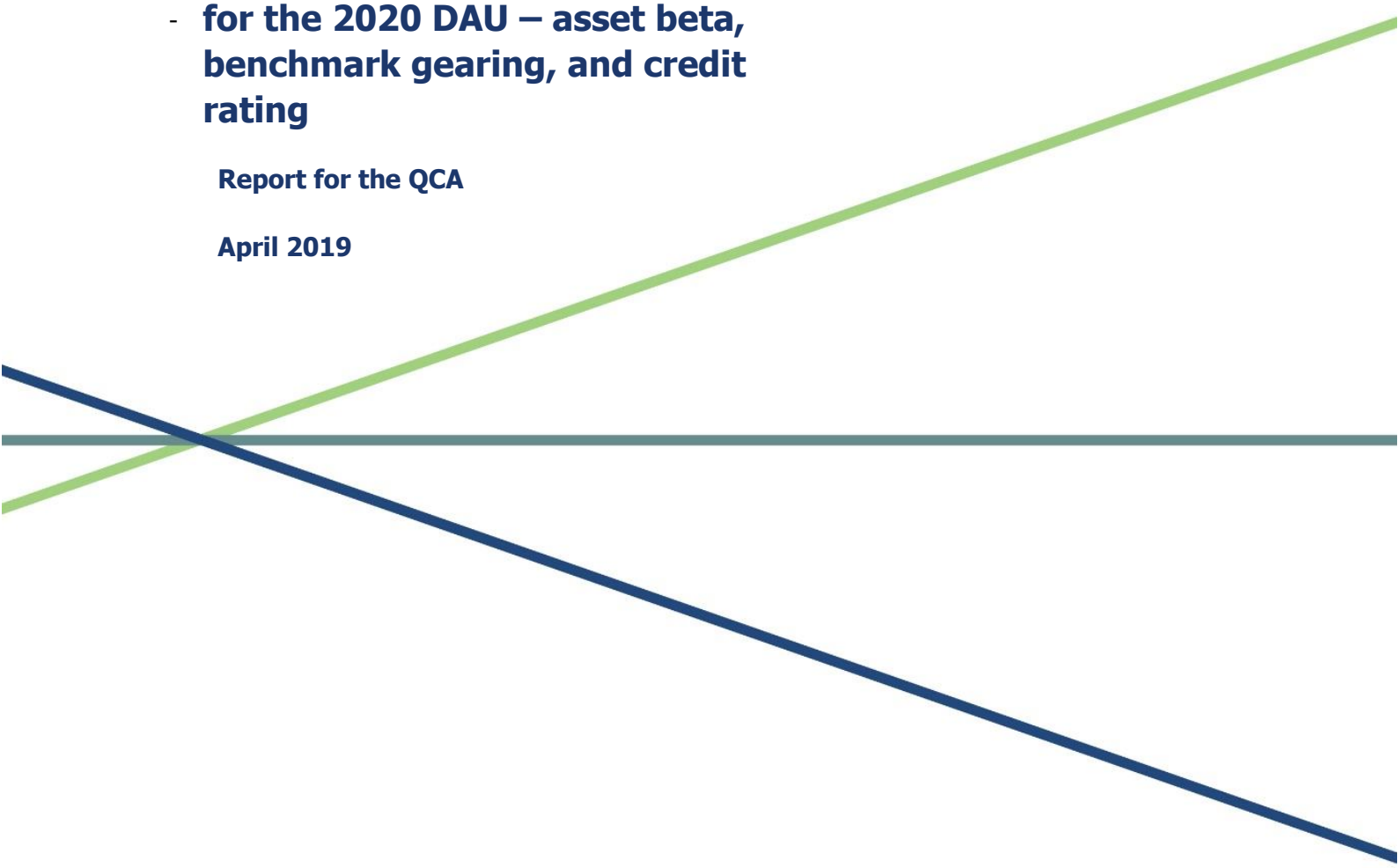
Estimating Queensland Rail's WACC for the 2020 DAU – asset beta, benchmark gearing, and credit rating

Report for the QCA

April 2019



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1. Introduction and overview

1.1 The Brief

The Queensland Competition Authority (QCA) engaged Incenta Economic Consulting (Incenta) to assist it in estimating Queensland Rail's (QR) Weighted Average Cost of Capital (WACC) for the 2020 Draft Access Undertaking (DAU). Queensland Rail (QR) submitted a DAU on 14 August 2018 for the regulatory period beginning 1 July 2020 (2020 DAU, or 'the regulatory period'), which the QCA is now considering under Part 5 of the QCA Act. This sets out the non-price and price-related terms and conditions for access to the declared service (i.e. QR's below-rail network).

QR is a statutory authority, operating through the wholly owned subsidiary Queensland Rail Limited. It is a below-rail railway operator owning more than 6600 km of track in Queensland, which services the passenger, tourism, resources and freight customer markets. In addition to the West Moreton system, its regional network covers the Mount Isa, North Coast, Western, South Western and Central Western lines. We use the term "QR-Coal" to refer to Queensland Rail's assets in the West Moreton system, which comprise a 314 kilometre below-rail single line connecting thermal coal mines in the Surat Basin to the Port of Brisbane.

The QCA's Draft Terms of Reference states that its aim is to determine whether it is appropriate for it to approve the indicative post-tax vanilla weighted average cost of capital (WACC) range and associated values for key parameters proposed by QR to derive coal tariffs on the West Moreton (QR-Coal) system for the five-year period proposed for the 2020 DAU. The QCA has engaged Incenta to assist in the assessment of Queensland Rail's 2020 DAU WACC proposal, its supporting documentation and stakeholders' submissions, and to provide advice on several WACC parameters.

The three key matters required to be addressed in this report are:[1]

- ***Estimate the asset beta of regulated energy and water businesses and tollroads***

  Given the findings of the QCA's first principles analysis, estimate the asset betas of regulated energy and water businesses and tollroads.

- ***Benchmark capital structure:***

  Assess an appropriate benchmark capital structure for QR-Coal, considering the total risk (systematic and non-systematic) facing West Moreton coal traffic, in comparison to the risks of other relevant businesses in Australia and other jurisdictions (as appropriate), and the extent to which the regulatory arrangements (e.g., treatment of the regulatory asset base) affect total risk.

- ***Benchmark credit rating***

  Determine a benchmark credit rating for QR-Coal's business providing below-rail access to coal traffic on the West Moreton system. It should be consistent with the respective benchmark capital

[1] QCA (25 October, 2018), *Draft Terms of Reference – 25/10/2018, Project: Estimating Queensland Rail's WACC for the 2020 DAU*, p.2.

structure, taking into account comparator firms, appropriate adjustments for the impact on risk of the regulatory arrangements and other relevant evidence.

We note that QR-Coal has only two customers, New Hope Group (New Hope) and Yancoal, compared with Aurizon Network's more than 40 customers. At the time of writing this report New Hope's proposed New Acland mine development has not been approved. Together with Yancoal's 2.1 mtpa would result in the full utilisation of QR-Coal's approximately 9 mtpa capacity. For the purposes of this report we have assumed that this uncertainty has been resolved, that New Hope proceeds with its development, and has take-or-pay contracts covering the vast majority of its component of the capacity.

1.2 Estimates of asset beta

In this section we provide estimates of the asset betas of regulated energy and water businesses, and tollroads.

We estimated beta by applying the QCA's Conine formula assumptions to raw betas that were obtained from Bloomberg. We estimated betas using the average of weekly and monthly return intervals over rolling periods of 5 years and 10 years up to 31 December, 2018. Consistent with our previous analysis we have had regard to the 10-year estimates as we consider these to be the best indicators of long-term asset beta. We have also reported 5-year beta estimates for completeness. Frontier Economics (Frontier, adviser to QR-Coal) proposed samples of 8 tollroads and 78 regulated energy and water businesses that drew heavily on samples that we have used for those sectors in previous engagements for the QCA. Compared to the samples that Frontier applied in its advice for QR-Coal, we removed one tollroad (Vinci) on grounds that it has material non-tollroad activities and 6 regulated energy businesses that have been the subject of merger or take-over activity.

The results for regulated energy and water businesses are shown in Table ES.1 below. They show that both the 10-year and 5-year estimate of asset beta has been gradually reducing since 2013, with the 10-year estimate falling from 0.42 to a current level of 0.37-0.38 (median-average). Five-year estimates have fallen at a slightly faster rate and are now in the region of 0.33-0.34.

Table ES.1: Asset beta estimates – regulated energy and water (10-year average of monthly and weekly data)

			2013	2014	2015	2016	2017	2018
Average of Monthly and Weekly data	10 year beta	Average	0.42	0.42	0.41	0.41	0.40	0.38
		Median	0.42	0.42	0.41	0.40	0.40	0.37
	5 year beta	Average	0.41	0.41	0.39	0.39	0.38	0.34
		Median	0.40	0.40	0.38	0.37	0.37	0.33

Source: Bloomberg and Incenta analysis

The results for tollroads are displayed in Table ES.2. We find that both the average and median of estimates of asset beta have ranged between 0.48 and 0.52 for the entire period, and both the average and median estimates are currently 0.51.

Table ES.2: Asset beta estimates – tollroads (10-year average of monthly and weekly data)

Average of Monthly & Weekly data:			Rolling 10 year asset betas					
Company name	Ticker	Country	2013	2014	2015	2016	2017	2018
Abertis Infraestructuras SA	ABE SM Equity	Spain	0.54	0.52	0.49	0.48	0.48	0.48
ASTM SPA	AT IM Equity	Italy	0.53	0.51	0.48	0.47	0.49	0.50
Atlantia SPA	ATL IM Equity	Italy	0.53	0.53	0.54	0.53	0.53	0.53
Groupe Eurotunnel SE - REGR	GET FP Equity	France	0.50	0.51	0.51	0.54	0.57	0.51
Societa Iniziative Autostradali e Servizi SpA	SIS IM Equity	Italy	0.51	0.50	0.48	0.48	0.49	0.52
Transurban Group	TCL AU Equity	Australia	0.36	0.35	0.35	0.36	0.35	0.32
Atlas Arteria Roads	ALX AU Equity	Australia				0.74	0.73	0.71
Average			0.49	0.49	0.47	0.51	0.52	0.51
Median			0.52	0.51	0.49	0.48	0.49	0.51

Source: Bloomberg and Incenta analysis

Our conclusions with respect to the asset betas of the industries requested by the QCA are:

- Regulated energy and water businesses currently have an asset beta of **0.38**; and
- Tollroads currently have an asset beta of **0.51**.

1.3 Benchmark gearing

1.3.1 Introduction

In the previous regulatory review QR-Coal proposed to benchmark itself with Aurizon Network, and therefore applied comparable asset beta and gearing assumptions. This was agreed to by the stakeholders. In this review QR has proposed a materially lower benchmark gearing level of 28 per cent relative to the 55 per cent benchmark gearing estimate that was previously applied, and this has not been agreed to by stakeholders. The QCA has therefore decided to undertake an analysis that considers the specific risk characteristics of QR-Coal and applies a first principles analysis. Our view is that the benchmark gearing of a regulated business must be carefully considered and, once established, should not be adjusted without thorough testing of the implications for investors, customers, and financial adequacy. This is necessary to ensure that the testing of financial creditworthiness has a real-world effect and so promotes the stable context for ongoing investment in the regulated asset and the services it provides.

It is against this background that we consider the question of QR-Coal's benchmark gearing. After considering stakeholder submissions on the topic, which were brief, we undertake a first principles analysis to establish the most appropriate comparator industry or industries for QR-Coal.

1.3.2 Stakeholder submissions

Queensland Rail and its adviser, Frontier, submitted that a benchmark gearing level of 28 per cent should be applied to QR-Coal. This was based on weightings applied to a number of comparator industries including general cargo ports, Class 1 rail, airports and tollroads. While we have applied essentially the same method as Frontier (i.e., to determine the benchmark gearing level with reference to the observed level of comparable firms), we have undertaken a comprehensive first principles analysis of how these industries compare with QR-Coal's operations in order to assess the

comparability of different firms/sectors. A conclusion of this analysis is that we do not agree with the industry weightings that Frontier applied. New Hope pointed out that general cargo ports and airports have neither the physical connection nor the regulatory or market similarities that would warrant their inclusion as comparators for QR-Coal, and we agree with this assessment. We also agree with Yancoal that the low gearing level proposed by Queensland Rail is not likely to be appropriate since QR-Coal has a lower risk profile than is assumed by QR.

1.3.3 First principles analysis

Our first principles analysis looked at the fundamental factors that could influence the total business risk of QR-Coal. We examined a number of these factors for QR-Coal (a wholly thermal coal export business) compared to Aurizon Network (a predominantly metallurgical coal export business) and several potential comparator businesses (with final numbers of firms shown in brackets):[2]

- Regulated energy and water (72)
- Tollroads (7)
- North American pipelines (12)
- Railroads (11)
- Coal mining (5)

The results of our first principles analysis with respect to each factor showed that:

- *Cost curve and stranding risk* - With respect to position on the world export thermal coal curve and asset stranding risk, QR-Coal was relatively similar to Aurizon Network, which implies relatively stable volumes and revenues regardless of where the thermal coal price is. We consider the risk of asset stranding of QR-Coal assets to be higher than for Aurizon Network, whose main exports are metallurgical coal, but still to be relatively low compared with coal mines and North American pipelines.

- *Market Power and resulting regulatory framework* – We conclude that QR-Coal, Aurizon Network, and regulated energy and water businesses have similarly high levels of market power, a captured customer base, and regulatory controls that would result in dampened volatility of earnings. Other things being equal, QR-Coal's revenue is likely to be more variable than Aurizon Network's owing to its price-cap regulation relative to the latter's revenue-cap regulation, the use of an assumed volume of sales to set the price and exposure. In addition, QR-Coal differs from Aurizon Network and its own previous arrangement in that its prices will be based on an assumed volume of sales rather than a forecast of actual sales. The other potential comparators have few or none of these characteristics, being subject to competition and displaying either a lack, or a reduced form, of regulatory control.

[2] Business names, Bloomberg tickers and country of origin are provided in Appendix A. Several sample businesses were excluded due to lack of data. The tickers of those businesses are provided in the main body.

- *Relationship to the business cycle* – Relative to metallurgical coal (i.e. Aurizon Network's principal cargo), QR-Coal's thermal coal exports can be expected to have a lower response to changes in national income since much of the output is for energy consumption rather than construction. However, QR-Coal is expected to be less sensitive to the business cycle than North American pipelines, Class 1 railroads and coal mining. We expect demand for tollroad services (mainly domestic consumers) to be relatively income inelastic compared with Class 1 rail (freight), and North American pipelines (industrial gas).

- *Contract duration* – Miners in the West Moreton system have long term take-or-pay contracts for close to 100 per cent of the line's capacity. Hence, long term contracts would cover a higher proportion of throughput than in the case of Aurizon Network. This suggests also a lower volatility in earnings compared with other potential comparator industries such as Class 1 railways and coal mining. Tollroads have relatively low revenue volatility, even though there is no contracting.

- *Operating leverage* – For operating leverage to be important a firm needs to have a high percentage of fixed costs, and earnings that are volatile. We consider the operating leverage of QR-Coal, like Aurizon Network, tollroads, and regulated energy and water businesses to be medium, but the influence to be muted because of relatively low earnings volatility. This compares with an expected greater impact of operating leverage on coal mining and Class 1 rail, which are industries with more volatile earnings streams.

Based on our review of first principles factors, we conclude that the best comparator industries for determining the benchmark gearing level for QR-Coal are regulated energy and water businesses and tollroads. We consider that 5-year estimates of gearing provide a better indicator of future gearing than 10-year estimates, because the latter are still heavily influenced by the spike in gearing levels that occurred in the global financial crisis. Our respective conclusions are:

- Regulated energy and water businesses - a gearing level of 38 per cent to 39 per cent (average-median);

- Tollroads – a gearing level of 39 per cent to 42 per cent (average-median); and

- QR-Coal - we conclude, having regard to the overlapping gearing estimates for relevant comparator industries, that a benchmark gearing level of **40 per cent** is appropriate.

We have also tested the appropriateness of this benchmark gearing assumption by comparing the EBITDA margins of QR-Coal to the different comparator industries. Other things being equal, a higher EBITDA margin provides greater debt capacity.[3] We estimate that QR-Coal's EBITDA margin is likely to lie in a range of 40 per cent to 44 per cent.[4] Compared to this:

[3] For businesses that are regulated and subject to cost-based pricing, the significance of the regulatory depreciation allowance in an entity's regulated revenues is a key driver of that entity's EBITDA margin.

[4] We have calculated QR-Coal's likely EBITDA margin range from the regulatory model supplied to us by the QCA.

Aurizon Networks and the Australian regulated energy networks (which have a benchmark gearing assumption of 55 per cent and 60 per cent, respectively) have EBITDA margins of approximately 65 per cent and 70 per cent respectively[5]

- the mainly North American regulated energy and water businesses in our sample of comparable entities have an average (median) EBITDA margin of 33 per cent (31 per cent), and
- our sample of tollroads has an average (median) EBITDA margin of 53 per cent (52 per cent).

