ANGLO AMERICAN

12 February 2010

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The Queensland Competition Authority
Level 19, 12 Creek Street
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By Delivery

Dear Sir or Madam,

Submissions on the Queensland Competition Authority's assessment of QR Network's 2009 Draft Access Undertaking

We refer to the Queensland Competition Authority's (**Authority**) invitation for submissions on its assessment of QR Network's 2009 Draft Access Undertaking (**UT3**).

In response to the Authority's invitation, please find **enclosed** two copies of a submission to the Authority by Anglo American Metallurgical Coal Pty Ltd (**Anglo American**) in relation to UT3.

An electronic version of the submission will be forwarded to rail.submissions@qca.org.au.

Anglo American welcomes any opportunity to discuss its submissions in further detail with the Authority.

Yours faithfully,

[redacted]

Mike Allen
Marketing and Transportation

Submission to the Queensland Competition Authority

QR's Rail Access Undertaking (UT3)

Anglo American Metallurgical Coal Pty Ltd

12 February 2010

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1. Executive Summary

Anglo American Metallurgical Coal Pty Ltd (**Anglo American**) supports the draft decision of the Queensland Competition Authority (**QCA**) and makes the following submissions:

(a) the Weighted Average Cost of Capital (**WACC**) remains too high given that QR Network is subject to a maximum revenue cap which operates as both a maximum and a guarantee of revenue for nearly all of its regulated revenue. Accordingly, the nominal post tax WACC should be no more than 7.7 per cent based on a maximum equity beta of 0.27 gearing of 65% and a better credit rating.

(b) there is a negligible risk of asset stranding given the regulated guaranteed revenue, take or pay contracts, medium and long term export prospects for the Queensland industry and the fact that the original Depreciated Optimised Replacement Cost (**DORC**) established for the network in 2001 did not fully take into account past user capital contributions;

(c) the definition of Major Project should be clarified and the capital expenditure threshold should be raised to $750 million and indexed by a suitable capital or construction deflator as the unindexed $300 million is an extremely low threshold;

(d) the Prescribed Factors should be amended to ensure consistency with other provisions of UT3 and to remove those Prescribed Factors which would be open to manipulation by QR Network;

(e) it is essential that Access Conditions for Major Projects be subject to a requirement that they are reasonable and required only to the extent that it is necessary to address the risk of asset stranding;

(f) clause 7.3.3 of UT3 should be amended to clarify that in circumstances where a capacity expansion can be reasonably expected to provide the existing regulated WACC set by the QCA, QR Network is required to undertake the capacity expansion, subject to necessary protections for QR Network. This amendment is necessary as it is the only way to restrain the exercise of market power by QR Network where it refuses to build strategically important rail infrastructure unless coal customers agree to pay additional fees to ensure that QR Network obtains a return on investment which is significantly higher than the return which QR Network would be entitled under the undertaking;

(g) the capacity resumption test in UT2 should not be modified as it is unnecessary for it to be easier for QR Network to trigger a resumption in circumstances where QR Network's risks are virtually eliminated by the existence of the revenue cap and 100% take or pay contracts and the prospects of the Queensland coal industry;

(h) there should be no general principle that socialisation of costs should always apply and that the QCA should consider the socialisation of costs on the merits each time the issue applies. For example, if an expansion is undertaken where the existing user obtains no benefit but will have to pay significantly higher tariffs and the expansion is for a higher value product such as metallurgical coal any existing thermal coal mines may not be viable at the higher transportation costs. Therefore, the words at page 31 of the draft decision that it would "in general, be inequitable and inefficient to lock in the benefits of a lower tariff for some customers but not others" should be removed;

(i) there should be no limitation on the grounds upon which a decision of QR Network can be challenged in respect of the Capacity Allocation Process particularly in light of the potentially significant ramifications to an access seeker if they fail to obtain capacity to a Major Project. For example, the limited grounds of review may not enable an unsuccessful Interested Party to challenge a mistake such as QR Network incorrectly deriving the Net Present Value (**NPV**) of a requested access, even where that mistake resulted in the access seeker failing to obtain any capacity;

(j) the QCA should introduce a specific prohibition on Access Conditions which have the effect of restricting the ability of access seekers or users to raise a dispute under or in relation to UT3; and

(k) in light of the imminent privatisation of QR Network the QCA should introduce tight timeframes in respect of the resolution of any access disputes. This would avoid some of the issues which arose in the disputes in respect of Dalrymple Bay Coal Terminal and is consistent with current regulatory practice including the imminent introduction of binding time limits into the access regime in the Trade Practices Act (see the *Trade Practices Amendment (Infrastructure Access) Bill 2009*).

Any capitalised terms in this submission which are not defined in the submission are to be read as a reference to the definition in UT3.

2. Reference Tariffs

Attached is a report by Dr John Fallon of Economic Insights addressing a number of specific economic issues including the WACC parameters. The key points of the report are that:

(a) QR Network is subject to a maximum revenue cap which operates as both a maximum and a guarantee of revenue for nearly all of its costs for the access period;

(b) This regulatory arrangement virtually eliminates volume risk for assets within the regulatory period, although there can be some lags in securing the specified revenue;

(c) Take or pay contracts further minimize the risk of asset stranding for QR Network;

(d) Export prospects for the Queensland coal industry are strong for a very long period;

(e) A significant adjustment to the beta proposed by the QCA for QR Network's cost of capital is required to properly recognize the impact of the total revenue cap and the absence of volume risk;

(f) The beta for the revenue covered by the guaranteed revenue cap should be approximately zero;

(g) Very few firms have similar guaranteed maximum revenue provisions to QR Network and even fewer are share market listed;

(h) Few energy sector firms have anywhere near the degree of revenue certainty provided by the regulatory provisions applying to QR Network;

(i) The sample average from the 9 energy businesses used by the Allen Consulting Group is not suitable for establishing a benchmark beta for QR Network;

(j) A minimum credit rating of A grade and gearing of 65 per cent is appropriate for QR Network given its relative revenue certainty;

(k) Accordingly, a nominal, post tax vanilla WACC of no more than 7.7 per cent (based on an equity beta of 0.27 and gearing of 65 per cent) is appropriate for QR Network rather than the figure of 9.41 per cent adopted in the QCA draft report;

(l) It is not necessary to adopt a rolling 20 year life to calculate depreciation charges given the minimal risk of asset stranding for QR Network over a much longer time frame;

(m) Depreciation over a much longer time frame is more appropriate on both economic efficiency and fairness grounds;

(n) Where existing users do not clearly benefit from a rail infrastructure expansion they should not be required to pay for the expansion provided it is reasonably feasible to establish differential charging arrangements; and

(o) There should be no general principle that ‘full socialisation’ of infrastructure expansion costs should always apply.

3. Treatment of Major Projects

QR Network has proposed the introduction of a concept of "Major Projects" for the following purposes:

(a) the specification that pre-feasibility investigations either be underwritten by Access Seekers (or their Customers) or the prudency of scope for those costs be pre-approved as capital expenditure if the Major Project relates to coal carrying Train Services (see clause 4.8 of UT3);

(b) the introduction of a new and separate process for requesting access to capacity created by a Major Project including a process for allocating that capacity known as the "Capacity Allocation Process" (see clause 4.8 of UT3); and

(c) the introduction of a right to impose special Access Conditions on Major Projects (see clause 6.5.2 of UT3).

Anglo American accepts that special provisions are needed in UT3 to deal with significant projects.

There are a number of issues in respect of Major Projects which need to be considered:

(a) the definition of Major Project;

(b) the Capacity Allocation Process;

(c) the nature and extent of Access Conditions which can be imposed on Major Projects; and

(d) the dispute resolution process.

3.1 Definition of Major Project

With the exception of the monetary threshold level, Anglo American supports the draft decision of the QCA to amend the definition of "Major Project" to:

(a) explicitly state that a Major Project will create additional capacity;

(b) relate to a new railway corridor (that is, it does not relate to the CQCR mainline); and

(c) clearly relate to a single Major Infrastructure Enhancement relating to the expansion of an existing, or a greenfield development of a new, loading or unloading facility.

These amendments are necessary to reduce the ability of QR Network to aggregate a number of smaller projects of incremental expansion into one Major Project. This is necessary because in respect of smaller projects of incremental expansion, Access Conditions are not reasonably required to protect any risks taken by QR Network (for example Access Conditions would not be necessary to address any asset stranding risk).

If the QCA retains clause 6.5.2 of UT3 in its current form (see below for discussion on this issue) then Anglo American believes that the definition of Major Project as drafted by the QCA should be slightly amended as follows:

(a) the capital expenditure threshold should be set at $750 million at the beginning of the regulatory period and indexed annually by the most appropriate building and construction deflator. A threshold of $300 million is too low. Although there is an indirect protection in the sense that a project relating to the establishment of a new corridor is likely to exceed $750 million the definition does allow for "ancillary" Infrastructure Enhancements to be included in the calculation of the capital expenditure threshold. This amendment is also desirable in light of the fact that there are other flow-on implications of the capital expenditure threshold in the definition of Major Project being too low, including the fact that clause 4.8(b) of UT3 would allow QR Network to reject requests for access where the capacity cannot be provided in the absence of QR Network investing in a Major Project. A low threshold of $300 million would lead to most, if not all, expansions falling under the definition of Major Project and potentially outside the regulatory environment;

(b) it should be made clear that the ancillary Infrastructure Enhancements must relate directly to the creation of the new rail infrastructure for the New Corridor. This is necessary because as currently drafted the combination of the definition of Major Project and clause 6.5.2 would allow Access Conditions to be imposed on the ancillary Infrastructure Enhancements and this is only appropriate where the ancillary Infrastructure Enhancements are "directly" related to the creation of the new rail infrastructure for the New Corridor. The phrase "in connection with" the creation of the new rail infrastructure for the New Corridor is too broad. Similarly

the word "projects" should be removed to ensure that minor "projects" that relate generically to the Major Project are not artificially included in the scope of a Major Project; and

(c) the phrase "is reasonably expected to increase the value of assets in the regulatory asset base" should be amended to read "if included in the regulatory asset base, would be reasonably expected to increase the value of assets in the regulatory asset base". This amendment is desirable for clarity because clause 6.5.2(d)(ii) of UT3 provides for the possibility that where an Access Condition results in QR Network earning revenue in addition to the on-going access charge then QR Network is required to negotiate a separate agreement as outlined in clause 6.5.2(d)(i) or exclude the separately funded cost components from the regulatory asset base. In the latter case there may not be any increase in the value of the assets in the regulatory asset base and therefore the project would not technically satisfy the definition of a Major Project.

Recommendation - Definition of Major Project

The definitions relating to a Major Project should be amended as follows:

Major Project means a program of related capital expenditure that when complete:

(i) if included in the regulatory asset base, would be ~~is~~ reasonably expected to increase the value of the assets in the regulatory asset base by at least $~~300~~ 750 million; and

(ii) will give rise to or result in additional capacity by the creation of new R~~r~~ail I~~i~~nfrastructure for a New Corridor which, at the time immediately prior to the commencement of that program of capital expenditure, will not be ~~comprised~~ included in an ~~i~~Individual ~~c~~Coal ~~s~~System; and

(iii) where demand for that additional capacity was primarily generated by a single Major External Development.

A Major Project which satisfies the above definition will also include any ancillary Infrastructure Enhancements ~~projects~~ in relation to an existing Individual Coal System which relates directly to ~~undertaken in connection with~~ the creation of new Rail Infrastructure for a New ~~Rail~~ Corridor.

Major External Development means the announcement of:

(i) an expansion of an existing loading or unloading facility; or

(ii) a ~~G~~greenfield development of a new loading or unloading facility by an entity other than QR Network or a QR party, which increases, or facilitates the increase of, the demand for Access for coal carrying train services.

Where a New Corridor is a non-existing CQCR mainline.

3.2 Capacity Allocation Process

QR Network has proposed the introduction of a new and separate process for requesting access to capacity created by a Major Project. This includes a process for allocating that capacity known as the "Capacity Allocation Process". In particular, QR Network proposed:

(a) the ability to reject applications for access where the request for access is for capacity which cannot be provided in absence of QR Network investing in a Major Project (clause 4.8(b) of UT3);

(b) that QR Network be able to develop a Capacity Allocation Process and seek submissions from Interested Parties (clause 4.8(e) of UT3); and

(c) interested parties who are not satisfied with the Capacity Allocation Process can challenge that process if more than 40% of the Interested Parties by number are not satisfied (clause 4.8(g) of UT3).

Anglo American strongly supports the draft decision of the QCA to require an open and transparent process for the allocation of capacity, the introduction of criteria to be applied in the allocation of capacity and the removal of the requirement that there be 40% of Interested Parties who wish to challenge the Capacity Allocation Process before a challenge can be mounted.

All of these amendments are necessary to ensure that QR Network does not apply criteria which are either not consistent with UT3 or are inappropriate. The ability to challenge an unfavourable decision by QR Network is also necessary to ensure the Capacity Allocation Process is correctly undertaken.

Anglo American supports the drafted amendments in Appendix 4 subject to the below comments.

