to the regulatory decision and the relevant index. In this regard, there are numerous issues with the various escalation measures used by the QCA that may actually increase exposure to escalation risks.<sup>864</sup></p>	<p>Adjustment mechanisms assist Aurizon Network in managing risks associated with external cost shocks incurred throughout the regulatory period.</p> <p>The extent to which these mechanisms insulate Aurizon Network from price risk is highly dependent on how the firm’s costs and use of inputs are aligned to the regulatory decision and the relevant index. These matters are further considered, where relevant, throughout this decision.</p> <p>While inflation risk is unlikely to be completely addressed by these mechanisms, such risks have been considered as part of identifying firms that have comparable risk characteristics for</p>

<sup>860</sup> Aurizon Network, sub. 35: 18–20.

<sup>861</sup> Aurizon Network, sub. 1: 258.

<sup>862</sup> Aurizon Network, sub. 40: 36.

<sup>863</sup> Aurizon Network, sub. 40: 36.

<sup>864</sup> Aurizon Network, sub. 40: 36–37.

	<p>estimating Aurizon Network’s WACC. Relevantly, exposure to price escalation risk will also be apparent for those regulated firms that apply an indexation methodology to its cost base to calculate access charges.</p>
<p><b><i>Exposure to a long-term structural decline in demand for coal from the CQCN</i></b></p>	
<p>Aurizon Network stated that, while the regulatory framework reduces Aurizon Network’s exposure to short-term volume risk for each regulatory period, there remains a long-term risk associated with the CQCN that is not mitigated in any way by the framework.<sup>865</sup></p> <p>Aurizon Network considered that it is exposed to the long-term risk associated with the Queensland coal industry. Aurizon Network submitted that in the short term these risks may not translate directly into a variation in Aurizon Network’s cash flows, but in the long term it certainly will. Aurizon Network said that a reduction in demand risks tipping access pricing into uneconomical and unsustainable levels under revenue cap regulation. As a result, Aurizon Network considered that it is not immune from the long-term risk associated with the Queensland export coal market.<sup>866</sup></p> <p>Synergies also considered that over the medium to long term, the revenue cap cannot fully protect Aurizon Network against the risk of falling demand.<sup>867</sup></p>	<p>The QCA acknowledges that a structural change in the coal export market could materially affect the risk of long-term demand deterioration. However, the QCA notes that Aurizon Network has not provided any evidence that demand deterioration is likely.</p> <p>The QCA does not consider that inherent risks associated with Aurizon Network’s declared service reflect a long-term structural decline in demand for coal from central Queensland. The competitiveness of CQCN producers and the long-term market outlook for CQCN coal suggest that producers will remain competitive with other coal export markets in the foreseeable future based on the evidence provided.</p>
<p>Aurizon Network submitted that, although it has access agreements in place which provide revenue protection measures through take-or-pay and relinquishment fees, these arrangements do not necessarily mitigate long-term stranding risks, as:</p> <ul style="list-style-type: none"> <li>• the term of the existing access agreements are not sufficiently long in duration to address those risks</li> <li>• the ability to obtain take-or-pay coverage is highly dependent on system capacity being constrained such that a producer places considerable value on scheduling certainty</li> <li>• the coverage provided by the relinquishment fee is essentially capped at 50% of the exposure</li> <li>• the revenue cap framework exposes Aurizon Network to counterparty credit risk as it requires Aurizon Network to recognise revenue it is entitled to earn not what it receives.<sup>868</sup></li> </ul> <p>Synergies stated that any unrecovered payments, including take-or-pay, due to credit default are not mitigated by the revenue cap mechanism.<sup>869</sup></p>	<p>The regulatory framework and characteristics of the CQCN coal haulage market mitigate long-term demand risks as the competitiveness of coal producers in the CQCN to supply the seaborne coal market limits Aurizon Network’s exposure to these risks.</p> <p>While Aurizon Network’s take-or-pay contract arrangements help to reduce its demand risk, access agreements are only one feature of Aurizon Network’s regulatory framework.</p> <p>Where the take-or-pay mechanisms do not recover a revenue shortfall, the revenue cap mechanism allows the revenue shortfall to be recovered two years later through reference tariffs. Additionally, if an access holder counterparty fails, system reference tariffs recover the system allowable revenue from the remaining users within that system, thereby socialising counterparty risk among the users in that system.</p> <p>The QCA acknowledges that access agreement arrangements in themselves do not necessarily mitigate long-term stranding risks. However, combined with other mechanisms in the regulatory framework, Aurizon Network is the principal provider of service to the CQCN with a captive and resilient customer base. Incenta considered that the position that these captive users occupy in the global seaborne coal cost curve is more important to Aurizon Network’s long-term cash flows than the coverage and scope of its take-or-pay contracts.</p>

<sup>865</sup> Aurizon Network, sub. 40: 30-31, 84–85.