We observe from this that QR-Coal's EBITDA margin is likely to lie between the margins observed for energy and water businesses (31-33 per cent) and tollroads (52-53 per cent), but below that of the Aurizon Network and the Australian regulated energy businesses. This lends support for QR-Coal's benchmark gearing being between the observed level for the mainly US energy and water businesses and tollroads and below that of Aurizon Network, which is consistent with our recommended gearing level of **40 per cent** (debt/assets).

1.4 Benchmark credit rating

1.4.1 Introduction

Assessing the benchmark credit rating for a regulated business serves three purposes.

- First, it will ensure that there is a consistency across the various parts of the regulatory decision, and most notably, that the debt risk premium (which is based upon the benchmark credit rating) is consistent with the cash flows projected (and hence consistent with the choices of, amongst other things, the gearing level and depreciation method).
- Secondly, it will provide a test of whether a firm that is financed in a manner that is consistent with its peers would be expected to attract and maintain a credit rating that is appropriate for a provider of an important infrastructure service, in light of the regulatory settings.
- Thirdly, it will provide a test of whether a firm that has been financed in a benchmark manner will continue to attract and maintain a credit rating that is appropriate for a provider of an important infrastructure service, in light of the regulatory settings. This dynamic testing of financeability would provide confidence that a firm that had financed in the benchmark manner would continue to be financeable in future regulatory periods notwithstanding the intervening events or changes.[6]

However, as discussed above, as the QCA has asked us to look afresh at QR-Coal, the third of these purposes is less relevant to our current work (although this would be more relevant at the next review of QR-Coal's prices).

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5 QR-Coal's relatively low return of capital (depreciation) component in the building blocks, and relatively high operating cost (and maintenance cost) component compared with Aurizon Network and Australian regulated energy businesses is due to relatively older (depreciated) assets, and the additional costs of a rail line that is both old and not originally constructed with coal haulage in mind.

6 Assuming the business risk of the activity is assumed to be held constant, the factors that would tend to affect financeability are those that would lead to worsening financial ratios, which include a reduction in the aggregate rate of depreciation and a reduction in general interest rates (with the latter reducing the return on equity and hence the buffer for cash flows).

Our own examination of business risks based on first principles determines that regulated energy and water businesses and tollroads are the best available comparators, and that a benchmark gearing level of 40 per cent is appropriate. While stakeholder submissions did not examine the credit rating issue, we have assessed the outcomes using the asset betas of regulated energy and water businesses and tollroads, and benchmark gearing, noting that if consistency of financeability assumptions were not met, there are regulatory precedents for using such tools as accelerated depreciation and expensing of capital expenditures to achieve the benchmark credit rating

1.4.2 Stakeholder submissions

Queensland Rail submitted a benchmark credit rating of BBB+, which was based on the Aurizon Network precedent, although we observe that it did not test whether this remained consistent with its proposed gearing benchmark and other elements of its regulatory proposal, and the business characteristics of QR-Coal. No other stakeholders commented on the proposed credit rating.

1.4.3 Application of Standard & Poor's methodology

We have determined the expected credit rating for QR-Coal, given our benchmark gearing level, by applying Standard & Poor's methodology for determining the "anchor credit rating" for a rated issuer. This is the credit rating that is produced before it considers potential "modifiers". We ignore these modifiers (which include such factors such as diversification and ownership arrangements) as they are generally not relevant to the assessment of the credit rating that an efficiently operated benchmark entity could expect to receive.

Standard & Poor's anchor credit rating is the product of two assessments:

- The business risk profile,[7] which is scored on a 6-point scale ranging from "Excellent" to "Vulnerable"; and

- The financial risk profile, which is also scored on a 6-point scale ranging from "Minimal" to "Highly Leveraged," and reflects Standard & Poor's assessment of the credit metrics of the entity in question (i.e., a comparison of the past and forecast values for certain credit metrics against targets for those metrics).[8]

The "anchor credit rating" that Standard & Poor's determines reflects the combination of these two sets of scores.

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[7] We distinguish "business risk profile," which is specific Standard & Poor's terminology, from "business risk," used elsewhere in this report, and specifically in relation to testing for comparators for estimating the benchmark gearing level.

[8] The targets that Standard & Poor's applies to determine the financial risk profile depend on the characteristics of the relevant industry, with a choice between one of three sets of targets (referred to as the "Low Volatility", "Medial Volatility" and "Standard Volatility" targets). We assume that Standard & Poor's would apply the "Low Volatility" targets as this is what it has done for Aurizon Network, Arc Infrastructure Pty Ltd and most regulated energy and water businesses. We note that Standard & Poor's also assesses tollroad operators against the "Low Volatility" matrix (see 1 September, 2017, *Abertis Infraestructuras S.A.*), but assesses North American Class 1 railroads against the "Standard Volatility" matrix (see 29 October, 2018), *Kansas City Southern Upgraded to 'BBB' On Reduced Risk of Cross-Border Trade Restrictions, Outlook Stable*).

1.4.4 Business risk profile

We assess QR-Coal's business risk profile to be 'strong' based on an examination of the key business risk profile factors for QR-Coal. In doing so we compare QR-Coal's risk characteristics relative to those of two other below rail businesses that are rated by Standard and Poor's:

- *Aurizon Network* – a BBB+ rated, regulated below-rail network that operates four rail systems on Australia's Central Queensland Coal Network (CQCN), which has more than 2,670 kilometres of rail lines, providing transport services to more than 40 mines to ship their coal (overwhelmingly metallurgical coal) to several ports. The business risk profile that Standard & Poor's applies to Aurizon Network is "Strong" ("2" in the scale of 1 to 6).

- *Arc Infrastructure Pty Ltd* – Arc Infrastructure (previously called Brookfield WA Rail Pty Ltd) is BBB- rated, and is the holder of a 49-year lease (31 years remaining) to manage and operate a 5,500 km open access multi-user rail freight network spread across the southern part of Western Australia. The business risk profile that Standard & Poor's applies to Arc Infrastructure is "Satisfactory" ("3" in the scale of 1 to 6).

Although we consider that QR-Coal's business risk position is weaker than Aurizon Network's in some dimensions and stronger in others, we apply the same "Strong" business risk profile to QR-Coal that Standard & Poor's applies, which is one point above the "Satisfactory" business risk profile that Standard & Poor's applies to Arc Infrastructure. Our reasons for this, against the factors we have considered, are as follows.

Monopoly power and position in global markets

As noted above, we assess the business risk of QR-Coal to be "Strong", which is the same as Aurizon Network's business risk, but less than the "Excellent" business risk profile attached to Australian regulated energy businesses. We would not apply an "Excellent" business risk profile to QR-Coal for the same reason that Standard & Poor's does not apply it to Aurizon Network. Specifically, because unlike regulated energy transmission and distribution infrastructure, which provides essential services in a fixed geographic area, Aurizon Network's and QR-Coal's businesses are ultimately dependent on competition in global coal markets. However, Arc Infrastructure's business is not just subject to international competition in international iron ore markets, but also subject to potential modal substitution in some of its other transport activities.

Regulation

While QR-Coal and Aurizon have some differentiating features with respect to regulatory arrangements, we do not consider that these differences (e.g. "price-cap" vs "revenue cap" respectively) would shift them into a different business risk profile.[9] Both are subject to the same cost-based regulatory regime that Standard & Poor's has described as "generally supportive". Arc Infrastructure, on the other hand, is not subject to the same type of cost-based regulation and has a

[9] Similarly, we observe that Standard & Poor's does not necessarily assess regulated energy businesses to have different business risk profiles depending on whether they are price-cap, revenue cap, or rate of return regulated. As noted above, Standard & Poor's assesses a 'Strong' rather than 'Excellent' business risk profile for Aurizon Network because of its exposure to global coal markets.

negotiated agreements framework with upper and lower price bounds. This largely reflects the fact that Arc Infrastructure is subject to competitive constraint for some of its services/products.

Level and trend of industry margins

Both Aurizon Network and Arc Infrastructure have relatively high EBITDA Margins. QR-Coal has a lower EBITDA margin due to its older asset base (lower depreciation component in the building blocks) and relatively higher maintenance costs owing to the nature of the track. For both QR-Coal and Aurizon Network the trend of margins is relatively predictable, being based on efficient operating costs, capital expenditure and depreciation rates. For Arc Infrastructure the trend of margins is less predictable, as it depends on competitive factors and negotiations. Asset stranding risk is likely to be lower for QR-Coal and Aurizon Network relative to Arc Infrastructure owing to a more supportive regulatory regime, and customers who are neither operating at the margin of international competitiveness, nor subject to competition from alternative transport modes.

Counterparty risks

Counterparty risk has been a consistently negative feature of Arc Infrastructure's operations.[10] By contrast, when coal prices fell to low levels between 2012 and 2016, neither Aurizon nor QR-Coal experienced major counterparty risk issues. While Peabody closed its Wilkie Creek mine, this capacity was "socialised" among the remaining mine operators and did not create a revenue shortfall for QR-Coal.

Take-or-pay contracts

QR-Coal is also in a relatively strong position in relation to take-or-pay contracting. Mines in the West Moreton system are expected to have close to 100 per cent long term contracting coverage of the approximately 9 mtpa capacity. In addition, the recovery component of these contracts is relatively high.[11] By contrast the corresponding figures for Aurizon Network and Arc Infrastructure are lower.[12]

1.4.5 Financial risk profile

We consider that Standard & Poor's would apply its "Low Volatility" panel of credit metrics to assess the Financial Risk Profile of QR-Coal. Standard & Poor's applies this panel when it assesses the majority of regulated energy and water businesses and tollroads (see footnote 8).

Targets for credit metrics

Table ES.3 sets out the targets for the credit metrics that we have applied.

10 See Standard & Poor's (12 April, 2017), *Brookfield WA Rail Pty Ltd*, p.6 and p.8, which discusses the Memorandum of Understanding (MoU) that Brookfield concluded with Kara Mining Limited (KML), contributing 25 per cent to 30 per cent of Brookfield's revenues, which enabled three year tariff relief based on iron ore prices. As noted above, Brookfield changed its name to Arc Infrastructure in 2017.

11 For take-or-pay capacity that is not used in a year, the mine pays the outstanding amount at the end of the year. If capacity on the line is relinquished altogether, the mine pays a high percentage of the NPV of the remaining outstanding costs for the term of the contract.

12 See Standard & Poor's (12 April, 2017), p.5.

Table ES.3: Cash Flow / Leverage Analysis Ratios - "Low volatility" industries.

	Core ratios				Supplementary coverage ratios				Supplementary payback ratios					
	FFO / debt (%)		Debt / EBITDA (x)		FFO / cash interest (x)		EBITDA / interest (x)		CFO / debt (%)		FOCF / debt (%)		DCF / debt (%)	
	From	To	From	To	From	To	From	To	From	To	From	To	From	To
[1] Minimal	35+		< 2		> 8		> 13		> 30		20+		11+	
[2] Modest	23	35	3	2	5	8	7	13	20	30	10	20	7	11
[3] Intermediate	13	23	4	3	3	5	4	7	12	20	4	10	3	7
[4] Significant	9	13	5	4	2	3	2.5	4	8	12	0	4	0	3
[5] Aggressive	6	9	6	5	1.5	2	1.5	2.5	5	8	-10	0	-20	0
[6] Highly leveraged	< 6		> 6		< 1.5		< 1.5		< 5		< -10		< -20	

Source: Standard & Poor's (19 November, 2013), p. 35.

Scenarios for credit metrics and results

We tested two of the key credit metric ratios used by Standard & Poor's, which are FFO/Debt and FFO / Interest cover, although we note that Standard and Poor's places most weight on FFO/Debt when assessing regulated infrastructure businesses. In Table ES.4 below we present the credit metrics calculated for two scenarios, which reflect the benchmark gearing estimate and the asset beta estimates for the two benchmark comparator industries:[13]

- Scenario 1: The benchmark gearing level of **40 per cent**, and the regulated energy and water benchmark asset beta of **0.38**.

- Scenario 2: The benchmark gearing level of **40 per cent** and tollroads benchmark asset beta of **0.51**.

Table ES4 below shows the key Standard & Poor's credit metrics and the Financial Risk / credit ratings that are implied by the two scenarios described above using Table ES.3 above and cross-referencing to Table ES.5 below. For example, in Table ES.3 an FFO/Debt ratio of 10.5 per cent is found to imply "Significant" financial risk profile (range of 9-13), which when combined with "Strong" business risk profile in Table ES.5 below, indicates a BBB credit rating.

Table ES.4: QR-Coal credit metrics – scenarios

Scenario 1		2020/21	2021/22	2022/23	2023/24	2024/25	Average	Financial Risk	Credit Rating
FFO/Debt	Gearing 40% & Asset Beta	10.1%	9.1%	8.9%	8.6%	8.5%	9.0%	Significant/Aggressive	BBB/BB+
FFO/Interest	0.38	3.3	3.0	2.9	2.9	2.9	3.0	Intermediate/Significant	BBB+/BBB
Scenario 2		**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**Average**	**Financial Risk**	**Credit Rating**
FFO/Debt	Gearing 40% & Asset Beta	12.0%	10.5%	10.2%	9.9%	9.8%	10.5%	Significant	BBB
FFO/Interest	0.51	3.7	3.3	3.2	3.2	3.1	3.3	Intermediate	BBB+

Source: Queensland Rail and Incenta

Our conclusions with respect to each of these scenarios are as follows:

- Scenario 1: The average FFO/Debt ratio of 9.0 per cent is on the borderline of "Significant" and "Aggressive" financial risk profile, which combined with a "Strong" business risk implies a

[13] The WACC scenarios underpinning these are shown in Appendix A.

BBB/BB+ credit rating. It is not clear whether Standard & Poor's would assign either of these credit ratings or BBB-. The FFO/Interest ratio implies a borderline "Intermediate/Significant" financial risk profile and respective BBB and BBB+ credit ratings. Since Standard & Poor's places most emphasis on FFO/Debt the appropriate credit rating is not clearly indicated.

- Scenario 2: The average FFO/Debt ratio is 10.5 per cent, which is comfortably within the range for "Significant" financial risk profile, implying a BBB credit rating. Here the FFO/Interest cover ratio implies an "Intermediate" financial risk profile and a BBB+ credit rating. We believe that Standard and Poor's would assign a BBB credit rating in this case by placing most weight on the FFO/Debt ratio.

Table ES.5: Standard & Poor's Business and Financial Risk Matrix

		Financial risk profile					
		1 Minimal	2 Modest	3 Intermediate	4 Significant	5 Aggressive	6 Highly leveraged
Business risk profile	1 Excellent	AAA / AA+	AA	A+ / A	A-	BBB	BBB- / BB+
	2 Strong	AA / AA-	A+ / A	A- / BBB+	BBB	BB+	BB
	3 Satisfactory	A / A-	BBB+	BBB / BBB-	BBB- / BB+	BB	B+

Source: Standard & Poor's and Incenta analysis

1.5 Conclusion

Based on our analysis, which addresses the three central questions that the QCA has asked us to consider for QR-Coal, we find:

- **Benchmark asset betas** – for the two industries that the QCA has instructed us to estimate asset betas for we conclude:
  - Regulated energy and water businesses have an asset beta of **0.38**; and
  - Tollroads have an asset beta of **0.51.**
- **Benchmark gearing for QR-Coal** - based on an international sample of regulated energy and water businesses and tollroads, QR-Coal's likely EBITDA margin and other relative characteristics, we recommend a benchmark gearing level of **40 per cent.**
- **Benchmark credit rating for QR-Coal** - Taking account of the benchmark gearing level and asset betas identified above, and given the regulatory model of QR-Coal prepared by the QCA, which incorporates all the other QCA WACC assumptions, we find that:
  - a benchmark credit rating of **BBB** is supported under scenario 2, which assumes a 0.51 asset beta, and
  - the credit rating is relatively indeterminate in scenario 1 with a 0.38 asset beta (i.e. it could range from BBB to BB+).

  These findings suggest that for the benchmark gearing level, while a benchmark credit rating of BBB is likely with an asset beta of 0.51, as the asset beta is reduced towards 0.38 the likelihood of

a BBB credit rating becomes progressively less certain unless other measures (e.g. shortening of regulatory asset lives) were introduced to bring cash flow forward.

1.6 Overview of report

In the remainder of this report:

- In chapter 2, we provide estimates of the asset betas of regulated energy and water businesses and tollroads, which the QCA's first principles analysis has identified as being of particular interest.
- In chapter 3, we recommend a benchmark gearing for QR-Coal, which is based upon a first principles analysis of the business risk characteristics of QR-Coal relative to several potential comparator industries and Aurizon Network. From this analysis we determine that both toll roads and energy and water businesses are the most relevant comparators for the benchmark gearing level.
- In chapter 4, we determine the expected credit rating to QR-Coal in light of this benchmark gearing level, its business risk and the expected cash flows for the next regulatory period. For this purpose we have:
  - Referenced Standard & Poor's credit rating methodology and its credit assessments of two Australian below-rail comparators, Aurizon Network and Arc Infrastructure Pty Ltd (formerly Brookfield WA Rail Pty Ltd). We explain this method further in chapter 4; and
  - Employed forecasted regulatory cash flows for QR-Coal that have been supplied to us by the QCA.

2. Asset beta of regulated energy and water businesses and tollroads

2.1 Introduction

In this section we estimate the asset betas of regulated energy and water businesses and tollroads. After describing the methodology applied, and the sample that we have used, we provide empirical estimates of asset beta for those two industries.