Prescribed Factor - Interested Party able to Obtain Customers for the Product Railed

It is inappropriate for QR Network to be able to rank expressions of interest on the basis of the prospects of the Interested Party being able to obtain customers for the product to be railed as currently set out in clause 4.8.4(b)(ii) of UT3.

This formulation of the Prescribed Factor would enable QR Network to request what is highly confidential sales information from coal companies. It would also involve QR Network undertaking a subjective analysis of the various sales contracts and sales processes of the various coal companies.

This formulation of the Prescribed Factor is particularly inappropriate given QR Network is not subject to the risk that a coal company is unable to find a customer because:

(a) QR Network will require 100% take or pay contracts in respect of any new Major Project of at least 15 years length; and

(b) QR Network has a revenue cap which eliminates volume risk in respect of AT_2 - AT_5 and whilst AT_1 may be subject to some volume risk, this risk is very low in light of the fact that the AT_1 maintenance costs are variable costs (and variable costs obviously have low volume risk because if the volume is not transported and most of the maintenance costs will not be incurred). In this regard, it should be noted that the AT_1 costs represent less than 10% of maintenance costs which means that they represent less than 2% of allowable revenues.

Anglo American believes that the drafting of this Prescribed Factor should be consistent with the requirements in UT3 which allow QR Network to cease negotiations on access where it is of the reasonable opinion that the access seeker has no reasonable likelihood of utilising access at the level sought (see clause 4.6(a)(iii) and 4.6(c) of UT3). These provisions provide that QR Network, in forming a conclusion as to whether an access seeker has no reasonable likelihood of utilising access at the level sought, may relevantly take into account the following factors:

(a) whether the access seeker has secured or is reasonably likely to secure the rights required to leave the QR Network rail network in order to unload at its destination, for instance, port capacity or capacity to unload at a power station; and

(b) whether the access seeker (if they are seeking to be an access holder and not an operator) has secured or is reasonably likely to secure a rail haulage agreement required to operate the Train Services the subject of the Access Application.

There is no compelling reason for the Capacity Allocation Process to be inconsistent with these provisions of UT3 by introducing a highly subjective factor relating to ability to obtain sales. This is particularly so where QR Network carries no risk and the information relating to sale contracts is extremely confidential and any disclosure of that information to the market generally would result in a significant commercial disadvantage to the company whose information is disclosed. The disclosure of confidential sales information could also raise competition issues under the Trade Practices Act.

Prescribed Factor - Interested Party able to Obtain Port Access and Rail Haulage

The current formulation of this Prescribed Factor allows too much discretion to QR Network in ranking expressions of interest.

Anglo American acknowledges that it may be appropriate for QR Network to consider whether an Interested Party is reasonably likely to secure access to port facilities and rail haulage. However, Anglo American believes that once QR Network has formed the conclusion that the Interested Party is reasonably likely to obtain port access and rail haulage then QR Network should not be quantifying the "prospects" and ranking on that basis. It introduces an element of discretion and subjectivity which is undesirable in the Capacity Allocation Process.

Therefore, Anglo American believes that the Prescribed Factor should be expressed as requiring QR Network to act reasonably in considering whether an Interested Party is likely to secure access to port and rail haulage and that consideration is limited only to the likelihood of securing access to port and rail haulage.

Prescribed Factor - Net Present Value

It is inappropriate to allow QR Network to allocate capacity on the basis of the net present value of each expression of interest.

There are likely to be a number of difficult issues which arise in respect of the application of this as a Prescribed Factor, including:

(a) there will be difficulties in access seekers being able to assess whether QR Network has derived the correct net present value (**NPV**) and, in particular, whether QR Network has applied the correct discount rate and it will be almost impossible for access seekers to assess whether this has been done consistently across all expressions of interest;

(b) the Prescribed Factor may be open to manipulation by QR Network to enable QR Network to achieve a rate of return which would be higher than it would otherwise be entitled (by creating a tension between the access seekers to offer terms with the highest NPV to ensure they obtain capacity); and

(c) the presence of this as a Prescribed Factor may provide an incentive for QR Network to under-invest because QR Network would have an incentive to propose an expansion which is not likely to create sufficient capacity for demand. The incentive would arise because if QR Network proposes an expansion which is not likely to create sufficient capacity for demand then access seekers are likely to compete to offer terms with the highest NPV and QR Network would have an incentive to take advantage of that as described in paragraph (b) directly above. It is noted that the incentive to restrict output is a fundamental feature of a monopoly and any restriction on output is the fundamental driver of an allocative efficiency loss for a monopolist.

Anglo American believes that this is inappropriate as a "default" Prescribed Factor (that is, a Prescribed Factor which does not require QCA approval). It is appropriate that if QR Network wishes to allocate capacity for a particular Major Project on the basis of the NPV of the expressions of interest then it should seek the approval of the QCA.

The Prescribed Factor should be removed from the list.

Prescribed Factor - Length of Contract

Similarly, there is too much discretion in respect of the length of contract sought. This provision should be consistent with the provisions which allow priority only to be given to access agreements in excess of 10 years (see, for example, clause 7.3.5(d)(ii)).

Prescribed Factor - Amount of Capacity

It is inappropriate for QR Network to allocate capacity on the basis of the amount of capacity sought by the access seeker.

This Prescribed Factor would discriminate heavily in favour of access seekers who are large companies and will leave access seekers who are smaller companies in a position where they are less likely to obtain capacity.

This is inconsistent with the fundamental principle of the undertaking set out in clause 2.2(b)(v)(C)(1) of UT3 that access seekers should be treated in a "fair, consistent and non-discriminatory manner".

The Prescribed Factor should be removed from the list.

Conclusion on Prescribed Factors

Anglo American believes that QR Network should not be given the discretion to allocate capacity based upon criteria which could be manipulated to QR Network's benefit or are discriminatory between the access seekers.

QR Network should be able to allocate capacity based upon whether the access seeker is willing to accept reasonable Access Conditions and whether they are reasonably likely to obtain port access and rail haulage. If, after application of these criteria, there is still insufficient capacity then it should be allocated upon a clear and fair basis, such as capacity being reduced proportionately from the volumes set out in the expressions of interest.

Limitations on Grounds of Appeal

There should be no limitation on the grounds upon which a decision of QR Network can be challenged as currently set out in clause 4.8.4(e).

The grounds set out in clause 4.8.4(e) are extremely limited and include only the failure to consider a Prescribed Factor, taking into account a factor that is not a Prescribed Factor and that the decision of QR Network was "so unreasonable that no reasonable decision-maker in its position could have made it".

These grounds of challenge are based upon three of the judicial review grounds of challenge. The third ground of challenge (that is, that the decision of QR Network was "so unreasonable that no reasonable decision-maker in its position could have made it") is based upon the decision of *Associated Provincial Picture Houses Limited v Wednesbury Corporation* [1948] 1 KB 223 and is known as "Wednesbury unreasonableness". The test of Wednesbury unreasonableness has been found to require proof that the decision was:

> "so outrageous in its defiance of logic or of accepted ... standards that no sensible person who had applied his mind to the question to be decided could have arrived at it"[1]

Clearly, a high level of "unreasonableness" is required before the ground of challenge will be successful. In the circumstances where there is insufficient Available Capacity to a Major Project (which is likely to be strategically very important to access seekers and their customers) such limited grounds of review are undesirable. Such limited grounds of review may not enable an unsuccessful Interested Party to challenge a mistake such as QR Network incorrectly deriving the NPV of a request for access, even where that mistake resulted in the access seeker failing to obtain any capacity.

Recommendation - Capacity Allocation Process

Clause 4.8.4 should be amended as follows:

(b) If insufficient Capacity will be created by the proposed Major Project to satisfy the requests for Access of each Interested party, QR Network shall reasonably determine which Interested Parties are allocated Capacity having regard to the following factors:

(i) the extent to which each Interested Party has complied with and/or indicated it will comply with the Access Conditions required by QR Network;

(ii) that QR Network reasonably considers that an Interested Party is unlikely to be able to utilise the capacity sought taking into account:

A. whether the Interested Party has secured or is reasonably likely to secure the rights required to unload at the relevant destination, for instance, port capacity;

B. whether the Interested Party has secured or is reasonably

[1] *Council of Civil Service Unions v Minister for the Civil Service* [1985] 1 AC 374 at 410.

likely to secure any necessary rail haulage agreement; and

~~the prospects of each Interested Party being in a position to utilise the Capacity sought (including obtaining customers for the product to be railed, access to an unloading facility such as a port, and haulage arrangements);~~

(iii) ~~the net present value of each Interested Party's request for Access to QR Network;~~

(iv) whether the request for Access is for a term of at least 10 years,~~the length of contract sought by each Interested Party; and~~

(v) ~~the amount of Capacity sought by each Interested Party,~~

(each being a "Prescribed Factor").

(e) Within fifteen Business Days after being given a notice pursuant to Clause 4.8.4(d), an Interested Party may refer the matter to the QCA for determination as a Dispute in accordance with Clause 10.1.4. ~~, but only the grounds that: ...~~

(f) If either:

(i) an Interested Party refers a matter to the QCA pursuant to Clause 4.8.4(e); or

(ii) a dispute is raised in respect of an Access Condition,

QR Network must not proceed with the Capacity Allocation Process until the dispute has been finally determined.

3.3 Access Conditions for Major Projects

QR Network has proposed that the use of Access Conditions be expanded into areas that were prohibited under UT2 and, in particular, allow the use of Access Conditions in respect of the funding of Major Projects.

Anglo American supports the draft decision of the QCA to require amendments to clause 6.5.2 to:

(a) limit the period of time over which rebates may be payable to the period of time of the asset lives;

(b) replace the phrase "presumed not to be reasonably required" with "deemed not to be reasonably required"; and

(c) introduce a requirement that the division of responsibility for the Access Conditions between the first party and subsequent parties is equitable.

The draft decision of the QCA concludes at page 154 that clause 6.5.2 of UT3 does not give QR Network an unfettered freedom to impose Access Conditions in the following terms:

> "In spite of this, QR Network does not have unfettered freedom to impose those conditions [Access Conditions]. In particular, QR Network's conduct is constrained by the specification in the introductory clause of the definition that access conditions are to `mitigate QR Network's exposure to the financial risks associated with providing Access for an Access Seeker's proposed Train Services'. Therefore, QR Network could not impose an onerous access condition that did not reflect its actual costs or risks..."

Anglo American accepts that Access Conditions may be appropriate in respect of any particular Major Project. However, Anglo American believes that these Access Conditions must be reasonable and required only to the extent that it is necessary to address the risk of asset stranding. This is consistent with the current undertaking which operates so that all Access Conditions must be reasonable (see clause 6.5.2(a) of UT2) and that Access Conditions are deemed to be unreasonable where the risk of stranding is not material (see clause 6.5.2(c)(i) of UT2).

Anglo American is of the view that the amendments required by the QCA to clause 6.5.2 do not sufficiently protect access seekers and users from unreasonable Access Conditions. This arises from an ambiguity in the operation of clauses 6.5.2(a), (b) and (c) and the definition of Access Conditions in UT3.

Clause 6.5.2(a) provides that QR Network may require an access seeker to agree to Access Conditions to the extent that this is reasonably required in order to mitigate QR Network's exposure to the financial risks associated with providing access for the access seeker's proposed train service. Importantly, clause 6.5.2(a) contains an important protection in requiring that Access Conditions be "reasonably" required.

Clause 6.5.2(b) deems Access Conditions to be reasonably required where QR Network cannot provide the access sought unless it invests in a Major Project. The effect of this clause is that an Access Condition which is imposed in respect of a Major Project is deemed to be reasonably required. The definition of "Access Condition" does not affect this outcome because whilst it does define an Access Condition as conditions "that mitigate QR Network's exposure to the financial risks associated with providing access" it does not contain any notion that the condition must be reasonably required.

Clause 6.5.2(c) contains an important protection in respect of Access Conditions because it provides that Access Conditions are deemed not to be reasonably required where the Infrastructure Enhancement is likely to be used by a number of users such that the risk of QR Network being unable to recover the costs is not material. It is this protection which has the effect of limiting Access Conditions to the circumstances where there is a risk that assets will

be stranded. This protection will not apply to Major Projects by virtue of the fact that clause 6.5.2(c) is stated to be "subject to Clause 6.5.2(b)" which means that if an Access Condition is imposed on a Major Project it is deemed reasonable under clause 6.5.2(b)(iii) and clause 6.5.2(c) will have no operation.

Therefore, if QR Network imposes an Access Condition on a Major Project and states that the Access Condition is necessary to mitigate its financial risks this will deemed to be reasonably required. Access seekers and users will have no method of challenging QR Network's position on the basis that the Access Condition is unreasonable. In fact, access seekers and users will have no legal rights unless they can prove that the condition imposed does not fall within the definition of Access Condition which will be difficult as an assertion by QR Network that the condition is required to mitigate financial risk will be extremely difficult to refute, particularly where the definition does not contain any element of reasonableness. The definition of Access Condition also does not contain any limit on the "financial risks" that QR Network may recover and will have the effect that Access Conditions in respect of Major Projects may be far broader than protecting QR Network from the risk of asset stranding.