<sup>866</sup> Aurizon Network, sub. 26: 24–26.

<sup>867</sup> Aurizon Network, sub. 35: 21–22.

<sup>868</sup> Aurizon Network, sub. 40: 42.

<sup>869</sup> Aurizon Network, sub. 35: 14.

<p>Aurizon Network considered that, at least in the medium to long term, its risk profile is closely linked to the risk profile of the global seaborne coal industry it services.<sup>870</sup></p> <p>Synergies noted that CQCN coal producers are largely price takers—their ability to effectively compete depends on global demand for coal together with where these producers are positioned on the world cost curve.</p> <p>Synergies considered there has been a major change in the structural cost competitiveness of Australian coal mines in recent years—more than half of Australian metallurgical and thermal coal mines had costs above global averages by 2011. They also reported that rapidly rising capital costs were meaning that Australia’s new mining projects were also less competitive.</p> <p>Synergies reported that this structural change in cost competitiveness means that Queensland mines are significantly more vulnerable to changing conditions in the seaborne coal markets than was historically the case. Reduced international coal prices will leave Queensland producers significantly exposed to cash losses on their coal production.<sup>871</sup></p>	<p>The QCA agrees that the competitiveness of coal producers in the CQCN to supply the seaborne coal market will affect their vulnerability to market conditions.</p> <p>However, the QCA considers that the competitiveness of CQCN coal producers in the seaborne coal market remains strong. Aurizon Network has not provided evidence to suggest that the underlying risk of long-term demand deterioration for coal from central Queensland is likely. The competitiveness of CQCN producers and long-term market outlook for CQCN coal does not suggest that a structural change in the coal export market could materially affect the risk of long-term demand deterioration in the foreseeable future.</p> <p>As shown in Chapter 2, Queensland-based exporters are generally at the low-cost to mid-cost end of the seaborne coal export cost curve.</p>
<p>Aurizon Network submitted that, although the volatility of the market has some cyclical characteristics, there is no consistent and predictable pattern in the coal market.<sup>872</sup> Instead, Aurizon Network considered that there have been some major structural shifts in the industry in recent years and that the cyclical market conditions are characterised by a sustained decline in coal price.<sup>873</sup></p> <p>Synergies stated that coal producers have demonstrated their willingness to quickly and decisively alter their production to changes in market conditions. Recent price increases have led to reopening of some of these mines; however, the longevity of this production is uncertain. As coal producers increasingly structure their operational and contracting practices in order to provide themselves with greater production flexibility, it is highly likely that Queensland coal volumes will become increasingly volatile.<sup>874</sup></p>	<p>In terms of export price volatility, a key consideration in this respect is the continued competitiveness of producers to supply the market. The QCA notes that long-term outlook for seaborne coal markets supports the ongoing long-term demand for CQCN coal exports. Importantly:</p> <ul style="list-style-type: none"> <li>• CQCN producers are generally at the low- to mid-cost end of the seaborne coal market cost curve</li> <li>• CQCN produces some of the highest quality metallurgical and thermal coal, which is highly sought after in the seaborne coal markets</li> <li>• RMI forecasts that volatility in prices will stabilise and move to a more sustainable long-term pricing regime over the next 12 months.</li> </ul> <p>This market outlook suggests that coal producers in the CQCN will be competitive in seaborne coal markets in the foreseeable future.</p>
<p>The QRC supported the positive outlook for coal markets and coal production from Queensland. The QRC also submitted a curve showing metallurgical coal industry cash margins.</p> <p>In relation to changes in mine ownership, the QRC considered that the real relevance is the economics of a mine's operation, not the corporate</p>	<p>The QRC’s observations are largely consistent with RMI's analysis of Aurizon Network's volume forecast for UT5 (see Chapter 6). Additionally, mechanisms in the regulatory framework, including system reference tariffs, largely allocates the volume risk associated with individual producers from Aurizon Network to access holders within each coal system.</p>

<sup>870</sup> Aurizon Network, sub. 1: 271.

<sup>871</sup> Aurizon Network, sub. 35: 14–16.