2.2 Beta estimation methodology

2.2.1 Introduction

It is important to transparently describe the methodology we have applied to estimate asset betas so that stakeholders can duplicate the estimation process if they wish. We have therefore described the technical details of the methodology, as well as discussing the theoretical and empirical issues that arise. As a general rule we have applied market and accounting data sourced from Bloomberg.

2.2.2 Estimation period

Our estimate of asset beta is based on 10 years of market data up to 31 December, 2018, which is the latest practical date that can be estimated at this time.

We have consistently advocated reliance on 10-year beta estimates over 5-year estimates on grounds that the shorter period is more likely to be influenced by a short-term anomaly. Others have proposed that 5-year terms are long enough to eliminate short term anomalies. For example, it has been suggested that use of a 5-year term avoids the inclusion of data from the period of the global financial crisis, which is considered an anomaly. Our view is that the global financial crisis period should be included, although a period including the dotcom bubble around 2001 should be excluded, as this made a material change to the weighting of different sectors in the market.

We therefore place reliance on the estimates of beta obtained using 10-years of data up to 31 December, 2018, but report estimates using 5-years of data for completeness. Using this date creates some issues with respect to net debt numbers on that date. Depending on the frequency of reporting and end of financial year date, at the time our analysis was undertaken, some firms had not provided net debt values to the market, and Bloomberg either left a blank, or reported forecast estimates at that date or at some other date, such 31 March, 2019. Our approach has been to:

- Apply the Bloomberg estimate for 31 December 2018 (Bloomberg generally sources this from a broker's report);
- Interpolate the value from actuals and estimates that lie on either side of that date (e.g. end September 2018 and end March, 2019); or
- Apply the closest available net debt number if none of the above are available.

2.2.3 Sample selection

With respect to the two samples that are the objects of our beta estimation task, we have adopted the following approaches:

Regulated energy and water businesses

We began by applying the 78 energy and water businesses sample that was adopted by QR-Coal's adviser Frontier, which in turn was based on a sample that Incenta had earlier applied in relation to Aurizon Network. However, given that the sample is large, we excluded the six businesses that had been delisted owing to merger or takeover during the period up to 31 December, 2018. These six businesses were:

- Delta Natural Gas Co Inc (DGAS US Equity), acquired on 21 September 2017 by PNG Companies LLC (an investment company),
- DUET Group (DUE AU Equity), acquired on 17 May 2017 by multiple bidders,
- Empire District Electrical Co (EDE US Equity), acquired on 3 January 2017 by Algonquin Power & Utilities Corp,
- Great Plains Energy (GXP US Equity), acquired on 5 June, 2018 by Evergy Inc.,
- Westar Energy (WR US Equity), delisted 5 June, 2018 through merger into Evergy Inc., and
- WGL Holdings Inc (WGL US Equity), acquired on 9 July, 2018 by Altgas Ltd.

This left a sample of 72 regulated energy and water businesses, which we have used. The sample members are listed in Appendix A.

Tollroads

With respect to tollroads we examined the 8 businesses that were suggested by Frontier. We have included all but Vinci. We excluded Vinci on grounds that it has material construction-related business, while its tollroads business has accounted for only 57 per cent of its net income over the past 10 years. Bloomberg's description of Vinci is:[14]

> *The world's largest construction company by revenue, France's Vinci operates two semi-connected businesses: Contracting, which builds roads, buildings, and infrastructure; and Concessions, which operates and maintains toll roads, railways, airports, and more.*

We have retained Groupe Eurotunnel in the sample, although in addition to being a tollroad, it has material below rail and above rail activities. Owing to the monopoly nature of this business, our view is that a large component of its operations is close to the nature of a tollroad, and in any case the exclusion of this observation would not make a material difference to our tollroads beta estimate.

[14] Bloomberg company description for Vinci SA (DG FP Equity).

Table 3.1: Tollroads sample proposed by Frontier

Company name	Ticker	Country	Scope of operations (% Net Income)	Data availability / ownership	Include/Reject
Abertis Infraestructuras SA	ABE SM Equity	Spain	100% motorways construction and operation	Missing 9 months in 2018 due to takeover by Atlantia & Hochtief	Include
ASTM SPA	AT IM Equity	Italy	>90% motorways		Include
Atlantia SPA	ATL IM Equity	Italy	85% motorways, 15% airports	Involved in acquisition of Abertis through 2017-18	Include
Groupe Eurotunnel SE - REGR	GET FP Equity	France	Motorway, below & above rail		Include
Societa Iniziative Autostradali e Servizi SpA	SIS IM Equity	Italy	>95% motorways		Include
Transurban Group	TCL AU Equity	Australia	100% motorways construction and operation		Include
Atlas Arteria Ltd	ALX AU Equity	Australia	100% motorways construction and operation		Include
VINCI SA	DG FP Equity	France	57% motorways, 7% airports, 32% construction & contracting		Reject

Source: Frontier, Bloomberg and Incenta analysis

Another issue arises with respect to Abertis Infraestructuras (Abertis), which was acquired during 2017-18 in a number of transactions, first with Atlantia SPA holding 50 per cent, and Hochtief holding 20 per cent. At the end of 2018 Hochtief purchased the balance of shares that it didn't yet own in Abertis. Owing to the small sample size we considered it important to retain Abertis, but to exclude observations beyond the first week on March 2018.[15] This is because the share price of Abertis essentially froze at EUR18.63 a share from the date of an announcement made on 14 March, 2018 by which Atlantia would purchase certain assets in the Abertis portfolio. If these observations up to the ceasing of trading on 3 August 2108 were to be retained, they would have the effect of artificially reducing the beta estimate for Abertis.

We have previously not included Atlas Arteria (then known at Macquarie Atlas Roads) in analyses of tollroads beta as it didn't meet our inclusion criterion of having available at least 60 per cent of the potential maximum number of monthly or weekly observations. This business now meets that criterion.

2.2.4 Return interval and beta estimation period

Two important methodological issues relate to the return interval and estimation window, which we consider in turn.

Return interval (frequency)

The return interval (or "frequency") refers to the period of time over which the stock's market returns that are used in the beta estimation are measured. In recent years a debate has emerged about whether daily, weekly, or monthly returns should be used in estimating betas for regulatory purposes. The QCA has relied on an average of weekly and monthly returns in the past.

It is sometimes suggested that weekly return intervals are superior because this provides more observations and therefore lowers the standard error of the estimate, providing narrower confidence

[15] We note that the AER has for some time estimated the asset beta of Australian energy transmission and distribution companies including no longer extant firms. In certain scenarios this has included firms that may have not been trading for a dozen years.

intervals. However, there has been some recent academic analysis that suggests that there are other problems that emerge from applying higher frequency data.

Specifically, Gilbert et al (2014) show that differences in betas estimated using higher (daily or weekly) and lower (monthly) frequency may emerge as a consequence of differences in the relative "opacity" of information about the prospects of those firms and how their returns will be affected by market movements.[16] "Opaque" firms are those for which the market cannot readily assess market and firm data, and hence where more time is required for the market to incorporate news about the firm in the share price. If a firm is found to be more opaque, its beta would be expected to be underestimated when using higher frequency returns, relative to the beta estimate made with lower frequency returns that better reflects the underlying information.

Gregory *et al* (2018) have repeated and extended the Gilbert *et al* analysis using UK data. They report that the differences in beta estimates that are obtained by using high frequency versus low frequency data can be explained by factors that are widely used proxies for risk, which include opacity (proxied by a measure of abnormal accruals), size, illiquidity, and Book to Market ratio.[17] The implication of these findings was that the use of weekly return estimates does not pick up some aspects of systematic risk. Gregory *et al* also showed that when the standard CAPM tests are done using monthly data they perform in a superior manner to when performed using weekly data. They expressed some surprise that these issues had not been discussed by regulators in the UK and Australia.

While the predominant regulatory practice in Australasia is to use a combination of weekly and monthly information when estimating betas consistent with the QCA's past practice, we note that in its most recent analysis of beta for regulated Australian energy businesses the Australian Energy Regulator (AER) relied only on weekly return interval data, declaring these to be "the most useful empirical estimates,"[18] although it did report monthly estimates for an international sample used as a cross check.[19] In our view, however, the AER's analysis did not give sufficient weight to the potential for the higher frequency data beta estimates to be affected by opacity and like factors, and that it remains appropriate to have regard to both beta estimates derived by both weekly and monthly return interval data (i.e., recognising the narrower confidence intervals for weekly estimates, but also the potential for the estimates to be biased).

Beta estimation period

Our objective is to apply the beta estimation period that allows for the best estimate of beta during the coming regulatory period, taking into consideration regulatory stability. In regulatory contexts, most discussion of the beta estimation period centres around whether to use a 5-year or 10-year period. It is sometimes claimed that a 5-year period should be preferred because it is long enough to smooth out any unusual occurrences, but also reflects more current market data. Our view is that greater stability is obtained by using a 10-year beta estimation period, and that this allows for a greater number of observations, which narrows the band of confidence intervals. Whilst we consider that 5-year

16 Gilbert, T., Hrdlicka, C. Kalodimos, J. and Siegel, S. (2014), "Daily Data is Bad for Beta: Opacity and Frequency-Dependent Betas," *Review of Asset Pricing Studies*, Vol. 4 (1), pp.78-117.
17 Gregory, A., Hua, S. and Tharyan, R. (2018), "In search of beta", *The British Accounting Review*, Vol. 50, Issue 4, pp.425-441.
18 AER (December, 2018), *Rate of return instrument, Explanatory Statement*, p.97
19 AER (December, 2018), p.156.

estimation periods have the potential to introduce instability, we have also reported these values as regulators do give consideration to these results as well.

2.2.5 Bloomberg data

We have downloaded Bloomberg's raw beta estimates for the 10-year period ending 31 December 2018. For the weekly estimates we took 520 weekly observations from that date, and for monthly estimates we took 120 monthly observations from that date. The 5-year estimates using monthly (weekly) observations were obtained by taking the first and last 60 (260) observations from that pool of observations. For de-gearing purposes we estimated gearing over the respective periods using the market capitalisation (CUR_MKT_CAP) at the end of each calendar year relative to the accounting Net Debt value (NET_DEBT).

We applied the same (Net Debt to Net Debt plus Market Capitalisation) approach to estimate gearing and have used the last 5 years of data on grounds that there was a material distortion in gearing around the time of the global financial crisis that would influence an average based on 10-years of data.

2.2.6 De-gearing formula

We applied the Conine formula, which is the QCA's standard formula for the de-gearing of beta, and have also applied the QCA's standard assumption of a debt beta of 0.12[20]The Conine formula is:

$$\beta_e = \beta_a + (\beta_a - \beta_d)(1 - T)\left(\frac{D}{E}\right)$$

The de-levering formula is given by:

$$\beta_a = \frac{\beta_e + \beta_d(1 - T)\left(\frac{D}{E}\right)}{\left(1 + (1 - T)\left(\frac{D}{E}\right)\right)}$$

Where,

β_e, β_a and β_d are respectively the equity, asset and debt betas, D and E are the values of net (book) debt and market equity, and T is the effective tax rate. For Australian businesses in the sample we applied the imputation adjusted effective tax rate. That is, T = t(1 – γ), where t is the effective tax rate and γ is gamma, the value of distributed franking credits. When re-gearing to estimate the benchmark equity beta the Authority applies a gamma value of 0.484 and, as noted above, a debt beta assumption of 0.12. For non-Australian businesses gamma is zero. When de-gearing to estimate asset beta, these rates are effective tax rates as they take the actual values. When re-gearing, benchmark values (typically statutory rates) are applied.

[20] The QCA's standard approach differs from the current practice of most other Australian regulators as the latter use the Harris and Pringle formula and assume a zero debt beta. This means that care should be used when comparing the asset beta that the QCA may use with asset betas that may be quoted by other regulators.

2.2.7 Tax assumption

We have calculated and applied the average effective tax rate (EFF_TAX_RATE) over the 18 calendar years to 31 December, 2018. This approach provides a long-term view of effective tax rates, which are more relevant than statutory rates. For the two Australian domiciled tollroad operators (Transurban Limited and Arial Atlas Roads Limited, which are stapled securities) we have applied a statutory tax rate of 30 per cent as the effective tax rate and a gamma assumption of 0.484.

2.3 Empirical beta estimates

2.3.1 Introduction

The QCA has requested that Incenta provide it with technical estimates of the asset betas of regulated energy and water businesses and tollroads.

2.3.2 Regulated energy and water businesses

Table 3.2 below displays our estimates of the asset beta of regulated energy and water businesses applying the QCA's assumptions and de-levering using the Conine formula. As discussed above, we place primary reliance on the average of monthly and weekly estimates for a 10-year period, which yields an average asset beta of 0.38 and a median estimate of 0.37. Using the same sample, in 2016 the estimates would have been 0.41 and 0.40 respectively. While the 10-year average and median estimates lay within a narrow range of 0.40 to 0.42 between 2013 and 2017, in the last 12 months there has been a noticeable drop in the estimates. The reduction in the 10-year estimate appears to be mainly due to a sharp fall in the weekly returns estimate during 2018. The 10-year weekly estimate of beta had been gradually trending downward over the period from 2013 to 2017, but has recently fallen more sharply.

Table 3.2: Asset beta estimates – regulated energy and water

			2013	2014	2015	2016	2017	2018
Weekly data	10 year beta	Average	0.48	0.48	0.47	0.46	0.45	0.42
		Median	0.48	0.48	0.47	0.46	0.45	0.41
Weekly data	5 year beta	Average	0.45	0.45	0.42	0.42	0.42	0.34
		Median	0.45	0.45	0.40	0.41	0.41	0.32
			2013	2014	2015	2016	2017	2018
Monthly data	10 year beta	Average	0.37	0.37	0.36	0.35	0.34	0.33
		Median	0.36	0.36	0.35	0.34	0.34	0.34
Monthly data	5 year beta	Average	0.37	0.37	0.36	0.35	0.34	0.33
		Median	0.36	0.36	0.35	0.34	0.34	0.34
			2013	2014	2015	2016	2017	2018
Average of Monthly and Weekly data	10 year beta	Average	0.42	0.42	0.41	0.41	0.40	0.38
		Median	0.42	0.42	0.41	0.40	0.40	0.37
Average of Monthly and Weekly data	5 year beta	Average	0.41	0.41	0.39	0.39	0.38	0.34
		Median	0.40	0.40	0.38	0.37	0.37	0.33

Source: Bloomberg and Incenta analysis

For completeness the 5-year average of monthly and weekly estimated betas has also been trending downward since 2013 at a slightly faster pace than the 10-year estimates. The 5-year average of monthly and weekly estimates is now approximately 0.04 lower than the 10-year estimates.

In summary, our estimate of the asset beta of regulated energy and water businesses is **0.38**, which is the average value of our estimate using 10-year data for weekly and monthly return intervals, and slightly higher than the median estimate of 0.37.

2.3.3 Tollroads

In Table 3.3 we display the average asset betas of the tollroads sample using 10 years of data. Both the average and median estimates of the tollroads asset beta are 0.51, with relatively little variation in the estimate for 5 out of the 7-firm sample. That is, we find that most of the sample has a beta estimate in a relatively narrow range of 0.48 to 0.53. The two tollroad businesses with materially lower and higher estimates are respectively Transurban and Atlas Arteria Roads (formerly Macquarie Atlas Roads). The average and median estimates have stayed in a relatively narrow band of 0.48 to 0.52 over the previous 6 years. This provides comfort given the relatively smaller size of the tollroads sample.

Table 3.3: Asset beta estimates – tollroads (10-year average of monthly and weekly data)

Average of Monthly & Weekly data:			Rolling 10 year asset betas					
Company name	Ticker	Country	2013	2014	2015	2016	2017	2018
Abertis Infraestructuras SA	ABE SM Equity	Spain	0.54	0.52	0.49	0.48	0.48	0.48
ASTM SPA	AT IM Equity	Italy	0.53	0.51	0.48	0.47	0.49	0.50
Atlantia SPA	ATL IM Equity	Italy	0.53	0.53	0.54	0.53	0.53	0.53
Groupe Eurotunnel SE - REGR	GET FP Equity	France	0.50	0.51	0.51	0.54	0.57	0.51
Societa Iniziative Autostradali e Servizi SpA	SIS IM Equity	Italy	0.51	0.50	0.48	0.48	0.49	0.52
Transurban Group	TCL AU Equity	Australia	0.36	0.35	0.35	0.36	0.35	0.32
Atlas Arteria Roads	ALX AU Equity	Australia				0.74	0.73	0.71
Average			0.49	0.49	0.47	0.51	0.52	0.51
Median			0.52	0.51	0.49	0.48	0.49	0.51

Source: Bloomberg and Incenta analysis

The 5-year beta estimates for tollroads, which we have calculated for completeness, are shown in Table 3.4 below. The range of the 5-year beta estimates has been very close to the 10-year estimates, with the same median of 0.51 in 2018, but a slightly lower mean of 0.48. The overall picture is one of relative stability in the estimated asset beta for tollroads over the past decade or so. Six out of the 7 of the 5-year asset beta estimates fall within a range of 0.43 to 0.56. The fact that the 10-year and 5-year beta estimates are reasonably consistent is further evidence of their relative stability.