Recommendation - Access Conditions for Major Projects

Clause 6.5.2 should be amended as follows:

(b) For the purposes of Clause 6.5.2(a), Access Conditions are deemed to be reasonably required:

(i) where:

A. QR Network is to develop Infrastructure Enhancements (for example, a new branch line or increasing the height of tunnels to accommodate a single Customer's taller than usual trains);

B. there will be no more than one Customer using those Infrastructure Enhancements; and

C. those Infrastructure Enhancements would not be required had that Access Seeker not sought Access for its Train Services; or

(ii) if QR network requires those Access Conditions pursuant to Clause 6.5.2(e)(ii). ; or

~~(iii)where QR Network cannot provide the Access sought unless it invests in a Major Project.~~

(c) For the purposes of Clause 6.5.2(a) ~~and subject to Clause 6.5.2(b)~~, Access Conditions are presumed not to be reasonably required where QR Network is to construct Infrastructure Enhancements:

(i) that are likely to be used by a number of Customers, Access Seekers or Access Holders such that QR Network's risk of being unable to recover the costs of the Infrastructure Enhancements if any one or more of those Customers, Access Seekers or Access Holders ceases to require all or part of

the relevant Train Services is not material; or

(ii) that are for the purposes of increasing Capacity for the operation of References Train Services and that will form part of the Central Queensland Coal Region Mainline ~~except where the infrastructure Enhancements is part of a Major Project~~. [These words have been deleted because they are unnecessary in light of the amendments to the definition of Major Project which mean that a Major Project cannot relate solely to increasing capacity on the CQCR mainline.]

The amendments as suggested will operate so that an Access Condition can be imposed upon a Major Project but that the Access Condition must be reasonable and cannot be imposed if there is an immaterial risk of asset stranding. Anglo American believes that this is an appropriate balance between the interests of QR Network and the access seekers and users.

3.4 Dispute Resolution Process

QR Network has sought to limit the ability of Interested Parties to challenge the Capacity Allocation Process in respect of Major Projects to circumstances where more than 40%, by number, of Interested Parties are not satisfied with the proposed Capacity Allocation Process.

The QCA has not accepted QR Network's proposed 40% materiality threshold for the dispute resolution process (see draft decision 4.3). QR Network in its Statement of Regulatory Intent (February 2010) has rejected the position of the QCA in respect of the materiality threshold for the dispute resolution process.

Anglo American is strongly of the view that it is inappropriate for there to be no means for an individual coal producer to challenge a significant process such as the Capacity Allocation Process unless they are able to convince 40% of other coal producers or users to participate in that challenge. Such a restriction could have anomalous results. For example, if there were 10 users of infrastructure being built as a Merger Project and the Capacity Allocation Process allocated capacity to only 9 users, the tenth user who received no capacity could not by themselves challenge the decision of QR Network and commercially is unlikely to convince the users who obtained capacity to join in a challenge.

Therefore, Anglo American strongly supports draft decision 4.3 of the QCA to require QR Network to delete clause 4.8(g) of UT3.

4. Capacity Expansions

QR Network has sought to amend clause 7.3.3 of UT3 to clarify that QR Network will undertake infrastructure enhancements only if QR Network can commercially justify such projects.

Anglo American supports the draft decision of the QCA to require QR Network to provide written justifications for a decision not to proceed with a particular project.

However, Anglo American believes that clause 7.3.3 of UT3 should be amended to clarify that, in circumstances where the capacity expansion can be reasonably expected to provide the existing regulated WACC set by the QCA, QR Network is required to undertake the capacity expansion, subject to necessary protections for QR Network.

This amendment is necessary to restrain the exercise of market power by QR Network and ensure that the operation of the undertaking is not undermined by QR Network refusing to undertake necessary capacity expansions and extensions of the network unless access seekers and users pay a rate of return higher than the regulated rate of return.

The importance of this amendment is evident with a recent negotiation between QR Network and a number of coal producers in respect of the Goonyella Abbott Point Expansion (**GAPE**). QR Network refused to build what is considered to be strategically important rail infrastructure linking the Goonyella System with the port at Abbott Point (known as the northern missing link) unless the coal customers agree to pay additional fees to ensure that QR Network obtains a return on investment which is significantly higher than the return which QR Network would be entitled under the undertaking. QR Network, as part of its negotiation of the Access Conditions applicable to GAPE, has required the coal companies to sign a deed that provides for the GAPE Fee which is significantly above the normal rate of return and:

(a) requires the coal companies to agree that they will not challenge the GAPE Fee (which would, for example, preclude any challenge that the GAPE Fee is an unreasonable Access Condition); and

(b) requires the users to agree that they will not make a submission to any regulator which would impact upon the GAPE Fee.

Even if QR Network had not limited the right of coal producers to challenge the GAPE Fee, any challenge by the coal producers on the basis that the GAPE Fee is an unreasonable Access Condition. This course of action will have no practical benefit to the coal producers because, even if the coal producers were successful in establishing that the GAPE Fee is an unreasonable Access Condition, QR Network could continue to refuse to build the infrastructure unless the GAPE Fee was paid. Therefore, the Access Condition regime contains no protection for access seekers and users unless there is also a requirement on QR Network to undertake the capacity expansion or extension.

The QCA has the power to make these amendments. Section 137 of the *Queensland Competition Authority Act 1997* (Qld) (**QCA Act**) provides that an access undertaking may

contain "terms relating to extending the facility". In this context "extensions" would include "expansions". The restrictions contained in section 119 of the QCA Act in respect of the QCA only being able to make an access determination requiring the extension of the facility where the QCA imposes a requirement on a person other than the facility owner to pay the costs of extending the facility do not apply. The restrictions do not apply because they relate to arbitrations of access disputes where there is no access undertaking. In any event, the access seekers and users will be paying for the extension/expansion through the Reference Tariffs.

Recommendation - Capacity Expansions

Clause 7.3.3 should be amended as follows:

> QR Network will undertake Infrastructure Enhancements to create sufficient Available Capacity to provide Access Rights sought by an Access Seeker unless the requirement to undertake the Infrastructure Enhancements is unreasonable or uneconomic, having regard to the following:
>
> (a) the actual or anticipated long-term demand for Access; and
>
> (b) the costs of the Infrastructure Enhancements.
>
> For the purposes of clause 7.3.3 the Weighted Average Cost of Capital established by the QCA will be deemed to be an adequate economic return such that if QR Network will recover the Weighted Average Cost of Capital set by the QCA then the Infrastructure Enhancements will be deemed to be reasonable and economic unless QR Network can prove to the contrary.
>
> ~~, if QR network reasonably considers that its expected net additional revenue less any expected costs associated with the Infrastructure Enhancements, is sufficient to commercially justify QR Network undertaking the Infrastructure Enhancements (including QR Network's incurring of those costs and exposure to financial and other risks).~~

5. Capacity Resumption Test

QR Network has proposed to significantly tighten the trigger for the resumption of capacity. In particular, QR Network has proposed that the test in UT2 be modified to permit the resumption of capacity where an Access Holder does not:

(a) for cyclic traffic, operate at least 90 percentage points of the Train Services allowed under its Train Service Entitlement for each of four (4) consecutive quarters; or

(b) for Timetabled Traffic, operate a Train Service on a Scheduled Train Path, for seven (7) or more (not necessarily consecutive) times out of any twelve (12) consecutive occasions on which that particular Scheduled Train Path exists.

The draft decision of the QCA requires QR Network to amend clause 7.3.6 such that the resumption trigger of 90% for cyclic traffic applies over a year rather than in each of 4 consecutive quarters as currently drafted.

Anglo American is concerned by the changes in the capacity resumption test. As set out in the original submission of the Queensland Resources Council there are a variety of reasons that an access seeker may wish to hold capacity greater than their immediate requirements including:

(a) an access seeker wanting to hold capacity for risk mitigation purposes;

(b) an access seeker's ability to utilise capacity could relate to constraints in the coal supply chain; and

(c) an access seeker can require capacity that is not immediately required but could be used in the future for a committed capacity expansion.

In circumstances where QR Network's risks are virtually eliminated by the existence of the revenue cap and 100% take or pay contracts, it is unnecessary for the capacity resumption trigger to be easily triggered and indeed raises the question of whether a capacity resumption trigger is necessary at all. Further, given that logistics chains do not operate at 100% of name plate capacity continuously, it is arguable that under utilisation of contract capacity by an individual access holder should not necessarily trigger a resumption of capacity as it is reasonable for an access holder to seek more capacity then they need to deal with the fact that coal train efficiency is less than name plate capacity.

To the extent that it is desirable for the coal chain as a whole to maximise throughput, this issue should be dealt with by having an easy and transparent process to allow users to trade capacity and not by a capacity resumption process.

Anglo American suggests that the capacity resumption trigger either be removed altogether or, alternatively, the current capacity resumption test in UT2 be retained. Anglo American believes that there is no justification for lowering the trigger for the resumption of capacity. In light of the fact that Anglo American believes that to the extent it is desirable to maximise throughput the issue should be dealt with by having an easy and transparent transfer process Anglo American suggests that Decision 7.9 (page 210 of the draft decision) be amended to make it clear that Access Holders may reallocate weekly or daily train paths as a capacity transfer. The QCA should also set out a timeframe within which QR Network must respond to the issues raised by the QCA in Decision 7.9.

6. Socialisation of Costs

At page 31 of the draft decision of the QCA, the QCA formed the conclusion that it would "in general, be inequitable and inefficient to lock in the benefits of a lower tariff for some customers but not others".

Anglo American believes that in circumstances where a current user does not require any further capacity it would be inequitable and inefficient to require that user to pay for any significant upgrade to the line. For example, Anglo American is currently the only significant user of the line between Banana to Wooderson and does not require any further capacity on the line between Banana to Wooderson. QR Network in its pricing paper on the upgrades in the Southern Bowen Region (which includes the upgrade to the Banana to Wooderson line) has indicated that current users may have to pay up to 2.5 times their current tariff.

There may be arguments to say that new entrants would be prepared to pay higher costs for the additional capacity and that therefore the total cost of the Infrastructure Enhancements should be socialised. However, this argument does not take into account that where the cost of the Infrastructure Enhancements are socialised they could effectively jeopardise an existing mine's viability to compete. For example, if a mine made a decision to invest in mine infrastructure based upon a particular tariff and that tariff was to double to allow for a new entrant then the original mine may no longer be economically viable. If the new entrant is able to be competitive at the higher tariff then it would seem to be unfair to expect that existing mines should contribute to the cost of the expansion where the existing mine does not require additional capacity and does not obtain any benefit. The Banana to Wooderson case illustrates that it is the specifics of an individual circumstance which will determine the relative merits of how these additional costs should be treated.

In other words, Anglo American believes that there should be no general principle that socialisation should always apply. The ability of the value of the product to bear large cost increases also needs to be considered. For example, if an expansion of the system was to accommodate a metallurgical coal (which has a substantially higher value than a thermal coal) the new entrant may be able to pay the higher transportation costs but any existing thermal coal mine may not be viable at the higher transportation costs. Anglo American believes the QCA should not have a general rule that socialisation is equitable and efficient and that the QCA should consider each circumstance on its merit as it arises.

Attached is a report by Dr John Fallon of Economic Insights addressing the economic issues in respect of this type of "socialisation" of costs.

7. Timeframes

In light of the imminent privatisation of QR Network one of the significant concerns that Anglo American has is that disputes under UT3 do not currently have any protections in terms of timeframe. As the experience with disputes in respect of Dalrymple Bay Coal Terminal show, disputes can be lengthy and expensive.

A dispute which takes a significant amount of time can significantly impact upon the competitiveness of the Australian coal industry. For example, if a dispute were to be raised as to whether the GAPE Fee is an unreasonable Access Condition then this could significantly delay the construction of the GAPE infrastructure which, in turn, would significantly impact the ability of the coal producers to export their coal to the world market. At the moment global coal prices are high and a delayed ability to export has significant revenue implications for coal producers.

The introduction of tight timeframes in respect of access disputes would be entirely consistent with the *Trade Practices Amendment (Infrastructure Access) Bill 2009* (**Bill**). The Bill introduces binding time limits as a result of agreement at the Council of Australian Governments and as a result of a report by the Productivity Commission into the effectiveness of the third party access regime contained in Part IIIA of the Trade Practices Act. It is acknowledged that binding timeframes are necessary to ensure that third party access is not frustrated through the delay of dispute processes.

Anglo American believes that UT3 should include binding timeframes on both the QCA and parties to the dispute. Anglo American has not suggested specific timeframes as it believes that the QCA is in a better position to decide the most appropriate timeframes. However, Anglo American notes that its preferred structure would be to have tight timeframes with an ability of the QCA to extend the timeframe for a decision by the QCA in appropriate circumstances.