<sup>872</sup> Aurizon Network, sub. 1: 250.

<sup>873</sup> Aurizon Network, sub. 26: 16.

<sup>874</sup> Aurizon Network, sub. 35: 16.

<p>ownership of a mine. The QRC submitted that, if anything, a change in corporate ownership may assist in keeping a mine operating—such as where the existing owner is burdened by debt relating to the original mine development costs. The QRC noted examples of where changes of ownership are assisting to increase production volumes from the CQCN.<sup>875</sup></p>	
<p>Aurizon Network said that cost curves do not offer a balanced representation of difficult trading conditions experienced by Australian coal producers in recent times. Aurizon Network noted that there have been periods where up to a quarter of Australian metallurgical coal export volume was understood to have operated at a negative cash margin, with some mines becoming insolvent during the UT4 regulatory period.<sup>876</sup></p> <p>Aurizon Network considered that the speed with which the market has turned and actions taken by producers highlight the inherent risk to which Aurizon Network and its infrastructure is exposed. These are risks that other regulated entities do not face, due to the size and nature of their customer base.<sup>877</sup></p> <p>Synergies said that the structure of the Queensland coal sector has changed markedly in recent years since the downturn in international coal prices. While the industry had previously been experiencing consolidation, the more recent trend has been the divestment of mining projects by some of the larger companies to smaller entities, some of whom have little or no previous mining experience.</p> <p>Aurizon Network also submitted that its customer base has seen more ‘junior miners’ purchasing mining operations from larger companies within the CQCN. Customers are seeking alternative, less capital-intensive solutions to generate additional coal production to take advantage of elevated coal prices.<sup>878</sup></p> <p>Synergies also considered that the combination of small customer numbers, high average RAB value and high average revenue per customer means that credit quality of those customers is a material issue for Aurizon Network’s risk levels.<sup>879</sup></p>	<p>The risks facing individual customers of Aurizon Network are not indicative of the extent to which Aurizon Network is exposed to the cyclical nature of the industry, whether through volume risk or counterparty risk.</p> <p>Fundamentally, the competitiveness of coal producers in the CQCN to supply the seaborne coal market with the product that is demanded by end customers will determine Aurizon Network’s exposure to counterparty risk in the longer term. While the ownership structure of coal producers may change as a result of firm-specific factors, coal haulage services will be sustained as long as the demand for the output of the mines remains.</p> <p>The CQCN has continued to demonstrate consistent annual growth in coal exports and railings.</p> <p>The attributes of the CQCN, along with the long-term outlook for seaborne coal markets, supports the ongoing long-term demand for CQCN coal exports.</p>
<p>Aurizon Network’s revenue is almost entirely derived from the provision of below-rail services to the export coal industry, including both metallurgical and thermal coal. Noting that thermal coal is typically drawn from the extremities of the Bowen Basin, Synergies considered that Aurizon Network has a higher revenue dependence on</p>	<p>Based on the evidence available, the QCA considers that the long-term market outlook does not reflect a long-term structural decline in demand for CQCN thermal coal in the foreseeable future. In particular, RMI reported that thermal coal demand will be driven by construction of High Efficiency Low Emissions (HELE) thermal coal power stations. Furthermore, there is also expected to be seaborne supply</p>

<sup>875</sup> QRC, sub. 21: 26–28.

<sup>876</sup> Aurizon Network, sub. 26: 4–5, 25.

<sup>877</sup> Aurizon Network, sub. 1: 18.

<sup>878</sup> Aurizon Network, sub. 40: 9.

<sup>879</sup> Aurizon Network, sub. 35: 13.