Table 3.4: Asset beta estimates – tollroads (5-year average of monthly and weekly data)

Average of Monthly & Weekly data:			Rolling 5 year asset betas					
Company name	Ticker	Country	2013	2014	2015	2016	2017	2018
Abertis Infraestructuras SA	ABE SM Equity	Spain	0.49	0.50	0.49	0.45	0.44	0.43
ASTM SPA	AT IM Equity	Italy	0.43	0.41	0.42	0.43	0.43	0.53
Atlantia SPA	ATL IM Equity	Italy	0.50	0.52	0.55	0.51	0.50	0.52
Groupe Eurotunnel SE - REGR	GET FP Equity	France	0.52	0.46	0.45	0.46	0.53	0.51
Societa Iniziative Autostradali e Servizi SpA	SIS IM Equity	Italy	0.45	0.48	0.51	0.48	0.52	0.56
Transurban Group	TCL AU Equity	Australia	0.30	0.30	0.22	0.31	0.33	0.33
Atlas Arteria Roads	ALX AU Equity	Australia	0.70	0.82	0.75	0.57	0.54	0.51
Average			0.48	0.50	0.49	0.46	0.47	0.48
Median			0.49	0.48	0.49	0.46	0.50	0.51

Source: Bloomberg and Incenta analysis

In summary, we consider the evidence for the latest 5-year period indicates a tollroads asset beta of about **0.51**, which is consistent with the current average of monthly and weekly estimates using 10-years of data.

2.4 Conclusion

Having reviewed the evidence for monthly and weekly return intervals over both 5 and 10-year periods, we conclude that:

- For regulated energy and water businesses our estimated asset beta is **0.38**; and
- For tollroads our estimated asset beta is **0.51**.

If only monthly data had been relied on, the estimated beta would have been lower by 0.04 to 0.05 for regulated energy and water businesses (i.e.0.33 to 0.34), and higher by 0.01 to 0.02 for tollroads (i.e. 0.52 to 0.53).

3. Benchmark gearing

3.1 Introduction

The QCA has requested Incenta to provide an opinion on the benchmark gearing parameter, and our supporting analysis. In this chapter we consider the question of benchmark gearing first. Whilst we note that the gearing level and credit rating are not independent, it is appropriate to begin with the question of what benchmark gearing should be applied to QR-Coal, given its specific regulatory, economic and financial characteristics, and then to consider the benchmark credit rating given that gearing level.

In this chapter we set out Queensland Rail's proposals regarding QR-Coal's benchmark gearing level, and other submissions made to the QCA, and provide our respective responses. We then undertake our own analysis of benchmark gearing applying first principles analysis of the business risk characteristics using the data set of potential comparator industries that we identify.

3.2 Setting a benchmark gearing level

Our view is that the benchmark gearing of a regulated entity should be carefully considered and, once it is set, should not be changed without further careful consideration. This approach is required to provide regulatory certainty to all stakeholders, which facilitates continued investment, financing and provision of the regulated services. Investors should feel confident that real-world adjustments would be made to the regulatory regime to preserve the credit metrics (and benchmark credit rating) of a firm that was assumed to have been financed in the benchmark manner, and that a change to the benchmark gearing level would not simply be applied to assuage concerns about financeability. However, in this case, we are resetting the starting point

3.3 Stakeholder submissions

3.3.1 Queensland Rail's submission

Queensland Rail's submission on its 2020 DAU is relatively brief with respect to WACC parameters, and largely relies on the analysis undertaken by its adviser, Frontier Economics. Frontier is also relatively brief with respect to its recommended benchmark gearing for Queensland Rail, which is 28 per cent. The benchmark gearing recommended by Frontier is an outcome of its analysis of the asset beta of Queensland Rail. It should also be noted that Frontier was instructed by Queensland Rail to derive an asset beta and gearing estimate for the whole of Queensland Rail's business, and not just for the below rail coal business (i.e. QR-Coal).[21]

Frontier considered that the potential comparator industries it identified (see below) could be weighted to obtain an asset beta estimate and matching benchmark gearing estimate for Queensland Rail. Consistent with the way it estimated its asset beta of 0.77, Frontier applied weights of 15 per

[21] Frontier noted in its subsequent report in response to submissions that for both reports (including the original report) it was "instructed to estimate beta and gearing parameters that would be appropriate for QR as a single aggregated entity," because this was the approach that had been applied in the previous review. See Frontier Economics (26 October, 2018), *Response to submissions on the required return for Queensland Rail*, p. 2.

cent to airports, 40 per cent to Class 1 railroads, 30 per cent weight to general cargo ports, and 15 per cent weight to tollroads. Frontier used the mid-points of the 5 year and 10-year gearing levels it observed for these industries, obtaining a gearing level estimate of 28 per cent.

Frontier concluded with a recommendation that: [22]

> *For these reasons, our view is that the task of computing appropriate beta and gearing estimates for the MW-Metro coal rail network should be the subject of a separate process. Simply adopting the QCA's allowances for the CQCN would be inappropriate because:*
>
> - *The QCA's estimation process of relying exclusively on data from electricity and water firms is an inappropriate approach for estimating gearing and beta for a coal rail network; and*
> - *In any event, there are material differences between the* CQCN [i.e. Aurizon Network] *and WM-Metro coal rail networks* [i.e. QR-Coal].

In its subsequent response to the observations made by QR-Coal, customers New Hope and Yancoal (see below) submitted that the Frontier analysis had erred in estimating beta and gearing for the whole of Queensland Rail's operations.

Incenta's comments

We agree with Frontier that a fresh analysis of the systematic and business risk characteristics of QR-Coal's operations needs to be undertaken owing to differences between Aurizon Network (CQCN) and QR-Coal (WM-Metro coal rail networks). These analyses are being undertaken by the QCA, which has engaged Incenta to assist it.

We are concerned that the "target" that Frontier was pursuing with its analysis was not the QR-Coal business, but the whole of Queensland Rail's business. In addition, in our view Frontier's analysis applied weightings to the observed gearing levels of four industries that were not sufficiently supported by a first principles analysis of the risk characteristics of those industries. We also consider that the last 5 years of data are likely to be more informative about current and future gearing levels. Including 10 years of gearing data captures the impact of the Global Financial Crisis (GFC), which was an unusual period, and had the effect of depressing equity values relative to debt values and would therefore tend to increase gearing estimates relative to more recent values.

3.3.2 New Hope's submission

New Hope Group's (New Hope) submission agreed with the approach that has been applied in the past by the QCA and Incenta, which emphasised the need to "look through" the physical characteristics of potential comparators to "assess the economic fundamentals underpinning cash flows." With respect to QR-Coal's risk profile relative to Aurizon Network, New Hope noted that Queensland Rail and Frontier had omitted to mention:[23]

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[22] Frontier Economics (26 October, 2018), p.3.

[23] New Hope Group (17 October, 2018), *Queensland Rail's 2020 Draft Access Undertaking: Initial Submission – Volume 1, Overview and Reference Tariffs*, p.16.

> *(a) take or pay arrangements covering 100 per cent of access charges for contracted tonnes, providing QR with significant protection from volume risk (QR only bears volume risk to the extent that forecast tonnes exceed contracted tonnes);*
>
> *(b) a regulatory framework which provides protection from cost risk, by permitting changes to access arrangements (including reference tariffs) to address changes in circumstances (with the DAAU process in fact providing QR with complete freedom to seek amendments for any unanticipated event); and*
>
> *(c) limitations on the liability of the service provider where there are capacity shortfalls and/or a failure to meet performance standards.*

New Hope also criticised Frontier for targeting the whole of Queensland Rail's operations rather than the QR-Coal operations, and Frontier's choice of comparators. In particular, New Hope questioned Frontier's provision of weight to comparator firms drawn from the airports, railroads, ports and tollroads industries around the world. New Hope considered that the businesses included in their industries were operating in countries such as Russia, China and Mexico, which are markets where risks and institutional features are very different from those faced by QR-Coal. Regarding Frontier's submission that QR-Coal is subject to greater risk because it has only two customers, New Hope noted that Australian Rail Track Corporation (ARTC) in the Hunter Valley has only two customers in a specific pricing zone, and the Gladstone Area Water Board (GAWB) relies heavily on two large industrial customers. New Hope concluded that:[24]

> *We consider that regulated energy and water businesses are most comparable to QR and Aurizon Network, largely because the regulatory frameworks that apply to them have similar in-built risk protection mechanisms.*

Incenta's comments

As noted above, we agree that Queensland Rail and Frontier should have assessed the risk characteristics of QR-Coal's operations rather than the whole operations of Queensland Rail. In previous reports relating to Aurizon Network and DBCT, we have made the case that tollroad operations are a useful benchmark, since their systematic risk was assessed to be higher than that of those two assets.[25] It is also useful to consider the relative risk characteristics of Class 1 railroads, which have many of the physical characteristics of a below rail coal haulage business, and have previously been assessed to have greater systematic risk than Aurizon Network. However, this was primarily a systematic risk assessment, while questions of benchmark gearing and credit rating turn on business risk (e.g. absolute volatility rather than systematic volatility).

We agree with New Hope that general cargo ports and airports are unlikely to provide valid comparators for QR-Coal operations, as they have neither the regulatory, nor market similarities that are required to make them comparable. We agree with New Hope that QR-Coal being dependent on only two customers is not necessarily an important factor for systematic risk assessment and would add that what is important for that assessment is the position that these customers occupy in the global thermal coal cost curve. For a business risk assessment, the existence of two customers may be important if the West Moreton region, and the single QR-coal rail line are subject to greater risk of

[24] New Hope Group (17 October, 2018), p.22.
[25] See Incenta (December, 2017), *Aurizon Network's WACC for the 2017 DAU*; and Incenta (March, 2016), *DBCT 2015 DAU: Review of WACC parameters*.

flooding than, say Aurizon Network's operations. However, this risk is also dependent on the financial resources of New Hope and Yancoal. These issues are considered further below.

3.3.3 Yancoal's submission

Yancoal's submission made a case that the coal price exposure of QR-Coal customers "should not be overstated."[26] This is because the high capital sunk costs in coal mining projects necessitate looking at the long-term fundamentals of the coal market. With respect to Queensland Rail and Frontier's proposition that risks are higher when there are only two customers, Yancoal's response was:[27]

> *If the perceived risk is that a customer will become uneconomically unviable due to a prolonged down turn in coal prices and therefore reduce demand for the reference service, that risk presumably equally exists whether you have two large customers or many smaller ones.*

Yancoal also noted that the Queensland Rail submission's reliance on non-coal services is not relevant to establishing a tariff for QR-Coal services and emphasised that the regulatory framework and the form of regulation are important. Yancoal challenged what it termed Frontier's "assertion" that regulation is "only one of a number of more minor factors." One specific instance of regulatory protection of QR-Coal's revenues raised by Yancoal was the recent closure of the Wilkie Creek mine, since:

> *… it is coal companies who bore the risk through lower demand forecasts increasing the reference tariffs, while QR's revenue was protected (without any optimisation of the regulatory asset base occurring as a result of the change in demand).*

Another point raised by Yancoal is the long-term take-or-pay contracting that characterises other parts of the coal supply chain, including contracts between mines and haulage contractors (such as Aurizon Operations), and between mines and port operators. Based on the above, Yancoal concluded that the best comparator entities for QR-Coal are other Australian coal supply chain businesses with similar coal market exposure and regulation, and Australian water and electricity businesses with similar regulatory arrangements. While considering it difficult to comment on benchmark gearing, apart from rejecting the "extremely low gearing proposed by QR", Yancoal recommended that:[28]

> *…the QCA consider the efficient capital structure for QR closely including taking into account:*
>
> *(a) the low cost of debt that is available to QR as a result of its position as a government statutory authority; and*
>
> *(b) QR's low risk profile for the reasons discussed above*.

[26] Yancoal (17 October, 2018), *Initial Submission on QR 2020 Draft Access Undertaking*, p.7.
[27] Yancoal (17 October, 2018), p.7.
[28] Yancoal (17 October, 2018), p.12.

Incenta's comments

Yancoal's discussion of the socialisation of the Wilkie Creek capacity following the mine's closure, and its lack of impact on QR-Coal's business highlights another similarity between QR-Coal and Aurizon Network. However, this was socialisation at the margin. During the recent period of low coal prices, Moody's raised the question of whether socialisation could protect Aurizon Network in the event of sustained low coal prices that resulted in larger mine closures:[29]

> *Socialisation of lost revenue over certain corridors may be challenging in a coal market downturn*

While Yancoal submitted that the mines have other take-or-pay contracts with haulage operators and ports, and this would make mine closures costly, whether there is a material risk to QR-Coal again rests on where its customer mines fall in the world thermal export coal cost curve, and how their long-term prospects are viewed by their managements. These issues are also explored further below.

Yancoal's position that the risk a customer will become unviable is the same whether there are two large customers, or many smaller ones, is not necessarily correct. The risk relativities (overall counterparty risks) depend on a number of factors that include: the relative positions of the large customers and many smaller customers on the world export coal cost curve, the relative financial positions of the firms, how dependent they are on this activity, and the nature of contracting arrangements.

Regarding Yancoal's two conclusions regarding efficient capital structure, we agree with the proposition that the actual debt arrangements of QR-Coal (i.e. Queensland Rail) should not be taken into consideration. Regulatory benchmarking (and competitive neutrality considerations) dictates that a commercially efficient cost of debt should be assumed in the WACC, which is the approach that the QCA is taking. We disagree with Yancoal's proposal that an assessment of the efficient capital structure should take account of "the low cost of debt that is available to QR as a result of its position as a government statutory authority." Such an approach would not be consistent with competitive neutrality principles and would be likely to result in unwarranted subsidisation of the regulated service. In assessing this efficient cost of debt, once the benchmark gearing level has been established, the benchmark credit rating will need to be assessed by taking account of QR-Coal's risk profile. We now turn to our own assessment.

3.4 Assessing a benchmark gearing level for QR-Coal

3.4.1 Introduction

As discussed above, our approach to estimating the appropriate benchmark gearing level for QR-Coal, is to begin with a first principles analysis that concentrates on business risk factors that influence the volatility of cash flows, and sustainability of the business.

This is a different exercise to the first principles analysis that would be undertaken for the assessment of systematic risk, as it does not consider issues of market weighting or optionality and concentrates on absolute risk (volatility and cyclicality) rather than systematic risk. However, most factors that are

[29] Moody's (17 August, 2018), *Aurizon Network Pty Ltd, Update to credit analysis following release of FY2018 results*, p.2.

relevant to an assessment of systematic cyclicality in earnings are also relevant to the assessment of cyclicality per se. There will be additional factors that are relevant to earnings volatility: such as geographic diversification, complexity and vulnerability to weather, which are less relevant, or irrelevant, to systematic risk.

3.4.2 Methodology

We acknowledge that the analysis that Frontier undertook was primarily aimed at estimating the asset beta (i.e. systematic risk), and implications for benchmark gearing flowed automatically from it. By contrast, as noted above, we are looking at factors that are specifically relevant to gearing, which encompass a broader range than those applicable to systematic risk.

In our previous analysis of regulated businesses in the Queensland export coal industry value chain, we have relied on samples comprised of businesses involved in activities ranging from regulated energy and water networks, to coal mining. This has been done because there are no listed, cost-of-service-regulated, below-rail coal businesses that can be used as close comparators for a below-rail coal business.

By applying first principles analysis we have determined that the two regulated businesses that we have previously considered, Aurizon Network and the Dalrymple Bay Coal (DBCT), exhibited regulatory and economic characteristics that most resembled those of regulated energy and water businesses. As noted above, we concluded that such industries as tollroads, gas transmission pipelines in North America, Class1 railroads, and coal mining businesses had higher systematic risk than Aurizon Network and DBCT.

The sample

Queensland Rail's adviser, Frontier, proposed a number of potential comparator industries. These industries were:

- Class 1 railways
- Tollroads
- Pipelines
- Airports
- Ports
- Regulated energy and water

Our view is that general cargo ports and airports are likely to provide little guidance for analysis of QR-Coal's business and financial risks, and have no market or regulatory characteristics that are similar to QR-Coal's business. General cargo ports and airports are likely to be far more sensitive to the business cycle than QR-Coal, whose thermal coal is ultimately an input to the production of power (including a material residential component). These industries are unlikely to provide appropriate comparators to assess QR-Coal's benchmark gearing level. Coal mining businesses, however, lie at the beginning of an export coal value chain. Gas pipelines have some economic similarity to a below-

rail export thermal coal business, in that they transport energy, and at present gas and thermal coal prices are co-determined in the market, as they are substitutes at the margin.

We initially included 119 businesses in the following industries for analysis, including three additional businesses that were added by Frontier for these industries.[30] We set 31 December, 2018 as the cut-off date for the inclusion of data that was downloaded from Bloomberg. We downloaded financial data from Bloomberg for the period 29 December 2000 to 31 December, 2018. Eight businesses were eliminated due to having been acquired or merged, or through having other data issues.[31] This left a total of 107 businesses (shown with sample sizes in brackets):

- Regulated energy and water (72, removed 6)
- Tollroads (7, removed 1)
- North American pipelines (12, removed 3)
- Railroads (11, removed 1)
- Coal mining (5, removed 1)

We have considered coal mining businesses because they are representative of QR-Coal's customers (e.g. New Hope and Yancoal), however owing to their exposure to international coal prices and currency movements, they are expected to have materially greater business risks than a regulated below-rail coal business like QR-Coal.