Cost of Capital, Stranded Asset Risk and Socialisation of Costs for QR Network

Report prepared for
Anglo American Metallurgical Coal Pty Ltd

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CONTENTS

Key Points

- QR Network is subject to a maximum revenue cap which operates as both a maximum and a guarantee of revenue for nearly all of its costs for the access period.
- This regulatory arrangement virtually eliminates volume risk for assets within the regulatory period, although there can be some lags in securing the specified revenue.
- Take or pay contracts further minimise the risk of asset stranding for QR Network.
- Export prospects for the Queensland coal industry are strong for a very long period.
- A significant adjustment to the beta proposed by the QCA for QR Network's cost of capital is required to properly recognize the impact of the total revenue cap and the absence of volume risk.
- The beta for the revenue covered by the guaranteed revenue cap should be approximately zero.
- Very few firms have similar guaranteed maximum revenue provisions to QR Network and even fewer are share market listed.
- Few energy sector firms have anywhere near the degree of revenue certainty provided by the regulatory provisions applying to QR Network.
- The sample average from the 9 energy businesses used by the Allen Consulting Group is not suitable for establishing a benchmark beta for QR Network.
- A minimum credit rating of A grade and gearing of 65 per cent is appropriate for QR Network given its relative revenue certainty.
- Accordingly, a nominal, post tax vanilla WACC of no more than 7.7 per cent (based on an equity beta of 0.27 and gearing of 65 per cent) is appropriate for QR Network rather than the figure of 9.41 per cent adopted in the QCA draft report.
- It is not necessary to adopt a rolling 20 year life to calculate depreciation charges given the minimal risk of asset stranding for QR Network over a much longer time frame.
- Depreciation over a much longer time frame is more appropriate on both economic efficiency and fairness grounds.
- Where existing users do not clearly benefit from a rail infrastructure expansion they should not be required to pay for the expansion provided it is reasonably feasible to establish differential charging arrangements.
- There should be no general principle that 'full socialisation' of infrastructure expansion costs should always apply.

EXECUTIVE SUMMARY

Anglo American Metallurgical Coal Pty Ltd (Anglo American) has contracted Economic Insights Pty Ltd to prepare a report on certain economic issues in the Queensland Competition Authority's Draft Decision – QR Network 2009 Draft Access Undertaking (QCA 2009).

This report focuses on the cost of capital, stranded asset risk and socialisation of costs for QR Network. It reviews these aspects in the context of the form of access regulation that has been adopted considering the implications for specific parameters and regulatory decisions. In particular it reviews the proposed cost of capital parameters in the context of the nature and scope of stranded asset risk for QR Network, and the form of regulation addresses stranded asset risk. It considers the implications for the time profile for allowable depreciation. It also analyses the rationale provided for the socialisation of costs and other economically-based options for recovering the cost of incremental sunk infrastructure capital.

1 Factors influencing the stranded asset risk for QR Network

Regulated revenue cap

A pure total revenue cap operates as both a ceiling and a guarantee of revenue. It eliminates volume risk for a regulated monopoly, provided it still has a customer base to pay higher prices if volumes decline. Economic theory suggests that revenue caps can lead to prices at least as high as monopoly prices. However, the main adverse economic efficiency effect of a total revenue cap arises because a total revenue cap effectively eliminates incentives for the regulated firm to increase volumes.

QR Network is subject to a maximum revenue cap which operates as both a maximum and a guarantee of revenue for nearly all of its costs for the access period. The exception is some directly variable costs (less than 2 per cent of total regulated revenue) but such costs to the extent they are directly variable are not a component of asset stranding risk. This regulatory arrangement virtually eliminates volume risk for assets within the regulatory period, although there can be some lags in securing the specified revenue.

It is also considered that there is minimal risk that the QCA or any other relevant Australian regulatory body would introduce new regulatory arrangements that led to significant asset stranding risk in future regulatory periods. This reflects the high priority regulators place on maintaining and building regulatory credibility and also on minimising adverse impacts on investment incentives for major infrastructure.

Take or pay contracts and other regulatory and contractual factors

Take or pay contracts are a prominent feature of the business operations of QR network and they would help to minimise the risk of asset stranding beyond the current regulatory period, as well as improving the cash flows of QR network should throughput be lower than expected within the regulatory period. Take or pay contract provisions have also been strengthened in recent years, with recent access arrangements providing for 100 per cent take or pay.

In addition, as explained by the QRC (2009) in its submission, QR Network has put in place a number of other measures that reduce risk, including increasing imposition of special access conditions, and has proposed further measures to reduce risk, most of which have been accepted by the QCA in its 2009 draft decision.

DORC valuations and user contributions

The acceptance of a DORC-based estimate of the asset base has important implications for asset stranding risk, particularly where it can be established that the DORC value provides a capital base that is in excess of the invested capital that has already been recovered in net present value terms. Depending on the extent to which invested capital has already been recovered the risk of stranding could be negligible or non-existent.

The relevance of the economic theory that supported the use of DORC as a valuation methodology has been increasingly questioned in recent years. The underlying economic theory, that was used to support the use of DORC, assumes there are no sunk costs and that costless hit and run entry can occur and this is clearly not the case for the rail infrastructure assets of QR Network. The concept has also been criticised when it is implemented. given the considerable scope it provides for discretion, arbitrary valuations and divergences of views as well as the likelihood that it will lead to windfall gains and losses.

The appropriate asset valuation methodology, when there are sunk costs, is based on the concept of financial capital maintenance which means that a business can expect the recovery on a net present value basis of its financial capital invested. DORC may be helpful where there is poor accounting information but its weaknesses need to be recognised, particularly where there is evidence that values deviate substantially from those that would be consistent with the financial capital maintenance principle.

If the underlying theory, relating to DORC-based estimates, was sound and relevant and reliable estimates of asset values based on DORC could be obtained at reasonable cost, it could be expected that updated DORC estimates would be calculated at the start of new regulatory periods. However, regulators in Australia have tended to reject periodic DORC revaluations.

The Queensland Government in a submission for Queensland Rail's Draft Access undertaking in 1999, recognised that coal companies have made substantial contributions to rail infrastructure in Queensland. However, it claimed that the capital contributions have been paid back or otherwise recognised under various rail haulage agreements. But if the capital contributions have been paid back then that implies that QR Network should have been at least fully compensated on a financial capital maintenance basis.

This then raises a concern that a DORC-based valuation may contain values for some assets that have already been effectively amortised but still have a useful economic life. Anglo American Metallurgical Coal Pty Ltd ('Anglo American') contends that many of the assets that were funded by these capital contributions are still in use and are apparently included in the DORC-based valuation that was undertaken in 2001. To the extent this is true, it means QR network would in effect benefit from a windfall gain and would continue to benefit in the future to the extent that amortisation charges are in excess of what is required to ensure financial capital maintenance.

Anglo American is not proposing to revisit the DORC value to quantify the extent of over-recovery of QR Network's capital base but the issue is still highly relevant for highlighting that where there has been significant over-recovery of financial capital then by definition that financial capital cannot be subject to asset stranding risk.

Medium and long term prospects for Queensland Coal

The coal industry in Queensland is forecast to have good prospects by ABARE and independent experts for the next 20 years or so. These forecasts are also validated by the expansion programs of coal mining companies in Queensland.

Prospects for both thermal and metallurgical coal exports out of Queensland are still considered to be very good well beyond a 20 year time horizon. This reflects:

- The long term growth potential in the Asian region.
- The low cost characteristics of Queensland coal relative to competitors in export markets, particularly Asian markets where Queensland coal has an additional transport cost advantage over major competitors in the Americas.
- The risk of a changing fuel mix having a significant impact for thermal coal are low given there are clearly not viable large scale alternatives (see ABARE 2009).
- Metallurgical coal is not directly affected by greenhouse gas policies and is considerably more important in terms of exports than thermal coal exports out of Queensland.
- At present and forecast extraction rates there are ample thermal and metallurgical coal

reserves beyond 2030, even assuming reserves do not increase based on the most recent available estimates.

Conclusion

Based on the factors set out above, the risk of asset stranding for the rail infrastructure covered by QR Network's proposed 2009 draft access undertaking is assessed to be minimal over both the immediate regulatory period and the longer term extending well past the next 20 years.

2 Cost of capital parameters

Overview

Table ES 1 provides a comparison of WACC parameters applying to QR Network in recent years as well as for its proposal for 2009, for the QCA 2009 draft decision and our recommendations, together with brief comments for key parameters.

Collectively our recommendations point to a nominal, post tax vanilla WACC of no more than 7.7 per cent which represents a margin of 2.39 per cent over the risk free rate. This compares to the equivalent figure of 9.41 per cent adopted by the QCA (2009). We consider that the lower WACC is justified given that:

- QR Network is subject to a guaranteed total revenue cap for some 98 per cent of its revenue;
- it is reasonable to assume ongoing regulatory arrangements that would support a reasonable return on and return of capital invested; and
- long term demand for rail infrastructure is very secure.

It is suggested that the implications of a total revenue cap for an asset and equity beta have not been fully assessed by regulators in Australia and that **a significant adjustment to the beta proposed by the QCA is justified to properly recognise the impact of QR Network's total revenue cap.**

Beta

Beta is a statistical measure of the sensitivity of the returns to equity relative to variations in returns to the market as a whole and it is closely related to the sensitivity of revenues to returns to the market as a whole as confirmed in the following well accepted relationship:

$\beta_{asset} = [\beta_{revenue} \times PV(revenue) - \beta_{fixed\ cost} \times PV(fixed\ cost)/PV(revenue) - \beta_{variable\ cost} \times PV(variable\ cost)]/PV(asset)$

Table ES1: Comparison and Recommendation for WACC parameters for QR Access Proposal

	QR	QR	QR proposal	QCA draft	Recommendation	Comments
Year	2002	2006	2009	2009	2010	
Credit rating	A-	BBB+	BBB+	BBB+	A or higher	With a revenue cap, the credit rating should be higher than for utilities.
Risk free rate	5.97	5.21	6.70	5.29	5.29	The QCA risk free rate seems reasonable.
Risk free rate premium			0.45			As noted by the QCA there is no justification for an uplift factor.
Market risk premium	6.00	6.00	6.75	6.00	6.00	There is evidence the market risk premium is lower based on the last 20 years data. But it is not possible to demonstrate a formal statistical difference to QCA draft. An uplift for asymmetric risk is not justified
Asset beta	0.45	0.50	0.58	0.45	0.17	For a strict total revenue cap the asset beta should be approximately zero.
Debt beta	0.12	0.12	0.12	0.12	0.12	The debt beta has minimal impact on the WACC.
Gearing (debt%)	55.00	55.00	55.00	55.00	65.00	Gearing can be increased given the form of regulation and secure cash flows.
Equity beta	0.76	0.90	1.07	0.80	0.27	The recommended equity beta is based on a weighted average of zero (given the effect of the revenue cap) and the average beta for a sample of 5 energy companies that are the closest comparators to QR Network. The weights for the recommended estimate are 0.375 and 0.625 respectively.
Gamma (franking credit benefit)	0.50	0.50	0.13	0.50	0.50	There is evidence that gamma is higher and the AER raised it to 0.65. However, recognising uncertainty and the relationship to the market risk premium a gamma of 0.5 is adopted.
Equity margin	4.56	5.40	7.67	4.80	1.62	
Cost of equity(using QCA inf)	10.53	10.61	14.37	10.09	6.91	
Debt margin	1.20	1.30	2.80	3.43	2.68	Higher debt margins reflect the fall out of the financial crisis and may not be sustained over the regulatory period.
Debt transactions costs	0.00	0.13	0.16	0.13	0.13	
Total debt margin	1.20	1.43	2.96	3.56	2.81	
Cost of debt	7.17	6.64	9.66	8.85	8.10	When adjustments are made for tax effects, the cost of equity and debt are similar
WACC margin	2.71	3.22	5.08	4.12	2.39	
WACC (vanilla)	8.68	8.43	11.78	9.41	7.68	

The fixed cost beta is by definition zero. It is also understood that many of QR's variable costs have considerable fixity so that the variable cost beta is likely to be low. This then highlights the relevance of the revenue beta. But one of the essential features of a pure total revenue cap is that total revenue is both capped and guaranteed.

By implication there would be no variability in revenue for a pure total revenue cap and this in turn implies a revenue beta of zero. As a result with a pure total revenue cap (ignoring the impact of lags and the variable cost beta) the asset beta would also be zero. However, should the variable cost beta take on a positive value (which would be normal) then technically, with a revenue beta of zero, the asset beta would be negative. This would be unusual but not inconsistent with the underlying theory for beta, particularly in the context of the regulatory arrangements. A negative beta simply means that the asset's returns vary inversely with market returns and the inclusion of the asset would reduce the risk of a portfolio of assets.

The analysis in the text considers a more complicated version of the above relationship that recognises that a small component of total regulated revenues is not subject to a total revenue cap but as this revenue is less than 2 per cent of total revenue and is designed to relate to incremental directly variable costs, a reasonable inference is that beta is approximately zero if revenues are guaranteed as under the hybrid revenue cap arrangements that apply to QR Network.

While first principles point to a beta of zero in this case, we recognise that the QCA may also want to draw on experience observed in the marketplace. However, there are very few firms that have similar guaranteed maximum revenue provisions to QR Network and even fewer that are share market listed. While the energy sector provides one avenue for comparison, it is important to recognise that very few energy sector firms (or other firms) have anywhere near the degree of revenue certainty provided by the regulatory provisions applying to QR Network.