<p>thermal coal than would be inferred purely from tonnage volumes. Synergies said that the demand outlook for thermal coal is far more precarious, given that thermal coal is competing with a range of other fuel sources for electricity production, with the Office of the Chief Economist anticipating that world thermal coal trade will decrease in coming years.<sup>880</sup></p> <p>Aurizon Network considered that the CQCN is exposed to significantly higher long-term risk as a consequence of its exposure to international demand and coal price determinants. The CQCN is also subject to substitution risk with end customers in 2017 seeking increased coal supplies from other global supply chains, including the USA and Indonesia.<sup>881</sup></p>	<p>required to replace falling exports from Indonesia as their domestic generation demand grows and the diminishing oversupply from China.</p> <p>RMI considered that CQCN producers will be in a strong position in the seaborne coal market due to their lower costs and, importantly, higher quality coals.</p> <p>Aurizon Network agreed with RMI concerning the relative quality of coal supply in Central Queensland and the long-term opportunity for export growth, in particular the resilience of Australian seaborne export volume (compared to competing export nations) in periods of subdued coal prices.<sup>882</sup></p>
<p>Aurizon Network outlined a number of factors, when combined with market volatility and uncertainty, which it considered exacerbate the risk of certain assets being stranded:</p> <ul style="list-style-type: none"> <li>• The regulatory asset base is fragmented by system.</li> <li>• The operating life span of assets owned and managed by Aurizon Network is much longer than the regulatory period and coal price cycles.</li> <li>• Customers are concentrated (a relatively small number of customers that are all exposed to a single asset class), have continued to report major asset impairments, and have received credit downgrades from ratings agencies.</li> <li>• The industry structure is changing, with larger companies divesting mining projects to smaller entities with less prior mining experience.</li> <li>• Customers are increasingly requesting shorter-term access agreements and/or more flexible contracts, rather than renewing for the typical 10-year period.</li> <li>• Other parts of the CQCN supply chain are experiencing shorter contract profiles with a significant reduction forecast.<sup>883</sup></li> </ul>	<p>While outlining a number of factors that may exacerbate a risk of long-term demand deterioration, Aurizon Network has not provided evidence to suggest that the underlying risk of long-term demand deterioration for coal from central Queensland is likely.</p> <p>The competitiveness of CQCN producers and long-term market outlook for CQCN coal do not suggest that a structural change in the coal export market could materially affect the risk of long-term demand deterioration in the foreseeable future, based on the evidence available.</p> <p>In any case, the extent to which these individual factors may affect the risk of asset stranding is uncertain. The regulatory arrangements have not specified the precise method to address a structural deterioration in demand. If a structural deterioration in demand were to become evident, the QCA considers this would represent an industry-wide issue, requiring an industry-wide solution to address it. Aurizon Network has not detailed in its 2017 DAU how such risk would be apportioned between industry participants in the unlikely event that it occurs.</p>
<p>Synergies noted that, for the purposes of pricing access to its network, the CQCN is substantially fragmented. Synergies considered that to the extent that Aurizon Network suffers revenue shortfalls or stranding events in a RAB component, there is no mechanism in the regulatory framework that allows such shortfalls to be recovered from another component. Strictly compartmentalising the customer base from which Aurizon Network can source its revenue actually heightens the market risk that is borne by Aurizon Network.</p>	<p>As noted above, the competitiveness of CQCN producers and long-term market outlook for CQCN coal does not suggest that a structural change in the coal export market could materially affect the risk of long-term demand deterioration in the foreseeable future, based on the evidence available.</p> <p>The QCA acknowledges that the market characteristics and concentration ratios may vary from system to system. While it is the QCA's view that the system reference tariff approach provides appropriate pricing signals to guide decision-making, if such a demand deterioration risk does materialise for a specific</p>

<sup>880</sup> Aurizon Network, sub. 35: 11–12.

<sup>881</sup> Aurizon Network, sub. 40: 13.

<sup>882</sup> Aurizon Network, sub. 40: 142.

<sup>883</sup> Aurizon Network, sub. 1: 254–256.