3.4.3 First principles analysis

In reviewing the "first principles factors" we compare QR-Coal to Aurizon Network, and to the potential comparator industries that we introduced above.

Position on the world thermal coal export cost curve and asset stranding risk

The position of QR-Coal's two customers on the world thermal coal exports cost curve is fundamental to understanding the scope for volatility in QR-Coal's revenue and earnings. Recent experience suggests that operating costs at the mines operated by New Hope and Yancoal in West Moreton region are relatively cost efficient. As shown in Figure 2.1 below, production of thermal coal by QR-Coal's existing customers was resilient to the fall in thermal coal prices to USD47/tonne.[32] This is despite the fact that the Surat Basin is located 360 kilometres from Brisbane, and QR-Coal's transportation cost, owing to the specific nature of the track, being designed for general freight in the 1870s, is materially higher than that of the Australian Rail Track Corporation (ARTC) in the Hunter Valley of New South Wales.

30 These additions were: the railroad businesses Container Corporation of India (CCRI IN Equity), and Globaltrans Investment PLC of Russia (GLTR LI Equity); and the tollroad operator Vinci SA (DG FP Equity) of France. We excluded Vinci on grounds that it has material involvement in higher risk construction activities (as discussed in chapter 2 above).

31 Businesses removed from the initial sample are discussed in chapter 2 above.

32 The lowest thermal coal price in recent years was USD47.27, which was experienced on 29 January 2016.

Figure 2.1: QR-Coal – Export volumes vs Thermal coal price

Source: Bloomberg (Newcastle Port Thermal Coal, COASNE60 Index) and Department of Natural Resources and Mines (Coal Industry Review Tables)

The long-term outlook for thermal coal is for relatively slower growth than in metallurgical coal, owing to substitution by gas and renewables.[33] Also, the short-term outlook for thermal coal prices remains relatively strong, driven by demand in China and India. Bloomberg concluded its mid-2018 review on a bullish note:[34]

> *We continue to believe that thermal coal prices will stay well above $85-$90/mt in 2019 as well.*

This evidence suggests that QR-Coal's operations, assuming the approval of the current expansion, have a relatively low likelihood of stranding. However, QR-Coal's likelihood of asset stranding is expected to be higher than for Aurizon Network, which has a strong position on the global cost curve, exports mainly metallurgical coal and has dozens of customers.

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33 In recent years the International Energy Agency has forecasted the long-term outlook to be relatively flat growth in world thermal coal exports up to 2040, with Australia's share expected to grow owing to its higher-grade coal and proximity to Asian markets. See, IEA (2016) *International Energy Outlook 2016*, p.74. This implies that coal prices will remain above Australia's thermal coal production cost. IEA (2018), *World Energy Outlook*, p.4. proposed that coal's "overall global consumption is flat in the New Policies Scenario, with declines in China, Europe and North America offset by rises in India and Southeast Asia."

34 Andrew Cosgrove and Michelle Leung (2018) *BI Midyear Outlook: Global Coal Producers*.

Market Power and resulting Regulatory Framework

Market power should be considered together with regulation, since a high degree of market power is generally associated with the application of a regulatory framework. It is well recognised that regulation has the effect of dampening the cyclicality of earnings that could arise in its absence, which is expected to reduce the systematic risk of the regulated firm's cash flows. Under incentive regulation, however, the resetting of revenues or prices at the conclusion of a regulatory period based on efficient costs and benefits sharing could result in an element of earnings cyclicality that, whilst not systematic, would not arise in the absence of regulation. Overall, we would expect earnings volatility to be reduced through regulation, but not eliminated. Other things being equal, this should provide scope for a higher benchmark gearing level.

Form of price control

As shown in Table 2.1 below, the QCA applies substantially the same cost-based regulatory framework to both QR-Coal and Aurizon Network, which should have the effect of dampening earnings volatility. However, QR-Coal's revenue control arrangements are different, as it is subject to a "price-cap" (with some latitudes) and Aurizon Network has a "revenue-cap" applied. As discussed in a previous report, the revenue cap applied to Aurizon Network could actually result in more absolute volatility (but less systematic volatility) than in the absence of regulation.[35] For example, if tariffs had been negotiated between miners and Aurizon Network and backed by take-or-pay contracts. This is because the QCA's regulatory framework provides Aurizon with the same NPV but with a 2-year time lag. QR-Coal's regulatory framework does not have this arrangement, and its price-cap can be expected to result in revenue volatility for a number of reasons, including: concentrated assets subject to potentially severe flooding; and achieved capacity that has the potential to exceed contracted capacity.

Cost pass through

Compared with Aurizon Network, QR-Coal does not have as comprehensive cost pass-through arrangements. QR-Coal's *force majeure* events such as extreme flooding are partly passed through as follows. The miner customers are liable to pay maintenance to restore the functionality of the line but are not liable for take-or-pay commitments in the interim. However, after the flood of 2011 approximately $35 million in repairs were mainly funded by a government grant, but also through a tariff adjustment. With respect to capital expenditure, similar processes of approval are required in relation to QR-Coal and Aurizon Network.

[35] Incenta, (December, 2017), *Aurizon Network's WACC for the 2017 DAU*, p.79.

Table 2.1: Comparison of regulatory arrangements – Q-R Coal vs Aurizon Network

Aurizon Network	QR-Coal
Regulatory framework	
Application of a cost based regulatory regime with periodic price reviews (the "building block" approach)	Same approach applied to QR-Coal
Prices are reviewed at periodic intervals such that revenues are realigned with cost, with the effect on profit of any difference between forecast and actual outcomes for expenditure or demand being corrected on a forward-looking basis.	Same approach applied to QR-Coal
The value of the capital assets from one review to the next is updated by adding in new capital expenditure at cost, indexing for CPI inflation and deducting depreciation. Provision for QCA to deem capital expenditure as imprudent and disallow its recovery exists.	Same approach applied to QR-Coal
At each periodic review, the forecast revenue requirement (i.e., the assessed annual cost) is based upon a contemporaneous estimate of the cost of capital associated with the activity in question.	Same approach applied to QR-Coal
Revenue risk during a regulatory control period	
A revenue cap is applied. In the event that the take-or-pay mechanism does not recover a revenue shortfall, it will be recovered two years later through an adjusted tariff (with an NPV adjustment to make the firm whole).	A price-cap is applied, with some modificatiuons. There is greater volume risk, particularly in relation to ad hoc sales of spare capacity. There is a ceiling revenue to prevent over-recovery (ie revenue in excess of fully utilised capacity based on the price-cap)
Since UT3 an annual process has been introduced to reset volume forecasts in order to reduce the size of the revenue cap overs-and-unders, and hence the extent of revenue subject to timing differences	Not applicable under price-cap
Opex risk:	
Variation in operating cost compared to forecast during a regulatory period is borne by Aurizon Network, subject to the following measures to reduce the cost/benefit:	
A mechanism has been introduced to adjust the cost of electricity and transmission/distribution costs where these vary by more than 2.5 per cent.	QR-Coal operates on diesel. There are no similar provisions for the cost of diesel.
Certain costs are now being escalated based on Maintenance Costs Index (MCI), which provides a better alignment with Aurizon Network's actual costs, and there is an annual adjustment process, which corrects for differences between forecast and actual NCA and forecast and actual CPI.	No similar provisions are applied.
If maintenance costs prudently and efficiently incurred by Aurizon Network exceed the allowance by more than 2.5 per cent, this was a review event that could result in a variation to tariffs, however the definition of review event has been expanding over the years to include any material change in circumstances.	No similar provisions are applied.
A pass through for Force Majeure costs of over $1 million has been introduced and was used in relation to the 2011 floods.	Miners are liable to pay for maintenance works to restore functionality after a force majeur event, but are not liable to honour take-or-pay commitments during this period.
Capex risk:	
The scope of new capex is approved by customers prior to commencement of works, which eliminates stranding risk from this source; however, capex could still be declared to be imprudent by the QCA.	Same approach applied to QR-Coal
Stranding risk:	
A rolling 20 year asset life has been introduced for new capital expenditure, which substantially reduces the risk of asset stranding	No formal requirement for new assets to be depreciated over 20 years.
The risk of asset stranding has also been further reduced by an increase in the percentage of fees in the event of relinquishment from 40 per cent of two years of access charges under UT1, to 50 per cent of the NPV of the take-or-pay contract over the remaining life of the access agreement.	Take-or-pay contracts require payment of a higher percentage of remaining life.

Source: QCA and Incenta analysis

Stranding risk

Stranding risk, which is discussed further below, is not addressed as formally as it is in the case of Aurizon Network, where the depreciation of new assets is capped at 20 years. However, as noted above, we have assumed that the New Hope project goes ahead, and that long-term take-or-pay contracts will cover close to 100 per cent of QR-Coal's contracted capacity, which is higher than for Aurizon Network. Furthermore, in the event of a relinquishment of capacity, the QR-Coal contracts return 80 per cent of the NPV of the remainder of the contract, which is higher than is the case for Aurizon Network.

Summary

In summary, while QR-Coal's regulatory framework has some differentiating features relative to Aurizon Network, and regulated energy and water businesses, there are also many similarities. Apart from regulated energy and water, all of the other potential comparator industries are subject to greater or lesser degrees of competitive pressure, have light handed regulation or no regulation, and on this criterion are not suitable comparators for QR-Coal. The miners who contract with QR-Coal face competition in the world market, which makes their cash flow stream more volatile, but their incentive is to maximise throughput as long as the coal price is expected to exceed their operating costs in the long run.

While tollroads are subject to light regulation and are open to competition from other transport modes, the overall volatility in the ROA (Return on Assets) of tollroads is not much higher than that of regulated energy businesses. On this observation we might also expect the tollroads industry to provide a reasonable comparator for QR-Coal.

Relationship to the business cycle

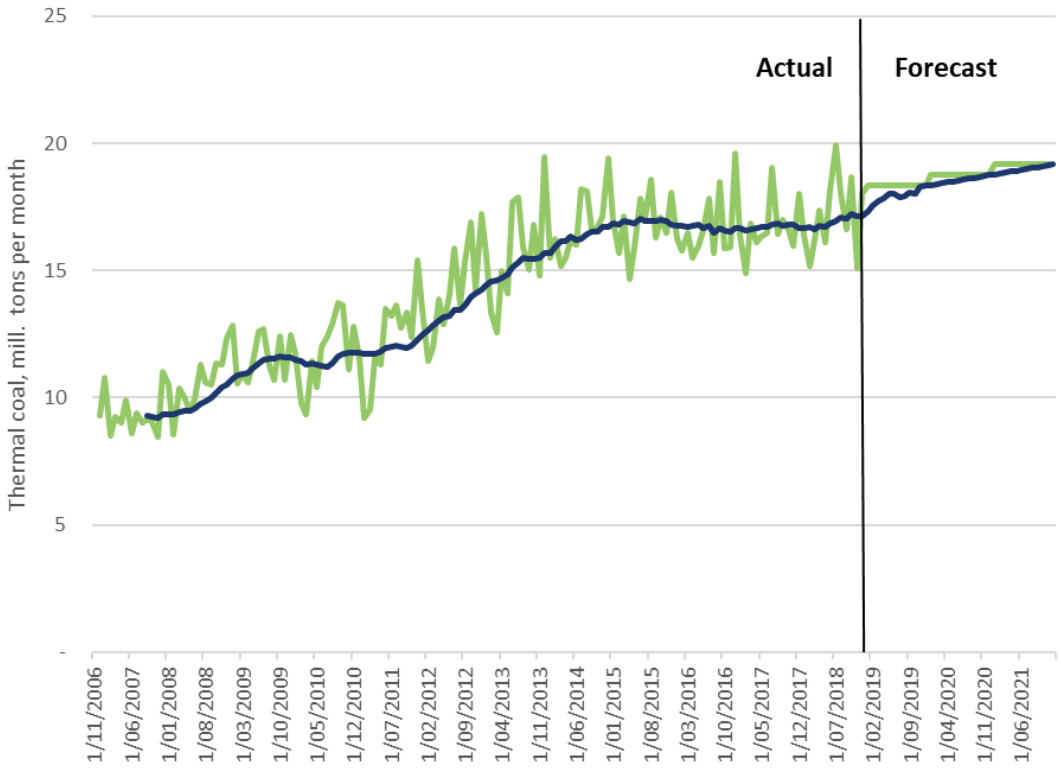
Other things being equal, a stronger relationship to the business cycle should result in a lower benchmark gearing level. The coal that is mined by QR-Coal's two customers, New Hope and Yancoal, is thermal coal, which is used to generate electricity, and is in competition with other energy sources such as gas and renewables. Cyclical volatility in thermal coal demand will depend on the income elasticity of demand, i.e. how pro-cyclical is demand when income levels change? There are several reasons to expect thermal coal to show a relatively low relationship to the business cycle. First, a significant proportion of demand will be for household consumption, which tends to be largely invariant to income changes. A second reason is that most of the seaborne exports of thermal coal are consumed in rapidly developing Asian countries, where fundamental processes of urbanisation and industrialisation are taking place and increasing demand for thermal power is tied to these processes, which continue through market cycles.

In Figure 2.2 we find that the growth in thermal coal exports that had taken place prior to the period during which coal prices were below USD80 per tonne (i.e. 2014 to 2017) was halted. In the 2014 to 2017 period export volumes stagnated, but 2018 showed signs of growth, and Bloomberg's coal team has forecast relatively strong growth in the 2019-2021 period.

In conclusion, we would expect regulated energy and water businesses and QR-Coal to demonstrate similar low volatility of revenue and earnings on account of income elasticity of demand. That is, relative to North American pipelines, railroads and coal mining, QR-Coal would be expected to have far less sensitivity to the economic cycle. While tollroads are expected to have some sensitivity to the

business cycle, their major customer group is engaged in private (i.e. "non-commercial") travel, which implies relatively less pro-cyclical demand. Hence, the Return on Assets (ROA) for tollroads is far less sensitive to the economic cycle than North American pipelines and Class 1 railroads.[36]

Figure 2.2: Australia – Thermal coal exports per month



Source: Bloomberg

Contract duration

Long term take-or-pay contracts can mitigate the impact of changes in demand that might otherwise result in higher volatility in revenues and earnings and would allow for a higher benchmark gearing level. We understand that 100 per cent of Yancoal's contracted volume is under take-or-pay contracts, and New Hope intends to do the same with respect to its capacity. However, the proportion of total capacity on the QR-Coal railway line that is covered by such contracts is also important. If the New Hope New Acland mine is approved, as we have assumed for this report, in the West Moreton system a high percentage of QR-Coal's contracted capacity will be subject to long-term take-or-pay contracts. This implies that with an evenly staggered distribution of contract terminations, at any time there will be several years before the full impact of an economic downturn is felt, which is longer than any recession (or low coal price) is likely to endure.[37]

[36] Incenta (December, 2017), pp. 46-49.
[37] This assumes the continued solvency of the miners through such a recession.

The contracting characteristics of QR-Coal are likely to be favourable relative to Aurizon Network, and are also likely to be more favourable than those of the other potential comparators. In North American pipelines contracts of 5 to 15 years are common but are for a smaller proportion of capacity. While regulated energy and water businesses generally do not have contracts with customers, those customers are captive. Class 1 railroads have contracts that are for shorter periods (only 1 to 3 years' duration), which provide little protection in a downturn. While there is no contracting for tollroad services, their revenue stream is relatively stable due to the nature of their customer base (as discussed above).

Operating leverage

Operating leverage refers to the sensitivity of earnings to sales when there is a high degree of fixed costs, however its impact also depends on the degree of revenue volatility. Greater revenue and earnings volatility implies a lower benchmark gearing level.

Regulated energy and water businesses generally have a low level of revenue and earnings volatility (or dampened volatility that is not systematic), which means that operating leverage will be an irrelevant or second order issue. However, some regulated businesses are potentially more affected by operating leverage, because volume risk remains and there is a higher degree of cyclicality in cash flows.

Operating leverage can be defined as the change in Earnings Before Interest, Tax and Depreciation (EBITDA) in response to the change in the number of units sold. However, we have empirically estimated the relationship by finding the γ_1 coefficient in a regression of the form:[38]

$$Ln\,EBITDA = \gamma_0 + \gamma_1\,Ln\,Sales + \mu$$

We estimated operating leverage in this way using 18 years of data (2001 to 2018) for the group of potential comparator industries. In addition, we calculated the 5-year ratio of operating costs to assets (opex/assets) as an alternative measure of operating leverage.[39] Due to the lack of a sufficient number of valid observations for QR-Coal, we have not estimated the above equation, but have provided the forecast 5- year Opex/Assets ratio for the coming regulatory period that Queensland Rail has submitted. Relative operating leverage measures are displayed in Table 2.2 below.

Table 2.2: Relative operating leverage

	No. of Obs.	Regression LnEBIT v LnSALES	5 year Opex / Assets
Aurizon Network	1	0.98	7.8%
Toll Roads	7	1.63	13.2%
QR-Coal	1		8.4%
Regulated Energy & Water	72	0.86	9.0%
Pipelines	12	0.96	5.0%
Coal	5	1.91	11.7%
Railroads	11	1.68	20.2%

38 See, Xue Zhang, (15 August, 2012), *The Role of Operating Leverage in Asset Pricing*, Master Thesis in Finance, Tilburg University.