The Allen Consulting Group (ACG) (2009 and 2008) has presented beta estimates for 9 Australian energy companies that it considered relevant for determining an appropriate beta for QR Network. The QCA (2009, p.19) agreed with ACG the most relevant comparators for determining a beta for QR Networks are the Australian regulated energy businesses. The ACG (2009, p.28) report contended that the level of systematic risk (beta) for QR network was unlikely to be empirically distinguished from energy transmission or distribution. We disagree with this proposition where the form of regulatory arrangements allows for the regulated firm to be subject to volume and hence revenue risk. Furthermore a detailed review of each of the 9 energy firms in the ACG sample confirms that many of them are involved in considerably more activities than energy transmission and distribution and that most of them are likely to be subject to considerably more revenue and non diversifiable, net income risk

then QR Network**. As a result we consider that it is clear that the sample average from the ACG study of the 9 energy businesses is not suitable for establishing a benchmark beta for QR Network.**

To help provide some market-based information we have removed 4 of the 9 firms from the ACG study based on an assessment that they clearly had substantially higher risk characteristics than QR Network and estimated average beta estimates based on the remaining 5 firms. We consider that the average beta for the sample of 5 firms would still be biased upwards compared to a beta that would be most appropriate for QR Network. This assessment reflects the view that most of these firms have risk characteristics that imply the variability of revenues (and sensitivity to market returns) would be higher than for QR Network, although they would still have relevance for benchmarking purposes.

As suggested there is a need to recognise that a first principles approach implies a beta of approximately zero while the market based information from the sample of 5 firms that we consider have some relevance would be biased upwards given differing risk characteristics.

A weighted average that applied equal weights to the first principles value and the average of the 5 energy sector firms would be likely to be most appropriate given the current state of knowledge. **A conservative approach (in favour of QR Networks) would form a weighted average where a 25 per cent weight was given to an estimate of zero beta and a 75 per cent weight was given to the average beta estimate for the 5 companies in the preferred benchmark sample. Using these weighted formulae, the estimated range we propose for an equity beta for QR Network assuming gearing of 60 per cent is 0.19 to 0.28. For the purpose of calculating the WACC we will adopt the mid-point of the range, i.e. 0.24 for assumed gearing of 60 per cent. However we consider that gearing of 65 per cent and an A credit rating should apply to QR Network. With gearing of 65 per cent our preferred estimate for an equity beta for QR network would be 0.27.**

Capital structure and credit rating

The hybrid revenue cap that applies to QR Network has important implications for the credit rating and efficient gearing that should apply to QR Network. The hybrid revenue cap that applies to QR Network effectively guarantees most of its revenue and all of its revenue relating to the asset base as long as the revenue cap arrangements are in place. With low volatility of all but a small portion of its revenue and some scope to lower maintenance and variable costs, QR Network's credit rating should be higher than the average for the energy utilities that have been used as a key benchmark. The security of revenue and the higher credit rating should provide incentives and the scope for higher gearing.

In its draft decision, the QCA (2009a, p.20) has noted that:

> 'Companies that face less risk in their operating environment are generally able to sustain greater risk in their financial profile (i.e. higher gearing) for a given rating category.'

In its draft decision, the QCA (2009, p. 21) has proposed a credit rating of BBB+ and gearing of 55 per cent.

Some additional evidence in support of a higher credit rating than BBB+ for QR Network has been provided in a recent Discussion Paper by IPART (2009). It presents information based on S&P data that shows that the probability of default for different credit ratings. The information in the IPART Paper suggests that for a BBB+ credit rating the probability of default is between 0.1 and 0.2 per cent in a one year period and between 1.9 and 5.4 per cent in a 10 year period. It is difficult to conceive that QR Network has a probability of default higher than 1.9 per cent over the next 10 years or higher than zero in a one year period. This follows from the nature of the regulatory arrangements over the next five years and the likelihood that there would be little risk of significant regulatory changes in the following regulatory period that would put sunk capital at risk, the prevalence of take or pay contracts and the prospects of the coal industry in that time frame. The information on default rates for credit ratings suggests that a credit rating of AAA would be appropriate for an entity with QR Network's risk characteristics and this would in turn support higher gearing for QR Network than 55 per cent at that rating.

In support of this proposition it is also noted that, according to information presented by IPART (2009) GasNet (which is considered to have regulated revenue cap arrangements with similar characteristics to QR Network) has an S&P rating of AAA (IPART 2009. P.15) and gearing of approximately 65 per cent (IPART 2009 p.39). As discussed in the section of the report on the beta parameter, the nature of the regulatory arrangements for GasNet suggest it is the closest comparator in terms of revenue risk to QR Network.

Information on the credit rating and gearing for 4 of the 5 firms that were discussed for determining an upper estimate for a mean beta for QR Network, shows that all of the firms have higher gearing than the 55 per cent selected by the QCA in its draft decision and two have a higher credit rating than BBB+. The credit rating for the other two firms may be lower because the gearing is higher.

Given the above information, and recognising the extremely low revenue volatility of QR Network that derives from the existing regulatory arrangements, and QR Network's robust business prospects that reflect the strong growth prospects and competitive position of the Queensland coal industry, it is considered that a BBB+ credit rating and 55 per cent gearing are not economically efficient benchmarks. It is considered that based on the default rate

information an AAA or AA credit rating could be supported, along with gearing of 65 per cent. This is consistent for example with the credit rating and gearing of GasNet which has similar regulatory arrangements to QR Network. **However, given regulatory precedents and the limited number of comparator firms we recommend a conservative approach of a minimum credit rating of A grade and gearing of 65 per cent.**

Based on a credit rating of at least A and information on fair value yield curves presented by ACG (2009, p.42) we suggest that the debt risk premium would be at least about 75 basis points below a BBB+ debt margin for a 5 year time horizon. We recognise that this adjustment is an approximation and suggest the QCA may want to investigate a more accurate estimate should it decide that a higher credit rating is appropriate in the circumstances. We accept the small margin for debt transactions costs proposed by the QCA. However, one final issue we would like to highlight is the likelihood that debt margins may decline significantly over the next 5 years as financial markets recover from the global financial crisis. This raises the issue of whether the cost of debt should be adjusted on an annual basis. We have not investigated that issue at this stage.

Risk free rate

We have adopted the QCA estimate of 5.29 for the risk free rate, recognising historical records and expected inflation. However, we reserve our view on whether the risk free rate and the cost of debt should be indexed for actual inflation over the regulatory period and whether debt margins should be adjusted within the regulatory period as well.

Market risk premium

We have also adopted QCA estimate for the market risk premium of 6.0.

We have calculated market risk premiums using annual data for the periods 1980 to 2009 and 1988 to 2009 inclusive. The respective observable market risk premiums are 5.9 and 4.7 per cent for these periods. Both estimates have similar variances when normalised by their mean values (coefficient of variation) but wide confidence intervals so that it is not possible to show from a formal statistical perspective that the estimates are different. We have also noted that if dividend imputation has an impact on share market prices, as it should if gamma is non-zero, then it is necessary to adjust the observable market risk premium for a yield related to the imputation credit. When this adjustment is made, using our preferred approach, and assuming gamma is in the range of 0.5 to 0.65, the market risk premium increases to 5.2 to 5.3 for the period 1988 to 2009 and 6.3 to 6.4 for the period 1980 to 2009. However, again there is no formal statistical difference between these estimates. A preference for the more recent estimates is **not ruled out** by greater variation in the estimates and may be justified if one considers more recent information is likely to be more representative. However, given

the uncertainty we have not recommended any change to the QCA's selected estimate.

Gamma

Although there may be scope to justify a higher value for gamma, given the uncertainty about the market risk premium and to ensure consistency we have assumed that a gamma of 0.5 is still appropriate.

3 The time profile for depreciation charges

The key economic efficiency issue in establishing the optimal time profile for depreciation charges is to ensure that the profile of charges will recover the cost of capital invested, while also ensuring that the time profile of charges encourages optimal use of the asset.

Given that the medium and long term prospects for both thermal and metallurgical coal can be reasonably assessed as strong and secure, the rail infrastructure assets used for the haulage of coal are considered to have a long economic life. In particular, the risk of substantial asset stranding within a 20 year period is considered to be extremely low. In addition beyond that period there are still substantial coal reserves in Queensland and the industry is one of the lowest cost producers in export markets and also has a transport cost advantage relative to many competitors when serving the fast growing East and South Asian economies. Even if world export demand were to weaken substantially, the cost advantage of the Queensland industry would provide strong support for its prospects and effectively continue to underwrite asset stranding risk for QR Network.

The risk of asset stranding for new assets also needs to take account of the prevalence of take or pay contracts and the scope for users to make capital contributions for new projects when infrastructure expansions are being negotiated.

In addition for existing assets, as explained in section 2, the DORC estimate is understood to include values for assets that had been previously paid for under old rail haulage agreements but still have useful economic lives. It is not reasonable to claim that such capital would be at risk as it has already been paid for. In addition, it is understood that some below rail infrastructure assets have lives longer than 50 years.

The QCA (2009, pp.35-36) decisions with respect to depreciation are consistent with a view that the asset stranding risk for QR Network is less than is maintained by QR Network. However, it is suggested that it is not necessary to adopt a rolling 20 year life for the purposes of calculating depreciation charges given the minimal risk of asset stranding for QR Network over a much longer time frame. Depreciation over a much longer time frame is considered to be more appropriate on both economic efficiency and fairness grounds.

4 The socialisation of costs

QR Network has a preference for an option for cost recovery that it describes as full socialisation (QR Network 2009c, p13). Full socialisation of capital costs entails the allocation of capital costs across all users of a rail network, usually in proportion to some measure of their use of the network (e.g. tonnage or tonne-kilometers). The economic efficiency rationale for the socialisation of costs essentially requires that overall economic efficiency be enhanced. For a network asset this requires that network benefits and any savings in transactions costs be realised to a sufficient extent to offset any efficiency detriment (e.g. deterring use or investment by users or downstream activities).

However, apart from economic efficiency it is necessary to take account of the interest of existing users. Where they stand to be significantly affected by the introduction of full socialisation of costs it is relevant to consider whether there are alternative mechanisms that would recover costs without compromising economic efficiency and without imposing cost imposts on users who do not receive any material benefits from a particular network expansion. For example it may be the case that the economics of prospective projects driving expansions would not be compromised if new users paid higher charges to recover the cost of expansion commensurate with their benefits while existing users who did not receive any benefits were able to pay commensurately lower charges. Acceptance of such an approach does not necessarily entail unmanageable administrative complexity where it is applied in those circumstances where cost imposts are potentially large and users clearly do not benefit from a network expansion.

Alternatively where assets have long economic lives, the recovery of capital could be extended over longer periods and backdated so that future users make a more substantial contribution and this may be justified where there is excess capacity but growing demand.

Other issues to consider are whether full socialisation breaches the well established cross subsidy criterion that charges should not exceed what is required for recovery of stand-alone costs or whether it is in excess of what coal mine investors reasonably expected when large sunk capital investments were made.

We propose that where existing users can be identified who do not clearly benefit from a rail infrastructure expansion they should not be required to pay for the expansion where it is reasonably feasible to establish differential charging arrangements and there are not other economic-efficiency or fairness based considerations that preclude differential charging arrangements.

QR Network notes (2009c, p.18):

> 'For the reasons outlined above, QR Network does not consider it feasible - nor desirable - to implement a partial socialisation approach by seeking to explicitly distinguish between those users who might benefit and those who may not.'

The reasons that QR Network alludes to seem to mainly relate to the scope for all users to share in the benefits over time from infrastructure expansion or the difficulty in determining whether non-expanding users benefit from infrastructure expansion. But consistent with QR Network's recognition of the importance attributed to the existence of benefits, where there are expansions that clearly do not benefit non-expanding users to any significant extent, there would not seem to be any reasonable justification for precluding an adjustment to access charges to reflect the situation with respect to benefits.

Where there is a substantial grey area QR Network may have a reasonable point but we understand that there are some significant examples where this is not the case. In particular, the Banana to Wooderson case illustrates that it is the specifics of an individual circumstance that will determine the relative merits of how these additional costs should be treated. In other words, there should be no general principle that socialisation of costs should always apply.

1 INTRODUCTION AND BACKGROUND

Anglo American contracted Economic Insights Pty Ltd to prepare a report on certain economic issues raised in the Queensland Competition Authority's Draft Decision – QR Network 2009 Draft Access Undertaking (QCA 2009). This report was prepared by Dr John Fallon and peer reviewed by Dr Denis Lawrence of Economic Insights.

This report focuses on the cost of capital, stranded asset risk and socialisation of costs for QR Network. It reviews these aspects in the context of the form of access regulation that has been adopted considering the implications for specific parameters and regulatory decisions. In particular it reviews the proposed cost of capital parameters in the context of the nature and scope of stranded asset risk for QR Network, and the extent to which the form of regulation addresses stranded asset risk. It considers the implications for the time profile for allowable depreciation. It also analyses the rationale provided for the socialisation of costs and other economically-based options for recovering the cost of incremental sunk capital.

Section 2 of the report considers key factors affecting the risk of stranded assets for QR Network including the form of the regulatory arrangements and, in particular, the revenue cap that has been in place since 2006. Section 2 also includes a discussion of some specific measures that QR Network has in place to address stranded asset risk, the quantum of the asset values that may be at risk and the medium and long term prospects of the Queensland coal industry. Section 3 reviews the proposed cost of capital parameters in the context of the circumstances and regulatory arrangements that apply. Section 4 considers the issue of the time profile of allowable depreciation. Finally, section 5 considers the proposed option for the socialisation of costs in the context of incremental sunk infrastructure capital.