<p>Synergies considered that the stranding risk mitigation measures in Aurizon Network’s regulatory framework are unlikely to be effective in protecting Aurizon Network against significant falls in volumes, particularly in those systems with a small number of users.<sup>884</sup></p> <p>Aurizon Network considered that the QCA primarily addresses long-term asset stranding risks from the perspective of Aurizon Network’s exposure to metallurgical coal. However, a significant value of the RAB is exposed to thermal coal demand, which has different demand and supply dynamics compared to metallurgical coal.<sup>885</sup></p>	<p>asset in future, the QCA considers that Aurizon Network has the ability to manage this risk within the regulatory framework.</p> <p>The regulatory arrangements have not specified the precise method to address a structural deterioration in demand in a specific RAB component. If such a structural deterioration in demand were to become evident, the QCA considers this would represent an industry-wide issue, requiring an industry-wide solution to address it. Aurizon Network has not detailed in its 2017 DAU how such risk would be apportioned between industry participants in the unlikely event that it occurs.</p>
<p>Aurizon Network did not consider it to be reasonable, or practically feasible, to incorporate arrangements to address how asset stranding associated with network fragmentation should be addressed. Aurizon Network considered the most efficient approach to addressing asset stranding risks requires consideration of the prevailing circumstances.<sup>886</sup></p> <p>In any case, Aurizon Network said that any mechanism addressing these risks would not be binding on the regulator in future regulatory periods. Aurizon Network considered that mechanisms designed to address asset stranding risks associated with future events in the undertaking are unlikely to mitigate those risks or provide the regulatory certainty necessary to reduce investor risk premiums. Furthermore, Aurizon Network said that circumstances which give rise to this risk being realised are highly uncertain and options available to addressing the problem after it has been realised are extremely narrow.<sup>887</sup></p>	<p>The QCA acknowledges that it may not be reasonable to incorporate specific arrangements to address how asset stranding associated with network fragmentation should be addressed. Appropriate allocation of such risk likely requires consideration of the prevailing circumstances.</p> <p>The QCA notes that Aurizon Network is able to submit changes to the regulatory compact as part of a DAAU submission or as part of the next regulatory review. In addressing such issues, the QCA supports Aurizon Network submitting reasonable proposals to manage long-term demand risks for specific assets as they arise.</p> <p>The QCA reiterates that the competitiveness of CQCN producers and long-term market outlook for CQCN coal do not suggest that a structural change in the coal export market could materially affect the risk of long-term demand deterioration in the foreseeable future, based on the evidence available. To the extent that an asset stranding risk is affected by arrangements contained in the regulatory framework, the QCA is not convinced that the options to address such risk necessarily narrow, or dissolve due to a lack of regulation. In both of these circumstances, Aurizon Network will have the opportunity to amend the regulatory framework through a DAAU process or otherwise.</p>
<p>Aurizon Network submitted that Australia’s metallurgical coal supply is considered more competitive compared to Australia’s thermal coal supply. Aurizon Network considered that the future demand for thermal coal is evident in the material contraction in coal exploration expenditure in Queensland and New South Wales.</p> <p>Additionally, Aurizon Network submitted that investors in Aurizon Network will take into consideration a range of long term uncertainties when determining the required return on invested capital.<sup>888</sup></p>	<p>In addition to coal producers’ competitiveness on a cost basis the CQCN produces some of the highest quality coal, which is highly sought after in the seaborne coal markets.</p> <p>As outlined by RMI, Australian coking coals have premium coking strength properties and Australian thermal coals are increasingly sought after by companies constructing HELE power stations. Aurizon Network outlined the view that in a carbon constrained environment, higher quality coal, which Australia supplies, will be favoured and will increase Australia’s participation in global trade.</p> <p>Based on the information available, the QCA is not of the view that a material demand deterioration risk currently exists for the CQCN, or a specific asset in the CQCN, due to the market characteristics of thermal coal.</p>

<sup>884</sup> Aurizon Network, sub. 35: 20–23.

<sup>885</sup> Aurizon Network, sub. 40: 31, 38.

<sup>886</sup> Aurizon Network, sub. 40: 44–45.

<sup>887</sup> Aurizon Network, sub. 40: 45.

<sup>888</sup> Aurizon Network, sub. 40: 41–42.