39 Bloomberg codes applied to obtain these data were: EBITDA (EBITDA), Sales (SALES_REV_TURN), Total Assets (BS_TOT_ASSET), Operating expenditure (IS_OPERATING_EXPN). Years with missing data were removed.

Source: Bloomberg and Incenta analysis. Note: QR-Coal's Opex / Assets is based on the QCA's regulatory model.

We note that QR-Coal's forecast Opex/Assets ratio is similar to that of regulated energy and water businesses, although this is not necessarily indicative of a similar level of operating leverage. Coal miners have a low Opex/Asset ratio, and a relatively high sensitivity of EBIT to sales (1.91).

QR-Coal's revenues may be subject to more volume risk than Aurizon Network because of its price-cap. However, we expect the volume risk for QR-Coal to be relatively low. Operating leverage is a more important factor in Class 1 railroads and coal mining because their cash flows are volatile. While the tollroads sensitivity also appears high, the volatility of tollroads sales is much lower, which implies that operating leverage will still not result in volatile earnings (EBIT).

EBITDA Margin

In Table 2.3 below we compare the EBITDA margins of QR-Coal and the comparator industries. Other things being equal, a higher EBITDA margin provides greater debt capacity. In regulated businesses that are subject to cost-based pricing, the relative contribution of the regulatory depreciation allowance in an entity's regulated revenues is a key determinant of their EBITDA margin. Based on the regulatory model supplied to us by the QCA, we estimate that QR-Coal's EBITDA margin is likely to lie in a range of 40 per cent to 44 per cent.

Table 2.3: Gearing levels vs 5-year EBITDA margin

	No. of Obs.	Average EBITDA margin	Median EBITDA margin	Average Gearing	Median Gearing
Aurizon Network	1	65%	65%	55%	55%
Toll Roads	7	53%	52%	39%	42%
QR-Coal	1	40% to 44%			
Regulated Energy & Water	72	33%	31%	38%	39%
Pipelines	12	30%	23%	40%	40%
Coal	5	19%	24%	28%	24%
Railroads	11	39%	41%	17%	18%

Source: Bloomberg and Incenta analysis. Note: QR-Coal's EBITDA margin range is based on the QCA's regulatory model.

By way of comparison, the EBITDA margins of:

- Aurizon Network and the Australian regulated energy networks, which have benchmark gearing assumptions of 55 per cent and 60 per cent, are respectively approximately 65 per cent and 70 per cent.[40]
- the (mainly North American) regulated energy and water businesses have an average (median) EBITDA margin of 33 per cent (31 per cent), and
- the tollroads sample has an average (median) EBITDA margin of 53 per cent (52 per cent).

[40] QR-Coal's relatively low return of capital (depreciation) component in the building blocks, and relatively high operating cost (and maintenance cost) component compared with Aurizon Network and Australian regulated energy businesses is due to relatively older (depreciated) assets, and the additional costs of a rail line that is both old and not originally constructed with coal haulage in mind.

We note that QR-Coal's likely EBITDA margin would lie between the margins of energy and water businesses (31-33 per cent) and tollroads (52-53 per cent), but below those of Aurizon Network (65 per cent) and Australian regulated energy businesses (70 per cent).

Summary of first principles analysis

Our first principles analysis indicates that considering earnings volatility and its implications for benchmark gearing, the most relevant comparators for QR-Coal are regulated energy and water businesses, and tollroads. The other potential comparators, such as North American pipelines, Class 1 railroads and coal mining, are all shown to have characteristics indicating materially higher business risks.

3.4.4 Relative gearing levels

The benchmark gearing level for QR-Coal can be assessed considered in Table 2.3 above, which displays operating leverage, gearing and EBITDA margins by industry. Our first principles analysis showed that QR-Coal's closest comparator industries are regulated energy and water businesses, and tollroads. For these two industries we find:

- Average (median) EBITDA Margins of 33 per cent (31 per cent) for regulated energy and water,[41] and 53 per cent (52 per cent) for tollroads; and

- Average (median) gearing levels of 38 per cent (39 per cent) for regulated energy and water and 39 per cent (42 per cent) for tollroads.

These observed gearing levels are materially lower than the benchmark gearing level of 55 per cent that has previously been applied to Aurizon Network by the QCA, and more recently by the AER to Australian regulated energy businesses. However, as noted above, these businesses derive a materially larger proportion of their building block revenue from the regulatory depreciation component, while QR-Coal derives proportionately more from operating costs, which are a pass-through. As a result, QR-Coal's EBITDA margin is materially lower than that of Aurizon Network and Australian energy businesses, and has less debt capacity.

Based on our findings for the key comparator groups we conclude that a reasonable benchmark gearing level for QR-Coal is **40 per cent.**

3.5 Conclusion

In this chapter we have considered the method applied by Queensland Rail and its adviser Frontier to determine a proposed benchmark gearing level of 28 per cent for QR-Coal. Neither Queensland Rail nor Frontier demonstrated that the weightings they applied to various industry comparators could be justified by reference to a first principles analysis, and in any case their objective was to derive a benchmark gearing level for the entire operations of Queensland Rail. Our view is that once a benchmark gearing level has been established by careful analysis, it should be maintained unless there is compelling new evidence that a change is required.

[41] We note that the regulated energy and water sample is overwhelmingly drawn from North America. EBITDA margins for the few Australian businesses in that sample are closer to 70 per cent.

Our approach was to undertake a first principles analysis of total risk, which concluded that QR-Coal's characteristics were closest to regulated energy and water businesses and tollroads. In addition, QR-Coal's likely EBITDA margin of 40 per cent to 44 per cent is within the range observed for energy and water (31-33 per cent) and tollroads (52-53 per cent). Our recommended benchmark gearing level for QR-Coal is **40 per cent** based on observations for the relevant comparator industries over the past 5-years.

4. Benchmark credit rating

4.1 Introduction

We now turn to consider the question of what the appropriate benchmark credit rating would be for the benchmark gearing level that we have identified. In the previous chapter, using first principles and empirical analysis, we concluded that a benchmark gearing level of 40 per cent is reasonable. As noted above, in the previous regulatory review QR-Coal had Aurizon Network's WACC parameters applied, and this was agreed to by stakeholders. Since a review of the benchmark gearing level has been undertaken, it is necessary to examine whether the previously applied BBB+ benchmark credit rating remains appropriate.

In this chapter we:

- Consider first the purpose of assessing a benchmark credit rating for a regulated business;
- Review Queensland Rail's benchmark credit rating proposal; and
- Present our own analysis of the benchmark credit rating, drawing on the Standard & Poor's methodology and the QCA forecasts of QR-Coal's regulatory cash flows;[42] which
- Simultaneously tests the financeability of the proposed regulatory cash flows with respect to the implied credit rating.

Our view is that regulatory WACC and other settings should be shown to be financeable at the assumed benchmark investment grade credit rating. If financeability were not achieved based on the assumed well-supported WACC parameters that are applied, there would be a case for adjusting cash flows through such measures as shortening of asset lives or allowing the immediate expensing of capital expenditures.

4.2 Assessing a benchmark credit rating

There are three reasons that a benchmark credit rating would be assessed for a regulated business:

- The first reason is to ensure a consistency between the various components of a regulatory decision, in particular that the debt risk premium (which is based on the benchmark credit rating) is consistent with the cash flows that are being projected. Therefore, ensuring consistency with choices about the gearing level and the depreciation method.
- A second reason is that a credit rating provides a test of whether a business financed in a way that is consistent with its peers could expect to attract and maintain a credit rating that is appropriate for the provider of important infrastructure given the regulatory settings.
- The third reason is that a benchmark credit rating tests whether a firm that is financed in the benchmark manner could *continue* to attract and maintain a credit rating that is appropriate for an important provider of infrastructure services, given the regulatory settings. This test is dynamic, as it asks the question of whether events or changes have occurred since the last price review

[42] WACC assumptions used in the QCA's model are provided in Appendix B.

would have changed the conclusions about financeability for a business that was financing in a benchmark manner, and if so would indicate the corrections to the regime (if desired) that could be made to restore the previous level of financeability. This dynamic test of financeability would provide confidence that a firm that had financed in the benchmark manner would continue to be financeable through future regulatory periods irrespective of intervening events or changes in circumstances.[43]

4.3 Queensland Rail's proposal for benchmark credit rating

Submissions

Queensland Rail's submission proposed that while the equity beta should be materially higher than that adopted by the QCA for Aurizon Network (respectively 0.98 and 0.73), the Aurizon Network benchmark credit rating precedent of BBB+ should be applied to QR-Coal's operations.[44] Neither New Hope nor Yancoal's submission commented on the benchmark credit rating.

Incenta's comments

Queensland Rail's submission (and Frontier's report) did not provide an analysis of why it chose to apply a benchmark BBB+ credit rating. This potentially introduces an inconsistency into Queensland Rail's WACC submission. On the one hand, it relied on a mix of weighted comparator industries to determine a materially higher asset and equity beta; but on the other hand, it proposed a materially lower benchmark gearing compared with Aurizon Network. It did not investigate what the weighted credit rating of those industries would be. However, this would not be our preferred approach.

We consider that the best way of establishing a benchmark credit rating for a business like QR-Coal, is to take the benchmark gearing that we have determined (40 per cent) and apply Standard & Poor's credit rating methodology using the best available comparators.

4.4 Standard & Poor's Methodology

The methodology employed by Standard & Poor's to determine a firm's credit rating is outlined below. Our description of the methodology is informed by recent Standard & Poor's publications relating to its overall corporate methodology,[45] and its specific methodology applied to regulated utilities.[46]

Overview: Steps applied in a credit rating assessment

The Standard & Poor's methodology is to first establish an "anchor credit rating" (shown in Figure 3.1 below), and then to modify the anchor credit rating, if necessary, in two further steps.

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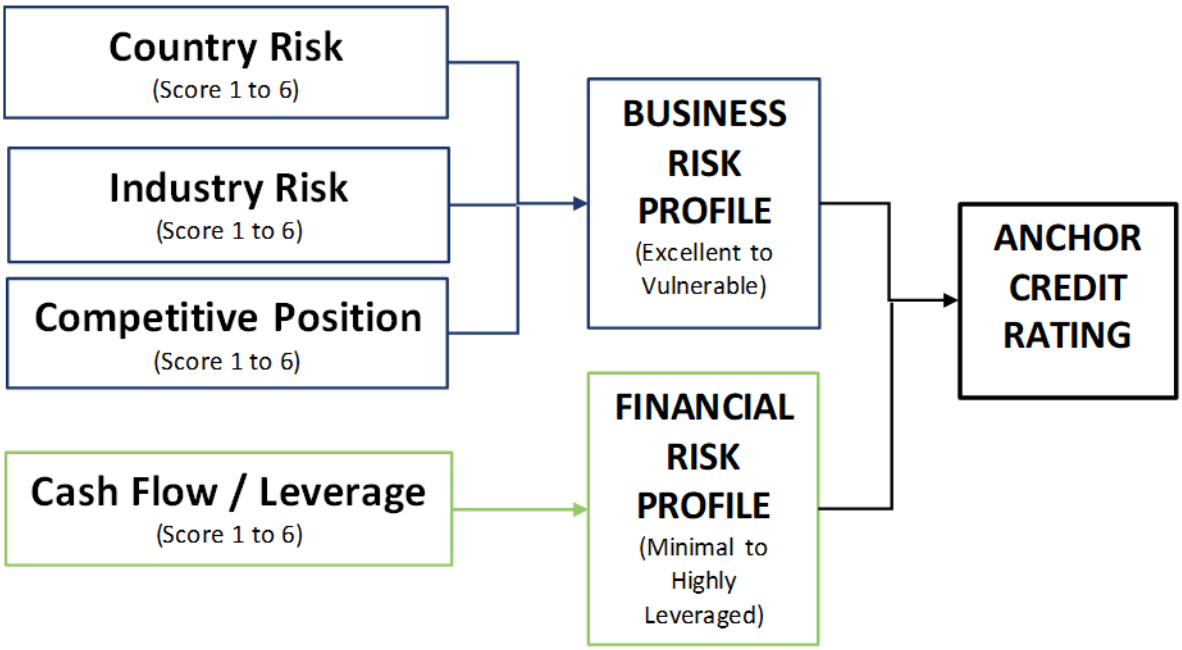
43 Financeability could be affected by a worsening of credit metrics, which could be the result of a reduction in the aggregate rate of depreciation and a reduction in general interest rates.
44 Queensland Rail (14 August, 2018), p.20.
45 Standard & Poor's (19 November, 2013a), *Corporate Methodology.*
46 Standard & Poor's (19 November, 2013b), *Key Credit Factors For The Regulated Utilities Industry.*

Figure 3.1: S&P credit rating methodology



Anchor credit rating (Step 1)

First, an "anchor credit rating" is calculated, which is the product of an assessment of the firm's "business risk profile" and its "financial risk profile". A matrix is applied that displays the anchor credit rating that results for a given combination of **business risk profile** and **financial risk profile**, as shown below:

Table 3.1: Anchor credit rating matrix

		Financial risk profile					
		1 Minimal	2 Modest	3 Intermediate	4 Significant	5 Aggressive	6 Highly leveraged
Business risk profile	1 Excellent	AAA / AA+	AA	A+ / A	A-	BBB	BBB- / BB+
	2 Strong	AA / AA-	A+ / A	A- / BBB+	BBB	BB+	BB
	3 Satisfactory	A / A-	BBB+	BBB / BBB-	BBB- / BB+	BB	B+

Source: Standard & Poor's (19 November, 2013), p. 35.

Business risk profile

The "business risk profile" is expressed as a score from 1 to 6, ranging from "Excellent" to "Vulnerable". This assessment is based on an assessment of **country risk** (score of 1 to 6, although this is irrelevant for low levels of country risk) and the risk of the **industry** in which the firm operates (score of 1 to 6), as well as an assessment of the **competitive position of the firm** in question.

- Industry risk (risk of secular changes, substitution, technology, barriers to entry)
- Cyclicality (level and volatility of profitability, EBITDA margin)

- Competitive position (competitive advantage, scale, scope and diversity of customer base, operating efficiency)

- Regulatory advantage (regulatory independence, stability, tariff setting procedure)

Our observation is that, for regulated utilities that undertake minimal non-regulated activities, the business risk profile is typically consistent (i.e., the same) across entities within the same sector. As an example, the regulated energy networks in Australia that are rated by Standard & Poor's have an "Excellent" business risk profile.

In our analysis we compare three rail businesses that share some common economic, regulatory and financial characteristics, but also have important differences:

- Aurizon Network – Is a regulated, below-rail network that operates four rail systems on Australia's Central Queensland Coal Network (CQCN), which has more than 2,670 kilometres of rail lines, servicing more than 40 mines (overwhelmingly producing metallurgical coal) to several ports.

- QR-Coal – Owns and operates the West Moreton system, a 314 kilometre below-rail single line that connects thermal coal mines in the Surat Basin to the Port of Brisbane (Rosewood to Miles), that is currently servicing two mine operators, New Hope and Yancoal.

- Arc Infrastructure Pty Ltd – Holds a 49-year lease (31 years remaining) to manage and operate a 5,500 km open access multi-user rail freight network spread across the southern part of Western Australia. Vital access link between eastern states of Australia and overseas markets through the region's five government-owned ports.

In comparing the business risk profiles of these entities, we have had regard to recent Standard & Poor's credit rating reports for Aurizon Network and Arc Infrastructure.[47] Both these rated businesses have a similar level of gearing, but Aurizon Network is rated BBB+, while Arc Infrastructure is rated BBB-.

Financial risk profile

The "financial risk profile" is also determined on the basis of a score of 1 to 6, ranging from "minimal" to "highly leveraged". The assessment of the financial risk profile is dependent in part on the risk of the industry within which the firm operates, with tougher thresholds applying for firms operating in a more risky industry. Standard and Poor's has three sets of metrics (financial ratios), which are as follows:

[47] Standard & Poor's (17 May, 2017), *Aurizon Network Pty Ltd*; and Standard & Poor's (12 April, 2017), *Brookfield WA Rail Pty Ltd*.