2 FACTORS INFLUENCING THE STRANDED ASSET RISK FOR QR NETWORK

2.1 A revenue cap

It is well accepted as an economic principle that a fixed total revenue cap eliminates volume risk for a regulated monopoly within the regulatory period, provided it still has a substantial customer base to pay higher prices. A fixed revenue or "pure revenue" cap sets a maximum revenue that may be collected over a certain period of time. A pure total revenue cap operates as both a ceiling and a guarantee of revenue. If actual revenue earned is different to the regulated revenue cap within a year then there is an adjustment to prices in the following year. Thus if volumes decline the regulated firm can increase prices for cost items covered by the revenue cap to ensure it obtains the specified total revenue, as long as there is still sufficient demand to pay the higher prices. This in turn means that provided the demand side of the market does not collapse, a strict total revenue cap eliminates the risk of asset stranding within the regulatory period. Where a revenue cap is designed to specify revenue sufficient to cover defined costs then it is those costs for which the risk of stranding is eliminated.

Crew and Kleindorfer, who are well recognised experts in the economics of regulation, strongly condemn revenue caps (RCs) noting in the context of the electricity industry (Crew and Kleindorfer 1996, p. 51):

> 'RCs are a very bad idea that not only should have no place in a competitive electricity industry but also should not have been employed even in the highly regulated industry. RCs are particularly deleterious when it comes to the promotion of efficiency. Claims of their proponents that RCs promote efficiency in a similar manner to PCR (price cap regulation) are misleading. RCs promote monopoly and may result even in prices in excess of monopoly price. They are incompatible with a competitive industry.'

Crew and Kleindorfer (1996, pp.42-43) provide a simple proof that revenue caps lead to prices at least as high as unregulated monopoly prices.

In its discussion paper on a Review of the Form of Regulation of Electricity Distribution the QCA, drawing on the work of Crew and Kleindorfer, noted (QCA (2002, p. 11)

> 'Under a fixed revenue cap, a distributor's income is fixed, regardless of how much electricity it distributes. As a result, distributors do not have a strong incentive to maximise throughput by pricing services efficiently. To the contrary, a fixed revenue cap may, under certain conditions such as where demand is inelastic, offer incentives for the distributor to produce a lower level of output at a higher price than under an unregulated (monopoly) situation (Crew and Kleindorfer, 1996).'

The incentive, under a total revenue cap, to produce at a price that is higher than the unregulated monopoly price arises in situations where the revenue cap specifies total revenue that is less than the revenue earned by an unregulated monopoly. In these circumstances if demand was price elastic, a reduction in price would increase output more than proportionately to the price reduction increasing revenue above the revenue cap. If demand was inelastic, a reduction in price would mean a less than proportionate increase in volumes and lead to lower profits where there were some fixed costs. Thus there is no incentive to reduce prices and revenue caps are conducive to price outcomes that are worse than for an unregulated monopoly.

The main adverse economic efficiency aspect of a revenue cap is related to the fact that a revenue cap effectively eliminates incentives to increase volumes. Where a regulated firm has little influence over volumes as a result of the prices it sets, the distortionary impact of revenue caps on incentives with respect to volumes may not be a major concern. However, there are still two important points that apply. First, revenue caps clearly eliminate volume risk for the time frame over which they apply, provided that there is still sufficient demand to support higher prices. For network infrastructure where demand is reasonably secure over the regulatory period volume risk would indeed be eliminated. Second, revenue caps, as described here, provide strong incentives to increase prices irrespective of impacts on volumes so that at some stage the size of price increases may have significant allocative economic efficiency implications for downstream activity. There would be a loss of allocative economic efficiency if downstream production declined because of price increases associated with a revenue cap or if a price increase led to under-utilisation of QR Network's infrastructure. As there is no incentive to expand volumes under a revenue cap there is no incentive to increase the utilisation of assets with excess capacity and this is clearly economically inefficient where utilisation can be influenced by QR's policies.

QR Network is subject to a maximum revenue cap which operates as both a maximum and a guarantee of revenue for nearly all of its costs for the access period. The exception is some directly variable costs (understood to be less than 10 per cent of proposed maintenance costs or less than 2 per cent of total regulated revenue) but such costs if they are directly variable are not a component of asset stranding risk. It is understood that if revenue in a year within the access period is less than the maximum revenue there is a tariff adjustment in the following year to make up the shortfall and vice-a-versa if revenue exceeds the maximum allowed. This arrangement virtually eliminates volume risk for assets within the regulatory period. There are some lags in securing the specified revenue but revenue could be less than or in excess of the regulated maximum so that lagged effects average out over time.

Looking beyond the regulatory period of QR Network's proposed draft 2009 access arrangement, it is also considered that there is minimal risk that the QCA or other Australian regulatory body would introduce new regulatory arrangements that led to significant asset stranding risk in future regulatory periods. This consideration is based on the assumption that the regulatory authorities in Australia place a high priority on maintaining and building regulatory credibility and also on minimising adverse impacts on investment incentives for major infrastructure, important for economic prosperity.

2.2 Take or pay contracts

Take or pay contracts are contracts that guarantee the provision of and payment in relation to a specified amount of capacity whether or not that capacity is used or not. This is another mechanism by which volume risk is reduced for QR Network for the costs associated with the take or pay provision. However in this case, the revenue guarantee is not dependent on market demand continuing to exist at a sufficient level over the regulatory period.

The risk of a collapse of market demand that would lead to an inability for a revenue cap to continue to apply is considered to be negligible, raising the question of why take or pay contracts are necessary when there is a regulated maximum total revenue cap. However, take or pay contracts would lower asset stranding risk beyond that associated with a revenue cap to the extent that they extend beyond the agreed regulated access period arrangement. They would also improve the timing in the cash flows of the regulated entity should demand weaken in a single year of the access period. Take or pay contracts for access capacity of QR Network may also help to protect the position of QR as an incumbent.

It is understood that take or pay contracts cover a substantial portion of QR Network's capacity and that they are typically for 10 years, with 15 years being proposed for certain major network expansions. In addition the Queensland Resources Commission (QRC) (2009 p. 61) notes that take or pay provisions have been strengthened in recent years to address stranding risk.

2.3 DORC valuations for existing assets and user contributions

The proposed asset base at the start of the regulatory period for QR Network is based on a value established by the Depreciated Optimised Replacement Cost (DORC) methodology that was estimated in 2001. Since then the DORC asset base has been rolled forward taking account of new capital expenditure, inflation (to maintain the purchasing power of invested capital) and allowable depreciation.

The acceptance of a DORC-based estimate of the asset base has important implications for asset stranding risk, particularly where it can be established that the DORC value provides a capital base that is in excess of the invested capital that has already been recovered in net present value terms. If users have contributed substantial capital to the rail network that is covered by the access arrangement or the bulk of capital invested has already been effectively amortised because of the cumulative value of charges, and corresponding adjustments have not been made to the DORC-based asset value, then the risk of stranding invested capital is correspondingly reduced. Depending on the extent to which invested capital has already been recovered the risk of stranding could be negligible or non-existent.

Anglo American is not proposing that the DORC estimate that has been established in this draft decision should be revisited as part of this review, but given the issues raised as to the suitability and appropriateness of the DORC, that the relevance of these issues is taken into consideration in determining the reasonableness of the rate of return, the time frame for depreciation and other adjustments to recognize minimal asset stranding risk. This position has an investment economic efficiency rationale where it can be established that the combination of the invested value at risk and the level of risk are low. This follows since in these circumstances there would be no adverse impact on the incentive for QR Network to invest in additional efficient infrastructure and users would also not face any further adverse cost impacts. However, if the DORC value contains assets that have already been paid for and still have a useful economic life, then it is not reasonable to claim that the associated value is 'at risk'.

Thus, it is relevant to briefly review the rationale for a DORC estimate and the circumstances with respect to recovery of the actual cost of capital invested in QR Network's asset base and their implications for determining the economic value at risk.

The DORC definition and rationale

Johnstone (2003, p.3) refers to the following definition of the ACCC and IPART:

> 'Optimised replacement cost is a variant of the replacement cost valuation methodology which measures the cost of the most efficient method of providing the services of the current asset (ACCC 1998a, p9).
>
> 'DORC is the replacement cost of an 'optimised' system, less accumulated depreciation. It allows for the depreciated state of the asset and also incorporates engineering optimisation of the utility's asset. An optimised system is a re-configured system designed to serve the current load plus expected growth over a specified period using modern technology. This method excludes any unused or underutilised assets beyond the specified planning horizon, and allows for potential cost savings which may have resulted from technological improvement. (IPART 1999, volume1, p52).'

Note that the IPART definition highlights that the DORC concept is based on serving the demand of the user in the most efficient way which entails the exclusion of unused or under-utilised assets. It is however recognised that from an economic perspective it will be optimal to have some excess capacity, where it is needed to accommodate peak demand or a surge in use for the haulage of coal and also to the extent that there may be economies in construction so that it is not economic to build in small increments. The main issues with respect to excess capacity are defining the optimal level of excess capacity and determining a structure of charges that is economically efficient and fair to users.

The DORC methodology received considerable support in Australia as publicly owned business enterprises were being reformed through a process of corporatisation and, in some cases, privatisation in the late 1980s and through the 1990s. However, the approach is based on some strict theoretical assumptions and, in practice, allows considerable discretion in arriving at an asset value for regulated networks. There are many regulatory decisions where unadjusted DORC values have not been adopted by regulators in Australia as explained further below.

The use of DORC in Australia was initially rationalised in a regulatory setting based on the costs a hypothetical efficient new entrant would face in providing the regulated service. In particular, some regulatory authorities have argued that the approach is justified as it is a relevant application of the theory of contestable markets in the valuation of assets.

For example, the ACCC (1998a) said:

> 'A return on replacement cost is the maximum that a monopoly firm could earn in a perfectly contestable market.'

In considering this justification there are three issues to consider:

1) Is the hypothetical new entrant benchmark relevant for significant sunk network type assets?

2) What has happened in practice?

3) Are there reasonable alternatives that have beneficial economic efficiency properties and avoid the windfall gains and losses associated with DORC based methodologies?

On relevancy, consider first the underlying assumption of contestable markets. The theory of contestable markets assumes there are no sunk costs and 'ultra free' or costless 'hit and run' entry (Baumol et al pp. 349-50, Hay and Morris 1993, p. 576). But for network industries like rail infrastructure there are substantial sunk costs. When assets are effectively sunk so that their use is tied to a specific purpose and they are an important part of the cost structure, then the 'hit and run' entry that is a defining characteristic of contestable market theory is not

a valid assumption and the contestable markets theory is not a relevant theory for supporting asset valuation.

The valuation of assets based on a hypothetical new entrant's efficient capital costs is also rationalised by interpreting such costs as relevant opportunity costs. However, where assets are sunk their opportunity cost (in another use) from the perspective of both the owner and society is zero (or at best very low if they can be sold as scrap).

Furthermore, simply assuming the price adjustment to assets implied by the theory of contestability should apply is not appropriate when there are significant sunk costs. This is because there needs to be a mechanism to ensure that sunk costs are recovered in an economically efficient manner and the theory of contestability does not specify such a mechanism when there are substantial sunk costs.

Economic Insights (2009) in assessing various asset valuation methods also shows that DORC is unlikely to be the preferred asset valuation method for productivity–based regulation. In particular, the use of DORC as opposed to historic cost asset valuation methods may lead to significant differences in the input price differential component of the X factor in setting a CPI-X price path and in the components addressing excess returns when setting price paths. Economic Insights (2009) explains that there is a risk that failure to recognise the sunk cost characteristics of network capital and a reliance on (replacement cost–based) capital goods price indexes in the input price differential term would lead to significant windfall gains or losses and thus not be consistent with ex ante financial capital maintenance (FCM) (explained further below) or dynamic efficiency. There is also a risk that excess returns would be underestimated and the X factor accordingly set too leniently.

It is notable that Professor Stephen King (2000, p.2), a past ACCC Commissioner, has stated that the theory of contestable markets and the hypothetical efficient new entrant benchmark have 'limited economic merit' in the context of determining asset values of sunk assets for regulated businesses.

Turning to the second point with respect to practice, an important criticism of the implementation of the hypothetical new entrant benchmark for the valuation of assets in the form of DORC is the considerable scope it provides for discretion, arbitrary valuations and divergences of views in the valuation of network assets.

For example, Johnstone (2003) notes:

> 'The most effective constraint on existing asset owners' initial DORC valuation, apart from any indirect benchmarking by the regulator, is the level to which the 'independent' engineering valuers, hired by asset owners to find this value, are ready to stretch. Given the alleged failures of independence of auditors in other, innately less subjective asset valuation contexts, the analogous economic

> incentives applying to engineering based DORC–valuers in tariff setting, and the scope for 'creative engineering', should be of serious concern to regulators. When seen in this light, the market discipline purportedly inherent to tariff settings based on DORC is more a product of economic sophistry than economic theory.'