<p>Alternative services are available that may allow users to bypass components of Aurizon Network's rail network, including<sup>889</sup>:</p> <ul style="list-style-type: none"> <li>• Aurizon Network's electric distribution system for the Blackwater and Goonyella Systems—there is an increased risk that rail operators or end customers may bypass the electric network and operate diesel train services. This creates a significant asset stranding risk for Aurizon Network, even if total demand for coal transport remains strong.</li> <li>• Goonyella to Abbot Point link—Adani has committed to the development of its Carmichael mine in the northern Galilee, and the existing Goonyella trunk line to DBCT/Hay Point provides an alternative route for users of the GAPE System to export their coal, allowing a bypass of the GAPE and Newlands Systems.</li> </ul>	<p>Mechanisms in Aurizon Network's regulatory framework, such as socialised reference tariffs and the revenue cap, mean that Aurizon Network is only exposed to by-pass to the extent that it materialises into an asset stranding risk for that asset.</p> <p>Aurizon Network has not submitted any evidence to suggest that the bypass risk for these assets is material for the UT5 regulatory period. Furthermore, Aurizon Network's 2017 DAU does not specify the way in which the risk of by-pass is to be addressed.</p> <p>If such a risk does materialise throughout the regulatory period, the Aurizon Network has the ability to manage this risk within the regulatory framework. In particular, Aurizon Network is able to submit changes to the regulatory arrangements as part of a DAAU submission or as part of the regulatory reset every four years.</p> <p>On 5 November 2018, the QCA received Aurizon Network's draft amending access undertaking seeking approval to amend the electric traction tariff (AT<sub>5</sub>) under the UT4 undertaking.</p>
<p>Aurizon Network submitted that the QCA's narrow focus on the commercial and regulatory risks, in terms of both cash flow volatility and the short-term emphasis on cash flow impacts from regulation, leads to a disproportionate assessment of risk.<sup>890</sup></p> <p>In relation to its regulatory framework, Aurizon Network noted:</p> <ul style="list-style-type: none"> <li>• Take-or-pay is only relevant for the term of the contract and only while the contract remains on foot.</li> <li>• The revenue cap is comparatively short in the context of the economic life of the asset base and only provides protection for the relevant period.</li> <li>• The revenue cap assumes that the MAR that is set for that period based on forecast volumes will actually allow it to earn a full return on and of capital on its RAB for that period.<sup>891</sup></li> </ul>	<p>These mechanisms do not necessarily address Aurizon Network's exposure to the risk of long-term demand deterioration.</p> <p>The QCA notes that there are other mechanisms in the regulatory framework that assist in mitigating such risk exposures, including:</p> <ul style="list-style-type: none"> <li>• accelerated depreciation</li> <li>• limited optimisation</li> <li>• security requirements for access holders and relinquishment fees.</li> </ul> <p>While individually the mechanisms will influence Aurizon Network's ability to manage various risks, collectively the regulatory framework establishes the extent of Aurizon Network's exposure to risk.</p> <p>Additionally, the QCA considers Aurizon Network's market exposure is limited due to its market power, captured and resilient customer base, long-term contracting and regulatory framework.</p>
<p>Aurizon Network considered the QCA overstates the extent to which accelerated depreciation mitigates asset stranding risks outside of the Goonyella System. In this regard the annual depreciation rate is in the order of 5%. However, this is offset by the escalation of the asset base in line with out-turn inflation and asset renewals expenditure which are anticipated to grow over time as the historical lumpy investment in asset improvement capex.<sup>892</sup></p>	<p>The QCA notes Aurizon Network's acknowledgment that accelerated depreciation is one amongst many risk mitigation approaches within the regulatory framework.</p> <p>The QCA also notes that the regulatory framework allows only limited optimisation of the RAB for capital expenditure that is approved by the QCA.</p>
<p>Synergies considered that the revenue cap arrangement will constrain the ability of the remaining mines in the system to accommodate the resulting revenue cap-related price increases in</p>	<p>The QCA is open to Aurizon Network proposing an alternative regulatory arrangement to the revenue cap framework proposed as part of its 2017 DAU. The QCA considers that these</p>

<sup>889</sup> Aurizon Network, sub. 35: 16–18.

<sup>890</sup> Aurizon Network, sub. 40: 30–31.

<sup>891</sup> Aurizon Network, sub. 1: 271–272.

<sup>892</sup> Aurizon Network, sub. 40: 41–42.