Table 3.2: Cash Flow / Leverage Analysis Ratios - "Standard volatility" industries

	Core ratios				Supplementary coverage ratios				Supplementary payback ratios					
	FFO / debt (%)		Debt / EBITDA (x)		FFO / cash interest (x)		EBITDA / interest (x)		CFO / debt (%)		FOCF / debt (%)		DCF / debt (%)	
	From	To	From	To	From	To	From	To	From	To	From	To	From	To
[1] Minimal	60+		< 1.5		> 13		> 15		> 50		40+		25+	
[2] Modest	45	60	2	1.5	9	13	10	15	35	50	25	40	15	25
[3] Intermediate	30	45	3	2	6	9	6	10	25	35	15	25	10	15
[4] Significant	20	30	4	3	4	6	3	6	15	25	10	15	5	10
[5] Aggressive	12	20	5	4	2	4	2	3	10	15	5	10	2	5
[6] Highly leveraged	< 12		> 5		< 2		< 2		< 10		< 5		< 2	

Source: Standard & Poor's (19 November, 2013), p.35

Table 3.3: Cash Flow / Leverage Analysis Ratios - "Medial volatility" industries

	Core ratios				Supplementary coverage ratios				Supplementary payback ratios					
	FFO / debt (%)		Debt / EBITDA (x)		FFO / cash interest (x)		EBITDA / interest (x)		CFO / debt (%)		FOCF / debt (%)		DCF / debt (%)	
	From	To	From	To	From	To	From	To	From	To	From	To	From	To
[1] Minimal	50+		< 1.75		10.5+		14+		40+		30+		18+	
[2] Modest	35	50	1.75	2.5	7.5	10.5	9	14	27.5	40	17.5	30	11	18
[3] Intermediate	23	35	2.5	3.5	5	7.5	5	9	18.5	27.5	9.5	17.5	6.5	11
[4] Significant	13	23	3.5	4.5	3	5	2.75	5	10.5	18.5	5	9.5	2.5	6.5
[5] Aggressive	9	13	4.5	5.5	1.75	3	1.75	2.75	7	10.5	0	5	-11	2.5
[6] Highly leveraged	< 9		> 5.5		< 1.75		< 1.75		< 7		< 0		< -11	

Source: Standard & Poor's (19 November, 2013), p.35

Table 3.4: Cash Flow / Leverage Analysis Ratios - "Low volatility" industries.

	Core ratios				Supplementary coverage ratios				Supplementary payback ratios					
	FFO / debt (%)		Debt / EBITDA (x)		FFO / cash interest (x)		EBITDA / interest (x)		CFO / debt (%)		FOCF / debt (%)		DCF / debt (%)	
	From	To	From	To	From	To	From	To	From	To	From	To	From	To
[1] Minimal	35+		< 2		> 8		> 13		> 30		20+		11+	
[2] Modest	23	35	3	2	5	8	7	13	20	30	10	20	7	11
[3] Intermediate	13	23	4	3	3	5	4	7	12	20	4	10	3	7
[4] Significant	9	13	5	4	2	3	2.5	4	8	12	0	4	0	3
[5] Aggressive	6	9	6	5	1.5	2	1.5	2.5	5	8	-10	0	-20	0
[6] Highly leveraged	< 6		> 6		< 1.5		< 1.5		< 5		< -10		< -20	

Source: Standard & Poor's (19 November, 2013), p. 35.

As noted above, the ratios that are applied when assessing the credit rating for a particular firm reflect the risk characteristics of the industry and are identified in credit rating assessments. We note that in the infrastructure sectors we have considered for this report, Standard & Poor's tends to apply:

- "Low Volatility" metrics to most regulated energy and water businesses,[48] and tollroads,[49] as well as below rail businesses that have substantial bulk commodity traffic (like Aurizon Network and Arc Infrastructure);
- "Medial Volatility" metrics to some regulated energy businesses;[50] and

48 All Australian energy network businesses.
49 Standard & Poor's (1 September, 2017) *Abertis Infraestructuras S.A.*
50 For example, Standard & Poor's (7 April, 2017) *Portland General Electric Co.*

- "Standard Volatility" (i.e. the highest volatility) metrics to Class 1 railroads (like Canadian Pacific Railway Ltd and Kansas City Southern).[51]

Stand Alone Credit Profile (Step 2)

In Step 2 Standard & Poor's considers a range of factors that could affect the rating from the "anchor", including: diversification, quality of capital structure, financial policy, liquidity, management and governance. These factors may cause the rating to be raised, or lowered, or left unchanged. An overall check is then applied (with overall judgement potentially being exercised), which may result in a higher or lower rating. The outcome of this assessment is the "stand-alone credit rating".

Issuer Credit Rating (Step 3)

A final step is applied where the firm is part of a wider group, and the effects of being part of that group are taken into account. This could result in the rating being raised (for example, due to government ownership), or lowered (where the parent has a lower rating than the issuer's stand-alone rating).

The anchor credit rating is appropriate for benchmark regulation

In the context of benchmark regulation, there are generally no reasons to expect the second and third steps would impact the credit rating, since factors such as diversification, quality of capital structure, financial policy, liquidity, management and governance are assumed to be constant in the benchmark firm. In practice we find that such factors do not typically result in a changed rating (which may be up or down). It is therefore reasonable to assume that a prudent and efficient firm would not be affected by these steps. In any case, the benchmark business is assumed to be stand-alone.

To reiterate, the Standard & Poor's method may be applied in the benchmark context as follows:

- the business risk profile of a benchmark firm can be determined by comparison with the business risk profile that is assigned to rated entities, on the assumption that the benchmark entity will have the same business risk profile as other firms in the industry (e.g. for regulated water businesses, this is likely to be an "excellent" business risk profile, as with the regulated energy networks)

- the relevant matrix of financial target thresholds can be ascertained from credit rating reports, and as this choice depends on the industry risk, this will not vary across entities (e.g. the "low volatility" panel is likely to be applied to regulated water businesses, as with the regulated energy networks)

- the product of the two will determine an anchor credit rating, and for a regulated business this generally can be taken as the expected credit rating for a benchmark firm.[52]

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[51] Standard & Poor's (23 July, 2018), Canadian Pacific Railway Ltd; Standard & Poor's (29 October, 2018), *Kansas City Southern Upgraded to 'BBB' On Reduced Risk of Cross-Border Trade Restrictions. Outlook Stable.*

[52] As noted above, Standard & Poor's modifiers for such issues as diversification and ownership arrangements do not apply to a benchmark regulated business. In cases where a split rating is indicated

Example: rating applied to Aurizon Network

Aurizon Network provides an example of the process that one would follow for a regulated transport infrastructure business:

- Standard & Poor's considers Aurizon Network to have a "Strong" business risk profile;
- Aurizon Network's financial risk profile is determined to be "Intermediate" given that the lower limit for the FFO/Debt financial indicator in the low volatility tables is 13 per cent for that ranking; and
- for a BBB+ credit rating, it would be able to support an "Intermediate" financial risk profile.

For firms that have a "Strong" business risk profile, there is a choice in the anchor credit ratings when a firm's metrics are consistent with an "Intermediate" financial risk profile. The practice of Standard & Poor's suggests that a firm whose ratios are at the lower end of the "Intermediate" range will have their anchor rating of BBB+, while firms with ratios near the top of the range will have an A- credit rating.[53]

The key metrics that Standard & Poor's applies to regulated infrastructure businesses are Funds From Operations/Debt and FFO/Interest cover, although it places most weight on the former. [54]These metrics are calculated as follows:

Funds From Operations / Debt

$$\frac{FFO}{Debt} = \frac{Revenue - Opex - Tax - Interest}{Debt}$$

Funds From Operations / Interest Cover

$$FFO/Interest\ Cover = \frac{(Revenue - Opex - Tax) + Interest}{Interest}$$

Standard & Poor's applies the following rules: if the business risk profile is less than or equal to 4 (i.e. fair, satisfactory, strong or excellent) the allocation to a credit rating depends on relative business risk profile strength; and where the business risk profile is 5 or 6 (i.e. weak or vulnerable) it is determined by the relative financial risk profile. See Standard & Poor's (19 November, 2013), pp.8-9.

53 Aurizon Network's credit metrics are close to the bottom of the band.

54 In its "Core ratios" panel, in addition to FFO/Debt, Standard & Poor's calculates a Debt/EBITDA ratio. While the Debt/EBITDA ratio is applied to general industrial companies, it is not relied on for regulated infrastructure businesses. Among its "Supplementary coverage ratios" Standard & Poor's also places more weight on FFO/cash interest than on EBITDA/Interest because it sees the former as a cash flow measure. We also note that Standard & Poor's places less emphasis on its "Supplementary payback ratios." It would in any case be problematic to apply ratios that include such measures as "Discretionary Cash Flow/Debt" because they require an estimate of dividend payments.

We also note that since the current Standard & Poor's metrics were established in 2013, there has been a material reduction in interest rates. This means that the FFO/Interest cover ranges that were set in 2013 are now easier to achieve and could indicate a higher credit rating.[55]

4.5 Assessing a benchmark credit rating for QR-Coal

In this section we apply the Standard & Poor's methodology to QR-Coal, using Aurizon Network and Arc Infrastructure as benchmarks.

4.5.1 Business risk profile

Standard & Poor's has applied a "Strong" business risk profile to Aurizon Network, but only a "Satisfactory" business risk profile to Arc Infrastructure. We examine the characteristics of all three firms to determine which business risk profile is most appropriate for QR-Coal.

Monopoly power

Monopoly power reduces business risk through an absence of competition that could undermine cash flow. QR-Coal and Aurizon Network are below-rail monopolists in their markets, as alternative transport modes are uneconomic, and are protected by high barriers to entry. While Arc Infrastructure has a strong monopoly in some of its freight operations, others could be subject to competition from alternative transport modes.

EBITDA volatility

Of the three businesses, Aurizon Network is in the strongest position, as it serves over 40 mine customers who produce mainly metallurgical coal, whose demand has been relatively strong. The demand for iron ore, one of Arc Infrastructure's major export commodities, has also been strong. However, Aurizon Network carries the vast majority of metallurgical coal exports, with mines that occupy a strong position on the world metallurgical coal exports cost curve. By contrast, the iron ore mines using Arc Infrastructure are smaller scale and less favourably positioned on the world export iron ore cost curve than much of Australia's iron ore production. Arc Infrastructure is also exposed to the vagaries of weather, and its impact on agricultural produce.

What distinguishes QR-Coal from the other two businesses is its single rail line, and its vulnerability to flooding. This could create some EBITDA volatility in the event of mines being flooded or track being destroyed. The other two operators have greater diversification of operations in this regard (i.e. more lines), although Aurizon Network, being situated north of QR-Coal's operations, may be subject to greater cyclone risk. However, for both QR-Coal and Aurizon Network, cyclone / flood damage risk is effectively underwritten by the customers.

As noted below, Arc Infrastructure is not regulated in the comprehensive manner that Aurizon Network and QR-Coal are. This and other factors (e.g. lower take-or-pay contact cover) creates more scope for EBITDA volatility. While Aurizon Network has a revenue cap, which smooths revenue in NPV terms in the event of volume changes, this can produce some (non-systematic) earnings

[55] If the 2013 level of interest rates were to be applied in QR-Coal's building block model the resulting financial risk profile under scenario 2 would indicate "Significant," which would result in an implied BBB credit rating. However, the FFO/Debt ratio would not change materially, and would also imply a BBB credit rating.

volatility owing to a 2-year delay in unders-and-overs true-ups. QR-Coal on the other hand operates under a price-cap, which could potentially create some volume related EBITDA margin volatility for above contracted volumes.

Regulation

The nature of the regulatory regime is an important feature in the assessment of business risk for regulated utilities.[56] Standard & Poor's describes the QCA's regulation of Aurizon Network as a:

> *Generally supportive regulatory regime, which mitigates volume and counterparty risks.*

We expect that Standard & Poor's would apply approximately the same words to the QCA's regulation of QR-Coal. Given other features of QR-Coal's regulatory and contracting framework, we would not expect to see much greater volume risk relative to Aurizon Network, and expect less volume risk than is faced by Arc Infrastructure.

In contrast to the two below-rail coal businesses, Arc Infrastructure is subject to a "negotiate and arbitrate" model under which it directly negotiates terms and conditions (including the tariff and escalations for CPI changes) with shippers. What the regulatory authority determines (in this case the Economic Regulation Authority of Western Australia, ERAWA) is the "ceiling" and "floor" price boundaries. The participants are not bound to negotiate within the framework if they choose not to.

Regulatory stability

On the issues of regulatory transparency, predictability and consistency, Aurizon Network and QR-Coal are close comparators.

Tariff setting procedure and design

Both Aurizon Network's and QR-Coal's regulatory frameworks are designed to encourage "recoverability of all operating and capital costs in full."

Financial stability

Timeliness and flexibility of the regulatory framework applying to both Aurizon Network and QR-Coal have been demonstrated in the past.

Regulatory independence and insulation

Through its assessments of Aurizon Network's access undertaking processes, Standard & Poor's has attested to the QCA's independence and insulation from political interference.

Level and trend of industry margins

Standard & Poor's places considerable emphasis on EBITDA margin (EBITDA/Sales Revenue) as a measure of both debt capacity and as an economic buffer in the event of a cyclical downturn. The reciprocal of the EBITDA margin can also be considered a measure of operating leverage. We note that on this criterion, Arc Infrastructure lies closer to Aurizon Network, as both businesses have an

[56] Standard & Poor's (19 November, 2013b), pp.6-9.

EBITDA margin in the vicinity of 65 per cent. QR-Coal is relatively unique in that its operation of an older rail line that was not designed for coal carriage. This results in much higher than usual maintenance and other costs. The EBITDA margin of QR-Coal is likely to be approximately 40 per cent to 44 per cent, which makes it more difficult for QR-Coal to sustain the higher gearing levels observed for Aurizon Network and Arc Infrastructure.

In terms of long-term trends, we have already noted that Aurizon Network is overwhelmingly dependent on metallurgical coal, and that Queensland's mines are in a favourable position on the world metallurgical export coal cost curve. It has a relatively strong future growth path, with little stranding risk. However, it is exposed to competition in the world export coal market, which is the primary reason that Standard & Poor's applies a "Strong" business risk to Aurizon Network compared with the "Excellent" rating it applies to regulated energy utilities. While QR-Coal's dependence on thermal coal could be seen as a weakness, its mines' likely positions on the world export thermal coal cost curve (shown by resilience during the 2014-17 decline in coal prices) indicate that stranding risk is also low, assuming New Hope's New Acland mine is approved. However, the lower growth rate (or potential decline) of thermal coal demand, its lower margins, and relatively high transport costs faced on the West Moreton system differentiates QR-Coal from Aurizon Network.

Counterparty risks

We have already noted the strong positions occupied by Aurizon Network's miner counterparties in the world metallurgical export coal cost curve, which reduces counterparty risk. QR-Coal's two miner counterparties, New Hope and Yancoal, have no option but to use its rail track, and have an incentive to maintain / maximise production as long as the thermal coal price is expected to provide positive margin over cost in the long term. Again, we note the continued operations and production of these miners during the years of low thermal coal prices. New Hope and Yancoal are well capitalised, with respective enterprise values of $2.4 billion and $8.1 billion in mid-2018. We expect that both Aurizon Network and QR-Coal will have lower counterparty risk than Arc Infrastructure, where this has been a particular issue noted by Standard & Poor's.[57] With respect to this risk factor, QR-Coal lies closer to Aurizon Network than to Arc Infrastructure.

Take-or-pay contracts

Take-or-pay contracts cover 50 per cent to 60 per cent of Arc Infrastructure's traffic, and a material component of Aurizon Network's traffic. We have assumed in this report that in the West Moreton system long-term take-or-pay contracts will cover close to 100 per cent of its contracted capacity. These contracts, backed by matching contracts with the Port of Brisbane and an above rail haulage business (Aurizon Operations), are a natural outcome of the interdependence of the miners and infrastructure providers. Here again, we consider QR-Coal to lie closer to Aurizon Network than to Arc Infrastructure.

[57] See Standard & Poor's (12 April, 2017), *Brookfield WA Rail Pty Ltd*, p.6 and p.8, which discusses the Memorandum of Understanding (MoU) that Brookfield concluded with Karara Mining Limited (KML), contributing 25 per cent to 30 per cent of Brookfield's revenues, which enabled three year tariff relief based on iron ore prices. As noted above, Brookfield changed its name to Arc Infrastructure in 2017.