However, despite these limitations DORC values may be helpful in situations where there is no information on historic costs, issues such as underutilisation do not arise and reliable DORC estimates can be arrived at. It is understood that the DORC benchmark was typically adopted by regulators in Australia because of the lack of adequate accounting information on historic costs (e.g. in relation to electricity transmission see ACCC 2004, pp. 38-39).

In some cases the contestable markets rationale was likely to have influenced the adoption of DORC as well, but it should be recognised that there are numerous regulatory precedents where DORC values have been adjusted to lower values substantially to take account of economic efficiency considerations and the interests of users. The New Zealand Commerce Commission (2008, Appendices D and E) has recently provided a comprehensive review of the ODV and DORC concepts and experience, noting the experience in Australia where DORC values have often been adjusted substantially by regulators.

In terms of the third point, an alternative to DORC, there are sound economic reasons for preferring indexed, depreciated historic cost where there is sufficient information to provide reliable estimates. Indexed depreciated historic cost is simply a measure of the asset value consistent with ensuing that the financial capital that is invested is fully recovered for a specified expected rate of return. This concept is also known as ensuring financial capital maintenance (FCM). FCM, as applied in a regulatory context, means that a controlled business is compensated for efficient expenditure and efficient investments such that, on an ex–ante basis, its financial capital is at least expected to be maintained in present value terms. A general measure of inflation (such as the CPI) is used to update asset values as it the most appropriate deflator for maintaining the purchasing power of investors' funds.

The principle of FCM is an accounting concept[1] that has its origins in rate-of-return regulation, to the extent that this approach achieves a 'fair rate of return' for investors. However the advantage of the ex ante FCM criterion is in how tightly it can be defined, so that there is no doubt that when applied on an ex–ante basis financial capital is expected to

[1] Byatt (1986) in an influential two volume report discussed the appropriate choice of accounting rules in the measurement of economic costs and pioneered the use of FCM in the context of regulating state owned enterprises. The reports advocated FCM as a common standard for comparing returns and as the ex–ante standard relevant for defining an investor's expectation with respect to recovering the opportunity cost of capital for a specific investment (Byatt (1986), Volume 1 paragraphs 18–19 and Volume II paragraph 3.54).

be maintained in real (inflation–adjusted and risk–adjusted) terms. The principle of FCM is important for ensuring adequate incentives to support efficient investment and so is particularly relevant for regulated industries with large sunk costs. The application of the FCM principle also avoids windfall gains and losses which is important for ensuring fairness and credibility of the regulatory process. The essential point about FCM is that it is consistent with achieving dynamic efficiency and hence avoiding asset stranding while also avoiding windfall gains and losses, which is in contrast to DORC-based estimates of asset values.

Finally if the underlying theory, relating to DORC-based estimates, was sound and relevant and reliable estimates of asset values based on DORC could be obtained at reasonable cost, it could be expected that updated DORC estimates would be calculated at the start of new regulatory periods. However, regulators in Australia have tended to reject periodic DORC revaluations. For example the ACCC (2004) rejected updating values for electricity transmission assets based on concerns that DORC estimates have wide ranges and could entail substantial windfall gains and losses. The AER (2005) has also ratified this decision.

As noted, the point of the discussion of DORC-based asset valuation and the concept of FCM is to highlight the issue that a DORC-based valuation will entail windfall gains and losses for asset owners and their customers while a FCM-based asset valuation will avoid windfall gains and losses while still ensuring there are appropriate incentives for investing in sunk capital.

For QR-Network, Anglo American has advised that it considers the DORC value has over-recovered the financial capital that was invested by QR-Network or its predecessor QR (see the following section). Where there has been significant over-recovery of financial capital, then by definition that financial capital cannot be subject to asset stranding risk.

2.4 User contributions and their implications

Coal companies have made substantial contributions to rail infrastructure in Queensland. This was recognised by the Queensland Government (1999, p.3) in a submission for Queensland Rail's Draft Access undertaking in 1999.

- 'Over the years, QR has received a substantial amount of funding from companies for the purpose of upgrading or extending the rail network; or for purchasing new assets including rollingstock. These capital contributions were usually paid up front to QR and paid back (or otherwise recognised) to the companies under various terms and conditions that were set out in contracts known as rail haulage agreements (RHAs). In this respect, it is critical that the QCA consider the issue of

past capital contributions within the context of the contractual relationship between the parties.

- It is necessary to consider separately the treatment of past capital contributions made before and after the 1993 Coal Royalty Review.
- The freight rates charged prior to 1993 generally incorporated the de facto royalty component of the freight rate extracted by the Queensland Government. As a result of the 1993 Coal Royalty Review, the de facto royalty components were removed from freight rates in RHAs negotiated after this Review. The Government specified that freight rates should be negotiated on commercial terms and specified that QR's practice of giving credit in freight rates for the value of any capital contributions for the effective life of those assets would continue.
- Freight rates for new mines or expansions of existing mines are set in accordance with these commercial pricing principles. Furthermore, as existing contracts expire they are renegotiated at commercial rates. This process commenced in 1993-94 as existing contracts expired and were re-negotiated.
- These RHAs have, in the main, been renegotiated with a carryover of "credits". Given the length of time between the date of the contributions and the expiry of current RHAs (i.e. between 2004 and 2013), it is the Government's view that full recognition for past capital contributions would have been effected by the expiry of the current RHAs. Accordingly the Government considers that there is no justification for adjusting reference tariffs or revenue limits.'

The issue of the extent to which past contractual arrangements for the haulage of coal led to over recovery or under recovery of capital for a monopoly provider of rail infrastructure services for the time frame of those agreements is not being considered in any detail in this paper. However, the above excerpt identified several important points of principle, notably:

> 'The Government specified that freight rates should be negotiated on commercial terms and specified that QR's practice of giving credit in freight rates for the value of any capital contributions for the effective life of those assets would continue.'
>
> '. . . it is the Government's view that full recognition for past capital contributions would have been effected by the expiry of the current RHAs.'

In addition, the following excerpts are relevant (Queensland Government 1999, p.5):

> 'These principles provided that prices will reflect the cost of services, including the earning of a commercial rate of return on assets employed in coal freight services, where the required return is commensurate with the risks associated with providing coal freight services.'

And (Queensland Government 1999, p.7):

> 'In 1993, central to the new royalty arrangements, the Government stipulated that QR would give credit (in terms of a lower freight rate) for the value of past capital contributions amortised over the life of the asset. This practice was endorsed by Cabinet and set out in QR's Corporatisation Charter.'

If rates are negotiated on commercial terms, it is reasonable to infer that meant terms that did not imply a monopoly return or a return in excess of a competitive risk-adjusted return. Furthermore it was noted that the Government supported QR's practice of giving credit in freight rates for capital contributions for the effective life of those assets. This clearly implies that credit should continue for the effective life of the assets. The final inference is that with the expiry of the RHAs referred to, the contention that there was full recognition of capital contributions, in conjunction with the principle that rates should be based on commercial (competitive) terms with credit for the effective life of those assets, implies that QR Network should not receive any further capital charges (return on and return of capital) in relation to the capital contributions from coal companies under the RHAs.

In other words if there has been full recognition of capital contributions then that implies that capital has been at least fully recovered by QR[2] and if this is the case then QR should not be entitled to receive any further capital charges for the capital under the RHAs referred to. However, Anglo American contends that many of the assets that were funded by these capital contributions are still in use and are apparently included in the DORC-based valuation that was undertaken in 2001.

To the extent that the current value of the asset base includes a value that relates to assets that were partially funded by coal company contributions and that still have a useful economic life then QR network would be over compensated relative to an asset value and stream of amortisation charges (covering return on and return of capital) based on financial capital maintenance. Simply put, in these circumstances, this means QR network would in effect benefit from a windfall gain and would continue to benefit in the future to the extent that amortisation charges are in excess of what is required to ensure financial capital maintenance.

[2] Anglo American contends that under some RHAs coal company capital contributions were not returned in full on a net present value basis at their cost of capital. This is because payment for capital was effectively made twice but repaid only once but in a form that allowed a tax deduction (the total contribution was the original contribution plus an ongoing charge in the rail freight, while the offset (repayment) was a separate capital rebate plus the tax deduction from the rail freight charge.)

Thus irrespective of the probability of asset stranding occurring, the component of a DORC that has already been recovered on a financial capital maintenance basis would not be at risk in terms of asset stranding, from an economic efficiency perspective, because it represents a windfall gain. Such a windfall gain is not necessary to induce efficient investment nor to ensure incentives for continued operation using the associated asset base.

2.5 Other regulatory and contractual factors

A regulated maximum revenue cap by itself does not impact directly on the risks of cost increases and does not directly reduce incentives to reduce costs within a regulatory period.

The Queensland Resources Council (2009, p.61) summarises the measures that QR Network has taken to reduce risk in recent years as well as the measures proposed in its submission.

In addition to the revenue cap, take or pay and cost pass through factors, the QRC notes the following measures would contribute to a reduction in risks for QR Network:

- Significant strengthening of Relinquishment Fees (a fee to recover the net present value of a take or pay contract where associated capacity is relinquished by the rail network user) to address stranding risk.
- The introduction of a regulatory pre-approval mechanism regarding the prudency of the scope of capital expenditure, addressing optimisation risk.
- Increasing imposition of special access conditions to reduce volume risk and stranding risk (including, in the case of the Western System, underwriting of the main line capital expenditure).
- Asymmetric use of regulatory processes, where QR Network is able to accept a risk under the undertaking and retain the benefit where outcomes are favorable (for example, UT1 maintenance costs) and submit a DAU where outcomes are unfavorable (for example UT2 maintenance costs).

The QCA (2009, p.149) also noted the following with respect to asset stranding risk:

> 'To offset this stranding risk, the Authority approved provisions in past undertakings that allowed QR Network to impose 'access conditions' in access agreements and limited the circumstances in which the Authority could optimise assets from the regulatory asset base.'

And, QCA (2009, p. 152):

> In practice, QR Network has typically imposed access conditions which involve the access seeker underwriting most or all of the capital cost of a project, not just the feasibility study.'

The QRC (2009 p.61) further notes that no adjustment to the WACC has been made to reflect the substantial reduction in QR Network's risk profile. The QRC also notes a number of additional measures in the QR Network submission that would further reduce the risk it faces as follows (p.63):

- Imposition of special access conditions for Major Projects.
- Acceleration of depreciation on all new capital expenditure.
- Revision of depreciation rates on existing assets.
- Ability to offer preference to access seekers who offer longer term Access Agreements (beyond the current 10 year term which Access seekers must offer in order to protect a place in the queue).
- Elimination of clusters, to reduce GAPE stranding risks (which in any case QR proposes to address through separate underwriting arrangements).

All of the above measures were accepted in the QCA decision with the exception of QR Network's proposal for accelerated depreciation of 20 years, where the QCA decision was that the depreciation profile for new investments should reflect a rolling 20 year life rather than a fixed 20 year life (QCA 2009, p.36).

QRC (2009 p.63, 64) suggests that WACC parameters should be adjusted to reflect both market conditions and changes in the risk profile of QR Network that follow as a result of the various risk reduction measures it has taken and proposes to take.

The above points are considered to have a sound economic basis in the context of the regulatory, contractual and market conditions that QR Network faces.

2.6 Medium and long term prospects for Queensland coal

The Queensland coal industry today

The Queensland coal industry is a major part of the Queensland and Australian economies. The production of coking coal is the most important resource industry in Queensland with the value of coking coal production estimated to be around $23 billion in 2008-09 (QRC 2009b). Thermal coal production was the next most important resource industry with production of $10.6 billion in 2008-09. Almost all of the coking coal and 65 per cent of the thermal coal

was exported in 2009. Total coal production currently represents about two thirds of the total value of mineral resources production in Queensland.

The Queensland coal industry is a major supplier in the World export markets. In 2009 Queensland metallurgical coal exports represented about 57 per cent of total seaborne exports and about 68 per cent of total exports in the Pacific region. In the same year Queensland's thermal coal exports were about 13 per cent of exports in the fast growing Asia-Pacific region.

Queensland is a low cost supplier of both metallurgical and thermal coal and has a transport advantage over most of the major exporting countries. Queensland also has large reserves of both metallurgical and thermal coal with estimated lives extending well beyond 2030, even if no further reserves are proven.

In relation to coal resources, in 2005 Geoscience Australia reported that Queensland had 23 billion tonnes or 58 per cent of total recoverable economic demonstrated resources (EDR) of black coal in Australia (Geoscience Australia (2005) in Fairhead et al 2006, p.17). Of this 7.5 billion tonnes was reported to be metallurgical coal, the majority of which is located in the Northern and Central Bowen basin. The Surat basin also has extensive EDR of thermal coal for future development.

There are likely to be additional resources reserves as reflected in figures reported by the Queensland Mines and Energy Department (http://www.dme.qld.gov.au/mines/resources.cfm). Estimates of indicated and measured resources were compiled in 2003 from available company information by the then Department of Natural Resources and mines. They showed total coking coal resources of 11.2 billion tonnes and thermal coal resources of 21.5 billion tones, with shallow coal making up 55 per cent of the total and 40 per cent within close proximity to operating mines in Queensland. Note that estimates of inferred coal resources, which would add significantly to the total coal inventory tonnage, are not included in these figures (Queensland Mines and Energy Department, 2009, p.3).