the event that market circumstances cause a significant loss in coal volumes in a system. <sup>893</sup>	are matters to be considered afresh as part of future investigations.
Synergies stated that the changing coal price aligned with the demands of Aurizon Network's customers has historically resulted in capital-intensive capacity expansions being requested directly from customers at times of high coal prices. Although requested in periods of higher coal prices, these capacity investment decisions are for assets with an operational life of up to 50 years. Synergies considered that this asset life will at times produce tension between the recovery of the cost of the asset and the prevailing market conditions. <sup>894</sup>	The QCA considers that mechanisms provided in the regulatory framework are sufficient for Aurizon Network to manage risk specific to a particular investment. In particular, Aurizon Network has the ability to negotiate access conditions with access seekers. Access conditions can vary, but may involve: <ul style="list-style-type: none"> <li>• an uplift of the regulated WACC for a specific investment to reflect any additional risks encountered</li> <li>• an up-front payment (or similar financial instrument) equal to the value of the asset</li> <li>• special access conditions, such as changing the depreciation period or profile, the take-or-pay arrangements or the term of the contracts.</li> </ul>
Reflecting its narrow market exposure, which is limited to the seaborne metallurgical and thermal coal markets, Aurizon Network provides below-rail services for a confined group of coal producers. As a result, Aurizon Network has a high average exposure to each of its customers. <sup>895</sup>	In considering Aurizon Network's exposure to servicing a relatively small number of customers—the risk associated with servicing coal producers in the CQCN depends on the competitive position of those customers in the global supply of seaborne coal exports.  Thus, Aurizon Network's market exposure is limited due to its market power, captured and resilient customer base, long-term contracting and regulatory framework.
<b>Exposure to revenue/capital deferrals</b>	
Aurizon Network considered the deferral of a portion of the WIRP capital costs (return on capital and depreciated capital costs) in UT4 has resulted in it holding long-term coal demand risk, which is magnified when one reviews the changing customer profile within the CQCN. Aurizon Network considered that this illustrates how it bears material risk on investments made on behalf of the customers that have approved those investments. Aurizon Network considered that investors are left with the uncertainty about if, and when, the deferred capital will be recovered. <sup>896</sup>	The QCA's decision is to approve Aurizon Network's 2017 DAU proposal relating to WIRP deferrals (see Chapter 3). As such, this decision provides investors with certainty as to when the deferred capital will be recovered.
Aurizon Network argued that the revenue cap is only moderately effective in managing volume risk in the shorter term, with it continuing to bear volume exposure due to revenue deferrals for expansion projects and revenue cap exclusions. <sup>897</sup>  Aurizon Network considered that the deferral of a portion of the WIRP capital costs results in RAB fragmentation and it being exposed to demand risk for no additional compensation. Aurizon Network also considered that the WIRP revenue deferral effectively means it bears the risk of non-railing volume, which is contrary to its legitimate business	The QCA considers that any RAB fragmentation or demand risk resulting from the WIRP expansion originates from Aurizon Network's initial decision to invest.  As outlined in Chapter 2, the QCA considers that mechanisms provided in the regulatory framework, including access conditions sought, are sufficient for Aurizon Network to manage risk specific to a particular investment.

<sup>893</sup> Aurizon Network, sub. 35: 21–22.

<sup>894</sup> Aurizon Network, sub. 35: 19.

<sup>895</sup> Aurizon Network, sub. 35: 12.

<sup>896</sup> Aurizon Network, sub. 26: 25; sub. 1: 250, 272.

<sup>897</sup> Aurizon Network, sub. 1: 294; sub. 40: 124.

<p>interests given that the risks are entirely outside of their control.<sup>898</sup></p> <p>Synergies also noted that the deferral on the inclusion of capital expenditure in the RAB has the effect of delaying Aurizon Network’s ability to recover revenue related to this expenditure. Recovery of this deferred revenue is dependent on the commencement of the increased volumes upon which the expansion was predicated.<sup>899</sup></p>	
<p>The QRC submitted that the WIRP revenue deferral is not a regulatory or commercial risk that should be remunerated through the WACC (and MAR). The QRC noted that Aurizon Network has effectively kept net present value neutral due to the roll-forward of the capital on which a return is being deferred. The QRC considered that the purpose of deferral is therefore to ensure that existing WIRP users do not pay for the volume risk created by future expected WIRP users that are not currently railing.<sup>900</sup></p> <p>In response, Aurizon Network did not agree with the QRC that WIRP deferral reduces Aurizon Network’s risk. Aurizon Network considered that the revenue deferral will only be net present value neutral if there is no uncertainty around the recovery of deferred revenue.<sup>901</sup></p>	<p>As outlined above, the QCA’s decision is to approve Aurizon Network’s 2017 DAU proposal to not defer WIRP capital.</p>
<b>Exposure to regulatory risk</b>	
<p>Aurizon Network submitted that the QCA has not evaluated the inherent impacts of the regulatory framework on the premium required by equity investors between discretionary and rules based regulatory regimes. Aurizon Network considered that the less prescriptive regime provided by the QCA Act provides greater degrees of freedom or flexibility in regulatory decision-making, which can potentially create value, but equally, gives rise to regulatory risk.<sup>902</sup></p> <p>Aurizon Network also submitted that the QCA has not evaluated the extent to which the regulatory framework exposes Aurizon Network and investors in the CQCN to increased exposure to the business cycle. Aurizon Network said that its exposure to regulatory risk is exacerbated when the QCA’s WACC decisions are focussed on short regulatory cycles rather than Aurizon Network’s long-term risk factors.<sup>903</sup></p>	<p>The QCA has given consideration to the extent to which regulatory framework exposes Aurizon Network to regulatory risk in estimating an appropriate WACC (see Chapter 5 and Appendix F). For instance, differences between discretionary and rules based regulatory regimes are considered as part of the QCA’s first principles assessment for estimating beta.</p> <p>The QCA acknowledges that the regulatory returns determined by the regulator will be subject to the business cycle. As discussed in Chapter 5, Aurizon Network has the ability to manage risks associated with varying market conditions.</p>
<p>Aurizon Network noted that in accepting ARTC’s proposed commercial parameter values, including the rate of return estimate, the ACCC referred to the importance of delivering regulatory certainty</p>	<p>The QCA notes that the ACCC accepted a rate of return that had not been calculated on the basis of its accepted methodology. However, this reflected stakeholders’ support for the ACCC accepting ARTC’s application.</p>