Business Risk: Summary

The discussion presented above, is summarised in Table 3.5 below. Our conclusion is that Standard & Poor's would be likely to apply a "strong" business risk rating to QR-Coal as QR-Coal shares more of the low business risk characteristics of Aurizon Network relative to Arc Infrastructure. Like Aurizon Network, QR-Coal is exposed to a world coal export cost curve. QR-Coal is a below-rail operator with strong monopoly power, is supported by a comprehensive and transparent regulatory regime, which is similar to Aurizon Network, but differentiate it from the negotiated agreements framework faced by Arc Infrastructure. We also note that for Standard & Poor's:[58]

> *AUN's [Aurizon Network's] regulatory framework underpins the company's slightly better business risk profile relative to Arc.*

Table 3.5: Business Risk Summary – QR-Coal vs Aurizon Network and Arc Infrastructure comparators

Business Risk	Aurizon Network S&P: Strong	QR-Coal Incenta: Strong	Arc Infrastructure Pty Ltd S&P: Satisfactory
Peer comparison	Regulatory framework underpins the company's slightly better risk profile relative to Arc Infrastructure.	Greater exposure than Aurizon Network to lower margin / more vulnerable thermal coal market, and relatively high transport	Weaker business risk profile than regulated utilities as a result of higher operating risk and greater exposure to volume fluctuations.
Monopoly power	Solid low-risk monopolistic below-rail operator serving all major Queensland coal producers	Monopoly below-rail operator of West Moreton line connecting mines in Surate basin to Brisbane Port	Monopoly below-rail operator in the southern part of Australia, with some operations potentially open to competition from alternative transport modes
EBITDA volatility	Regulatory revenue cap mechanism insulates Aurizon Network from exposure to coal volume fluctautionsExposure to ongoing competitiveness in the Queensland and global coal markets	Regulatory price-cap framework provides less protection against volume risk relative to Aurizon Network. More exposed to weather risk than Aurizon Network or Arc Infrastructure. Only two customers.	Sizable exposure to the volatile iron ore sector. Volumes correlated to import demand, particularly China. Commodities and volatile intermodal traffic each 10-15% of total revenue).More than 50% of revenue is from iron ore from smaller scale high cost
Regulation	Generally supportive regulatory regime, which mitigates volume and counterparty risks.	Generally supportive regulatory regime, which mitigates volume and counterparty risks.	Less robust regulation than Aurizon Network or QR-Coal.
Level and trend of industry margins	Relatively stable margins, determined by operating cost structure, cost of capital and cost efficiencies. Punctuated by regulatory resets and weather events (floods). Long term exposure to competition in world export coal markets (differentiates from 'excellent' business risk of regulated energy utilities).	Relatively stable margins, determined by operating cost structure, cost of capital and cost efficiencies. Punctuated by regulatory resets and weather events (floods). Compared with AN, exposed to greater competition in world export coal markets (ie thermal coal) due to high transport cost. Subject to greater long term substitution by gas and renewables	Less stable margins due to less robust regulation, less take-or-pay contracting, and greater volatility in iron ore markets and agricultural sector (also affected by weather).
Counterparty risks	Regulatory regime mitigates counterparty risks	Regulatory regime mitigates counterparty risks	Counterparty risk relating to Karara Mining (25-30% of forecast revenue) mitigated by letters of credit from larger customers. Exposure to weaker iron ore miners
Take-or-pay contracts	At March 2017 average length of contract signed was just over 7 years	Mines in the West Moreton system have long term take-or-pay contracts covering close to 100% of contacted capacity.	Partly insulated from volume risk via long-dated take-or-pay contracts covering 50-60% of volume. Downside scenario if this percentage fell materially

Source: Standard & Poor's and Incenta

58 Standard & Poor's (1 June, 2018), *Aurizon Network Pty Ltd.*, p.6.

4.5.2 Financial risk profile

Scenarios for credit metrics

We tested several credit metric ratios used by Standard & Poor's, which are FFO/Debt, Debt/EBITDA and FFO / Interest cover using the regulatory model for QR-Coal that was provided to us by the QCA.[59] In Table 3.6 below we present two scenarios based on the benchmark asset betas and gearing that we have identified in chapters 2 and 3 above based on the observed values for regulated energy and water businesses, and tollroads:

- Scenario 1: The benchmark gearing level of 40 per cent, and the regulated energy and water benchmark asset beta of 0.38.
- Scenario 2: The benchmark gearing level of 40 per cent, and the tollroads benchmark asset beta of 0.51.

Credit Metrics

Table 3.6 below shows the key Standard & Poor's credit metrics that are implied by the two scenarios described above.

Table 3.6: QR-Coal credit metrics – scenarios

Scenario 1		2020/21	2021/22	2022/23	2023/24	2024/25	Average	Financial Risk	Credit Rating
FFO/Debt	Gearing 40% & Asset Beta	10.1%	9.1%	8.9%	8.6%	8.5%	9.0%	Significant/Aggressive	BBB/BB+
FFO/Interest	0.38	3.3	3.0	2.9	2.9	2.9	3.0	Intermediate/Significant	BBB+/BBB
Scenario 2		**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**Average**	**Financial Risk**	**Credit Rating**
FFO/Debt	Gearing 40% & Asset Beta	12.0%	10.5%	10.2%	9.9%	9.8%	10.5%	Significant	BBB
FFO/Interest	0.51	3.7	3.3	3.2	3.2	3.1	3.3	Intermediate	BBB+

Source: Queensland Rail and Incenta

We apply Standard & Poor's "Low Volatility" Cash Flow / Leverage Analysis ratios that it applies to both Aurizon Network and Arc Infrastructure, and the "Strong" business risk profile for QR-Coal that we have assessed. We take the calculated average credit metric over the coming regulatory period (Table 3.6), find the implied "Financial Risk Profile" in Table 3.7 below, and cross reference with the "Business Risk Profile" (Strong) in Table 3.8 below.

Our conclusions with respect to each of these scenarios are as follows:

- Scenario 1: The average FFO/Debt ratio of 9.0 per cent is on the borderline of "Significant" and "Aggressive" financial risk, which combined with a "Strong" business risk implies a BBB/BB+ credit rating. It is not clear whether Standard & Poor's would assign either of these credit ratings or a BBB- credit rating. The FFO/Interest ratio implies a borderline "Intermediate/Significant"

[59] WACC assumptions used for each scenario are shown in Appendix B below.

financial risk and a borderline BBB+ and BBB credit rating. While Standard & Poor's places most emphasis on FFO/Debt, the appropriate credit rating is not clearly definable in this case.

- Scenario 2: The average FFO/Debt ratio is 10.5 per cent, which is comfortably within the range for "Significant" financial risk, implying a BBB credit rating. The FFO/Interest cover implies "Intermediate" financial risk and a BBB+ credit rating. As it places most emphasis on the FFO/Debt ratio metric, we believe that Standard and Poor's would assign a BBB credit rating in this case.

Table 3.7: Cash Flow / Leverage Analysis Ratios - "Low volatility" industries.

	Core ratios				Supplementary coverage ratios				Supplementary payback ratios					
	FFO / debt (%)		Debt / EBITDA (x)		FFO / cash interest (x)		EBITDA / interest (x)		CFO / debt (%)		FOCF / debt (%)		DCF / debt (%)	
	From	To	From	To	From	To	From	To	From	To	From	To	From	To
[1] Minimal	35+		< 2		> 8		> 13		> 30		20+		11+	
[2] Modest	23	35	3	2	5	8	7	13	20	30	10	20	7	11
[3] Intermediate	13	23	4	3	3	5	4	7	12	20	4	10	3	7
[4] Significant	9	13	5	4	2	3	2.5	4	8	12	0	4	0	3
[5] Aggressive	6	9	6	5	1.5	2	1.5	2.5	5	8	-10	0	-20	0
[6] Highly leveraged	< 6		> 6		< 1.5		< 1.5		< 5		< -10		< -20	

Source: Standard & Poor's (19 November, 2013), p. 35.

Table 3.8: Standard & Poor's Business and Financial Risk Matrix

		Financial risk profile					
		1 Minimal	2 Modest	3 Intermediate	4 Significant	5 Aggressive	6 Highly leveraged
Business risk profile	1 Excellent	AAA / AA+	AA	A+ / A	A-	BBB	BBB- / BB+
	2 Strong	AA / AA-	A+ / A	A- / BBB+	BBB	BB+	BB
	3 Satisfactory	A / A-	BBB+	BBB / BBB-	BB+ / BB	BB	B+

Source: Standard & Poor's and Incenta analysis

The findings above indicate that for benchmark gearing of 40 per cent, a benchmark BBB credit rating would be indicated if the QCA adopted a benchmark asset beta that was close to the 0.51 estimate for tollroads. However, as the benchmark asset beta adopted by the QCA declines from that benchmark towards the 0.38 estimated for regulated energy and water businesses, the likelihood of a BBB credit rating being obtained is reduced. With an asset beta of 0.38 it would be unclear that a BBB credit rating would be achieved.[60]

In summary, a comparison of the three Australian rail businesses that we have reviewed in detail indicates a:

- BBB+ credit rating for Aurizon Network, which has a "Strong" business risk profile and an "Intermediate" financial risk profile;

[60] Although Standard & Poor's has clear rules to determine the credit rating in border line cases, we understand it is also likely that a regulated utility would be likely to be given the benefit of the doubt and have the higher credit rating assigned.

- BBB credit rating for QR-Coal, which has a "Strong" business risk profile and a "Significant" financial risk profile based on the primary FFO/Debt metric used by Standard & Poor's;[61] and

- BBB credit rating for Arc Infrastructure, which has a "Satisfactory" business risk profile and an "Intermediate" financial risk profile.

One of the financial characteristics differentiating QR-Coal from Aurizon Network and Arc Infrastructure, is that the former has a lower EBITDA margin in the range of 40 per cent to 44 per cent, while the latter two businesses have an EBITDA margin of approximately 65 per cent, and gearing levels that are approximately 60 per cent. For QR-Coal we have determined that the benchmark gearing is 40 per cent.[62] We also note that when the components of the Building Blocks are compared, QR-Coal has a relatively low return of capital component (regulatory depreciation), which distinguishes it from the relatively greater contribution of this component in the case of Aurizon Network and regulated Australian energy businesses. This is likely due to QR-Coal's relatively older asset base.

4.6 Conclusion on benchmark credit rating

Queensland Rail's benchmark credit rating proposal assumed a BBB+ credit rating based on the precedent of Aurizon Network. However, this was proposed together with a 28 per cent gearing ratio, which is much lower than Aurizon Network's benchmark gearing ratio of 55 per cent, which was previously applied to QR-Coal. The financeability of the gearing and credit rating assumptions previously applied to QR-Coal were not tested.

In the present report we have assessed the benchmark gearing level of QR-Coal to be 40 per cent. Our own analysis of the benchmark credit rating draws on Standard & Poor's methodology and the regulatory model that was supplied to us by the QCA. It compares QR-Coal's business and financial risk characteristics to those of Aurizon Network and Arc Infrastructure, which are rated BBB+ and BBB- respectively.

Our conclusion is that a **BBB** credit rating would be indicated for QR-Coal if a benchmark asset beta of 0.51 were applied. This scenario implies a BBB credit rating would be highly likely, but that likelihood would reduce as the benchmark asset beta that was applied approached 0.38. The application of an asset beta of 0.38 would not be clearly BBB rated, as the most important credit metric indicates a credit rating on the border of BBB and BB+. Owing to the desirability of having a clear investment grade credit rating, if an asset beta of 0.38 were applied, a BBB credit rating could potentially be achieved by adjustment to asset lives in order to bring cash flow recovery forward.[63]

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61 As discussed above, this assumes a benchmark asset beta that is at or closer to the 0.51 estimate based on tollroads, than to the 0.38 asset beta estimate based on regulated energy and water businesses.

62 This is the accounting gearing ratio that Standard & Poor's attributed to Aurizon Network in its 2017 report, while the regulatory benchmark gearing is 55 per cent of RAB.

63 As noted above, Standard & Poor's is likely to give the benefit of the doubt to borderline cases where the business is a regulated utility that has a supportive regulatory framework.

A. Industry samples used in first principles analysis

Company name	Bloomberg ticker	Country
Coal mining		
Alliance Resources Partners LP	ARLP US Equity	US
Cloud Peak Energy Inc	CLD US Equity	US
Consol Energy Inc	CNX US Equity	US
New Hope Corp Ltd	NHC AU Equity	Australia
Whitehaven Coal Ltd	WHC AU Equity	Australia
North American Pipelines		
Boardwalk Pipeline Partners LP	BWP US Equity	US
EQT Midstream Partners LP	EQT US Equity	US
TC Pipelines LP	TCP US Equity	US
Kinder Morgan Inc/DE	KMI US Equity	US
Buckeye Partners LP	BPL US Equity	US
Enterprise Products Partnership LP	EPD US Equity	US
Magellan Midstream Partners LP	MMP US Equity	US
Plains All American Pipeline LP	PAA US Equity	US
Sunoco Logistics Partners LP	ETP US Equity	US
ONEOK Partners LP	OKE US Equity	US
Enbridge Inc	ENB CN Equity	Canada
TransCanada Corp	TRP US Equity	US
Tollroads		
Abertis Infraestructuras SA	ABE SM Equity	Spain
ASTM SPA	AT IM Equity	Italy
Atlantia SPA	ATL IM Equity	Italy
Groupe Eurotunnel SE - REGR	GET FP Equity	France
Societa Iniziative Autostradali e Servizi SpA	SIS IM Equity	Italy
Transurban Group	TCL AU Equity	Australia
Atlas Arteria Roads	ALX AU Equity	Australia

Company name	Bloomberg ticker	Country
Regulated Energy		
ALLETE	ALE US Equity	US
Alliant Energy	LNT US Equity	US
Ameren Corp	AEE US Equity	US
American Electric Power	AEP US Equity	US
APA Group	APA AU Equity	Australia
Atco Ltd	ACO/X CN Equity	Canada
Atmos Energy Corp	ATO US Equity	US
AusNet Services	AST AU Equity	Australia
Avista Corporation	AVA US Equity	US
Black Hills Corporation	BKH US Equity	US
Canadian Utilities Ltd	CU CN Equity	Canada
CenterPoint Energy	CNP US Equity	US
Centrica PLC	CNA LN Equity	UK
Chesapeake Utilities Corp	CPK US Equity	US
CMS Energy Corp	CMS US Equity	US
Consolidated Edison	ED US Equity	US
Dominion Resources	D US Equity	US
DTE Energy	DTE US Equity	US
Duke Energy Corp	DUK US Equity	US
Edison International	EIX US Equity	US
El Paso Electric	EE US Equity	US
Emera Inc	EMA CN Equity	Canada
Entergy Corp	ETR US Equity	US
Eversource Energy was NorthEast Utilities NU US	ES US Equity	US
Exelon Corporation	EXC US Equity	US
First Energy Corp	FE US Equity	US
Fortis Inc	FTS CN Equity	Canada
Hawaiian Electric Industries Inc	HE US Equity	US
IDACORP Inc	IDA US Equity	US
MGE Energy	MGEE US Equity	US
National Fuel Gas Company	NFG US Equity	US
National Grid PLC	NG/ LN Equity	UK
New Jersey Natural Gas Co	NJR US Equity	US
NextEra Energy	NEE US Equity	US
NiSource Inc	NI US Equity	US
Northwest Natural Gas	NWN US Equity	US
NorthWestern Corporation	NWE US Equity	US
OGE Energy	OGE US Equity	US
Otter Tail Corp	OTTR US Equity	US
PG&E Corp	PCG US Equity	US
Pinnacle West Capital	PNW US Equity	US
PNM Resources Inc	PNM US Equity	US
Portland General Electric Co	POR US Equity	US
PPL Corporation	PPL US Equity	US
Public Service Enterprise	PEG US Equity	US
SCANA Corp	SCG US Equity	US
Sempra Energy	SRE US Equity	US
South Jersey Industries Inc	SJI US Equity	US
Southwest Gas Corp	SWX US Equity	US
Spark Infrastructure Group	SKI AU Equity	Australia

Company name	Bloomberg ticker	Country
Spire Inc	SR US Equity	US
SSE PLC	SSE LN Equity	UK
The Southern Company	SO US Equity	US
TransCanada Corp	TRP CN Equity	Canada
UGI Corporation	UGI US Equity	US
United Utilities Group PLC	UU/ LN Equity	UK
Unitil Corporation	UTL US Equity	US
Vector Limited	VCT NZ Equity	New Zealand
Vectren Corporation	VVC US Equity	US
WEC Energy Group	WEC US Equity	US
Xcel Energy Inc	XEL US Equity	US
Regulated water		
American States Water Co	AWR US Equity	US
American Water Works co Inc	AWK US Equity	US
Aqua America Inc	WTR US Equity	US
Artesian Resources Corp	ARTNA US Equity	US
California Water Service Group	CWT US Equity	US
Connecticut Water Service Group	CTWS US Equity	US
Middlesex Water co	MSEX US Equity	US
SJW Corp	SJW US Equity	US
York Water Co	YORW US Equity	US
Pennon Group PLC	PNN LN Equity	US
Severn Trent PLC	SVT LN Equity	US
Railways		
Aurizon Holdings Ltd	AZJ AU Equity	Australia
Canadian National Railway Company	CNR CN Equity	Canada
Canadian Pacific Railway Limited	CP CN Equity	Canada
Container Corporation of India Ltd	CCRI IN Equity	India
CSX Corporation	CSX US Equity	US
Daqin Railway Co. Ltd	601006 CH Equity	China
Genessee & Wyoming	GWR US Equity	US
Globaltrans Investment PLC	GLTR LI Equity	Russia
Kansas City Southern	KSU US Equity	US
Norfolk Southern Corporation	NSC US Equity	US
Union Pacific Railroad	UNP US Equity	US

B. WACC assumptions for credit metrics scenario analysis

Parameters	Scenario 1	Scenario 2
Entity (Debt) Credit Rating	BBB/BB+	BBB
Risk free rate (10-yr.)	2.28%	2.28%
Gearing/Capital structure	**40%**	**40%**
Market Risk Premium	6.5%	6.5%
Asset Beta	**0.38**	**0.51**
Debt Beta	0.12	0.12
Corporate Tax Rate	0.3	0.3
Gamma (tax adjustment)	0.484	0.484
Equity Beta	0.53	0.73
Cost of Equity (10-yr.) ke	5.7%	7.0%
Equity margin	3.4%	4.7%
Debt Risk Premium/Margin (excl. allowances)	2.28%	2.28%
Debt transaction costs allowance	0.11%	0.11%
Interest rate swap costs - refinancing risk allowance		
Total Debt Margin (incl. allowances)	2.39%	2.39%
Cost of Debt kd	4.67%	4.67%
WACC - post-tax nominal 'WACC3'	**5.29%**	**6.08%**

Source: QCA and Incenta analysis. Note: To test the BBB+ credit rating band, a cost of debt of 4.44 per cent was applied.

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