<sup>898</sup> Aurizon Network, sub. 26: 26; sub. 1: 24.

<sup>899</sup> Aurizon Network, sub. 35: 22.

<sup>900</sup> QRC, sub. 21: 32.

<sup>901</sup> Aurizon Network, sub. 26: 26-27.

<sup>902</sup> Aurizon Network, sub. 40: 44, 86.

<sup>903</sup> Aurizon Network, sub. 40: 44, 85.

<p>for the Hunter Valley rail network and its affected stakeholders in making its decision.<sup>904</sup></p>	<p>In doing so, the ACCC noted concerns raised by stakeholders of regulatory oversight of the HVCN reverting to IPART should the ACCC not consent to the application by 1 July 2017. Stakeholders considered that this outcome would be inefficient and would result in significant regulatory and commercial uncertainty. The ACCC shared stakeholders' concerns that the outcome of this process illustrates significant issues with the current regulatory framework as it applies to the HVCN.</p> <p>The QCA considers that the significance placed on regulatory certainty by the ACCC has limited relevance for the QCA's assessment of Aurizon Network's 2017 DAU, noting:</p> <ul style="list-style-type: none"> <li>• Aurizon Network's proposed rate of return has not been widely accepted from other stakeholders</li> <li>• the issues associated with the HVCN's regulatory framework are not present in the regulatory regime under the QCA Act.</li> </ul>
<p>Aurizon Network considered that the market reaction to the QCA's draft decision illustrates the impact of surprising exercises of regulatory judgement on investors' appetite for Aurizon Network's stock relative to other stocks.<sup>905</sup></p>	<p>Share prices may reflect investor expectations that the entity will be able to achieve a return aligned with its regulatory proposal. This expectation is not necessarily built on whether such a proposal is efficient or appropriate to approve.</p> <p>Additionally, information disclosed to shareholders as part of a decision, such as the timing of Aurizon Network's averaging period, may affect the share price. However, this information was provided as part of Aurizon Network's proposal, but was simply not communicated to the market until the time of a decision.</p>
<p>Aurizon Network contends that any assessment of risk needs to have regard to factors that extend beyond the current regulatory period. This is important in order to reflect investor expectations and to align regulatory decisions with the objectives of the QCA Act. Without a longer term view, there is a risk that investment in latter regulatory periods could be discouraged if investment in mining and coal chain infrastructure was to be considered uneconomic.<sup>906</sup></p>	<p>The QCA acknowledges Aurizon Network's view that any assessment of overall risk needs to have regard to risks and other factors that extend beyond the current regulatory period. The QCA's approach to the treatment of the RAB takes into account such a view. Specifically, there are provisions in the undertaking that put in place processes that contribute to a long-term stable value of the real RAB and ultimately seek to provide investors with a return commensurate with the regulatory and commercial risks over time.</p> <p>The QCA's WACC decision has been made with consideration to Aurizon Network's incentives to invest, maintain and operate the CQCN in a manner sought by its customers.</p>

<sup>904</sup> Aurizon Network, sub. 40: 84–85.

<sup>905</sup> Aurizon Network, sub. 40: 85.

<sup>906</sup> Aurizon Network, sub. 40: 35.

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## APPENDIX H: AMENDED 2017 DAU

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Appendix H sets out the way in which the QCA considers it appropriate for Aurizon Network's 2017 DAU to be amended, subject to the incorporation of any further amendments necessary to correct any demonstrated typographical or cross-referencing errors.

Appendix H incorporates the attached mark-ups to Aurizon Network's 2017 DAU.

- H.1 Parts and Schedules of the 2017 DAU
- H.2 Standard Access Agreement
- H.3 Standard Train Operations Deed
- H.4 Standard Rail Connection Agreement
- H.5 Standard Studies Funding Agreement

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