Medium to longer term prospects

Forecasts by ABARE and independent experts confirm strong demand for both metallurgical and thermal coal for the next 20 years or more.

The demand for metallurgical coal is primarily related to the production of steel. As recovery from the global financial crisis continues and as China and India continue to grow over the medium and longer term, there is likely to be sustained, strong growth in their steel production and they will also find it more difficult to service their total metallurgical coal

requirements from local production. In addition growth of steel in Brazil and Central Europe is also expected to contribute to growth in the demand for metallurgical coal. Although there are capacity expansions underway in Canada, there is significant capacity expansion underway or planned in Queensland which also has a transport cost advantage in supply Asia, relative to Canada.

Metallurgical coal exports are less likely to be affected by policies focused on reducing carbon emissions. However, strong demand is forecast for thermal coal exports over the medium term.

In addition, Queensland is a relatively low cost supplier for both metallurgical and thermal coal, such that if demand were to be weaker than forecast, there would be a reduction in supply from higher cost producers first. This in turn implies minimal risk of stranding of rail infrastructure used in the transport of both metallurgical and thermal coal over the medium to longer term.

ABARE forecasts

In 2006 ABARE published a comprehensive study of Australian coal exports focusing on the outlook to 2025 and the role of infrastructure (Fairhead et al 2006). A multi-region, multi-sector, dynamic general equilibrium model of the world economy was used in preparing the forecasts. Key assumptions included long term annual economic growth rates for the 18 countries or regions in the model that appeared reasonably conservative (6.3 per cent for China and 6.1 per cent for India); and fuel mix assumptions that included a reduction in the share of black coal in electricity generation from 36 per cent in 2005 to 34 per cent in 2025 (pp. 23-27).

The ABARE study noted that Australia metallurgical coal faced less competition from producers in other countries and had a freight rate advantage in supplying the fast growth markets in China and India (p. 40).

Projections from the model to 2025 for a reference case for metallurgical coal and low, reference and high scenarios for thermal coal are summarised in Table 1 below.

Table 1: ABARE forecasts of Australian coal export volumes in 2005

Coal type	*2005*	*2025*			*2005-2025*
		Low	Reference	High	Annual growth
	mt	mt	mt	mt	%
Thermal	108	146	184	225	1.5 to 3.7
Metallurgical	125	210	210	210	2.6
Total	233	353	394	435	2.1 to 3.2

Source: Fairhead et al 2005 (p. 4).

Low and high growth scenarios were not developed for metallurgical coal because the authors considered it was subject to less uncertainty.

It is notable that even under the low growth scenario there are still reasonable growth prospects for thermal coal and that the authors did not consider it necessary to develop low or high growth scenarios for metallurgical coal based on perceptions of the degree of uncertainty.

The ABARE study (Fairhead et al 2005, p.4) noted that:

> 'The growth in Australia's market share of global coal trade is underpinned by Australia's substantial coal reserves, the strong economic performance of the coal industry and its position as a reliable exporter of quality coal.'

The forecasts for the Queensland coal fields are shown in Table 2 below.

The growth of exports from the Central Bowen coalfield is primarily related to the strong growth of metallurgical coal under all three scenarios. Growth in the South Bowen region is mainly attributable to thermal coal but with some support from the development of metallurgical coal mines as well.

Table 2: ABARE forecasts of Queensland coal export volumes in 2022

Region	*2005*	*2022*			*2005-2022*
		Low	Reference	High	Average annual growth
	mtpa	mtpa	mtpa	mtpa	
North Bowen	14	18	18	18	1.5
Central Bowen	90	145	150	150	2.8 to 3.1
South Bowen	49	93	95	105	3.8 to 4.6

Source: Fairhead et al 2005 (p. 55).

Wood Mackenzie forecasts

Wood Mackenzie, a premier supplier of research in the energy and minerals sector provides a coal price forecast service that includes an assessment of medium to longer term prospects. The Wood Mackenzie forecasts are useful for providing a more recent assessment of the Queensland coal industry's prospects (see Appendix 1 for more details) .

The Wood Mackenzie (June 2009a and b) reports on metallurgical coal price and export supply forecasts show that Queensland clearly has good prospects with respect to metallurgical coal.

It is understood that Wood Mackenzie's forecasts are built on cost based modeling and in particular a linear programming model that allocates supply to demand on a least cost basis, generating a cost based supply curve. The highest cost supplier represents the marginal cost of supply which is then used as a baseline to build market price forecasts. Prices are unlikely to fall below the marginal costs of supply for any sustained period of time.

The Wood Mackenzie forecasts from 2016 to 2025 highlight that Queensland is a low cost producer of the premium coal categories and that if demand should be weaker than forecast there would be a reduction in supply from higher cost producers first, underlining the strength of the volume forecasts for Queensland exports of metallurgical coal. **This in turn is consistent with minimal stranding of rail infrastructure used in the transport of metallurgical coal over the forecast period.**

Although thermal coal exports are less important than metallurgical coal exports out of Queensland, the Wood Mackenzie forecasts suggest they have very good volume and profitability prospects, and apparently better than for metallurgical coal.

Conclusion

The coal industry in Queensland is forecast to have good prospects by ABARE and independent experts. These forecasts are also validated by the expansion programs of coal mining companies in Queensland. However given the long physical asset lives of rail infrastructure it is relevant to consider risks to the forecasts as well as longer term prospects beyond the next 20 years.

2.7 Risks and longer term prospects

In terms of forecasts to 2025, ABARE has already incorporated a number of risks in both the reference case and the low growth scenario, as follows:

- The reference case scenario assumes relatively conservative growth rates in the fast growing Asia-Pacific region, which is most relevant to coal exports for Australia.
- The reference case scenario also assumes a shift away from coal fired power generation in China, India Japan and Korea, although there is a shift towards coal fired generation in the ASEAN countries.
- The low growth scenario assumes stronger growth of coal exports from other countries in the region.

It is notable that even taking account of these factors there are still good growth prospects forecast for both thermal and metallurgical coal and that the uncertainty primarily relates to thermal coal. In addition, the Wood Mackenzie forecasts are consistent with good prospects for both metallurgical and thermal coal exports to 2025.

More recently ABARE (2009) in assessing the prospects for thermal coal noted the following

> 'The prevalence of coal-fired power generation in Asia has increased over the past decade as a result of rapid energy demand growth. This trend is set to continue over the medium to long term with extensive plans for the expansion of coal-fired electricity generation capacity – around 579 gigawatts by 2030. While a number of the planned expansions to capacity will not come to fruition, there is expected to be a considerable increase in the demand for thermal coal in the region. For example, if only 20 per cent of the planned capacity is operational before the end of the outlook period, this would require an estimated additional 340 million tonnes of coal a year.
>
> Coal is expected to remain an important source of new electricity generation capacity in developing Asia because of its low cost, reliability of supply and wide geographic spread of producers. The need for rapid development of electricity generation capacity favours coal-fired technology over others.

> There is also expected to be an increased uptake of natural gas for electricity generation in many economies. This reflects a number of policy priorities including reducing greenhouse gas emissions, enhancing energy security, and ensuring a diversified fuel mix. In a number of countries where expansions are expected to occur there is insufficient domestic production of natural gas, requiring generators to import fuel.
>
> Expansions to nuclear power generation capacity are only expected in Asian countries with existing nuclear programs, such as Japan, China and India. Otherwise, the commissioning of new capacity is unlikely until after 2015. This reflects the long lead time in the construction of nuclear reactors and the time required to enact legislation and obtain community support.
>
> Renewable energy is not expected to feature prominently in the energy mix as projects in Asia are typically high cost and reliant on subsidies or other forms of protection. In addition, these plants are less attractive because of their small and variable output. Hydroelectric power is faced with environmental concerns and objections from competing water users and neighbouring countries.'

Thus ABARE has recently presented a view that the risks to thermal coal exports, from a changed fuel mix, over the medium term continue to be relatively low.

Over the longer term there is much uncertainty about greenhouse gas emissions policy. However, there are several important points to be made in relation to risks for the Australian coal industry with respect to greenhouse gas policies:

- First, the only large scale cost competitive fuel source that is likely to be relevant for some time is nuclear power but it takes considerable lead time and very large initial capital outlays to establish nuclear generation, and there is considerable resistance to this option in many countries.
- Second, it is reasonable to assume that Australia will not take action, that would have a substantial adverse impact on major export industries, unless there is a credible commitment by other major countries to reduce greenhouse gas emissions and recent experience suggests that is going to be difficult to achieve.
- Third, it is difficult to assume that Australia will implement policies that will significantly harm the prospects of one of its most important industries, particularly when there are no clear alternative wealth producing industries on a similar scale.
- Finally, metallurgical coal is not directly affected by greenhouse gas emissions policy and it is far more important than thermal coal in Queensland. This is particularly the case for the Central Bowen Basin mines and associated rail corridors.

Another important issue to consider, in assessing the risk of asset stranding for rail infrastructure is the expected economic lives of mine resources that support the use the major

rail corridors.

Estimates of remaining lives of coal resources were made based on the lower bound economically recoverable figure based Geoscience estimates and an upper bound figure based on the Queensland Mines and Energy Department estimates of measured or indicated resources[3] and cumulative forecasts of production of coking coal and thermal coal to 2030 provided by Anglo American. It was also assumed that production would continue beyond 2030 at the levels forecast in that year.

These assumptions implied that **metallurgical** coal production in Queensland could be sustained by resources for from **23 to 54 years after 2030** and that **thermal coal** production in Queensland could be sustained from **86 to 123 years after 2030, even if there is no increase in resources from current levels.** These figures should not be interpreted as exact but rather as indicative of the long economic lives of coal resources in Queensland.

2.7 Conclusion

The risk of asset stranding for the rail infrastructure covered by QR Network's proposed 2009 draft access undertaking is assessed to be minimal over both the immediate regulatory period and the longer term extending well past the next 20 years. This assessment is based on:

- The existence of a regulated revenue cap within the regulatory period.
- The likelihood that future regulatory arrangements will help ensure the risk of asset stranding continues to be minimal.
- Take or pay provisions and other contractual arrangements, including the scope for significant capital contributions from users, that QR Network has put in place.
- The amount of invested capital that is at risk, even though that risk is minimal, is well below the DORC based estimates, reflecting the cumulative impact of industry capital contributions and payment of capital charges (to provide both a return on and return of capital).
- There are very good prospects for both metallurgical and thermal coal as assessed by ABARE and Wood Mackenzie to 2025.
- Beyond 2025 prospects are likely to continue to be very good for both metallurgical

[3] . Note that estimates of inferred coal resources, which would add significantly to the total coal inventory tonnage, are not included in these figures (Queensland Mines and Energy Department, 2009, p.3).

and thermal coal exports from Queensland, reflecting the cost advantage in the rapidly expanding nearby Asian countries and the ample reserves that are estimated, even without further discoveries.

- Thermal coal exports face more uncertainty than for metallurgical coal, particularly in relation to uncertainty about greenhouse gas policies, however, it is important not to overstate this risk given the expected strong demand from major Asian economies, the difficulty in establishing large scale, cost competitive alternatives to coal-fired power stations and the importance of thermal coal as an Australian industry.
- Even if thermal coal becomes less competitive because of greenhouse gas policies, Queensland is a low cost producer of thermal coal and will be likely to retain this cost advantage relative to other major exporters, and metallurgical coal is far more important for QR Network's business than thermal coal, particularly in the Central Queensland corridor.

3 COST OF CAPITAL PARAMETERS

3.1 Overview

This section considers the cost of capital parameters proposed in the QCA (2009) draft decision. Table 3 below provides a comparison of the parameters proposed by the QCA with the parameters that applied in 2002 and 2006 for QR Network and the parameters proposed by QR Network in its 2009 draft access arrangement. It also provides a brief comment on the parameters proposed by the QCA and our recommended parameters. The reasons for our recommendations are set out below.

Collectively our recommendations mean a nominal, post tax vanilla WACC of 7.7 per cent which represents a margin of 2.39 per cent over the risk free rate. We consider that this WACC is justified given that: QR Network is subject to a guaranteed total revenue cap for some 98 per cent of its revenue; it is reasonable to assume ongoing regulatory arrangements that would support a reasonable return on and return of capital invested; and long term demand for rail infrastructure is very secure.

3.2 Beta

The implications of a guaranteed revenue cap for beta

The Capital Asset Pricing Model (CAPM) model which the QCA has used as a basis for determining the cost of equity is based on a theory of portfolio diversification that leads to the conclusion that only non-diversifiable or systematic risk (risk that is systematically related to economy-wide developments) is relevant for estimating the cost of capital. Diversifiable risk is not relevant for an equity investor in pricing the expected return simply because such risk is potentially diversifiable.

Beta is the parameter in the cost of capital model which measures the non-diversifiable risk and the market risk premium is the price of that risk. Beta measures the sensitivity of the equity returns for the asset in question relative to variations in a measure of the return for the market as a whole. Formally it is measured by the covariance between the equity return for a particular investment and the market return divided by the variance of the market return.

Since beta is a statistical measure of the sensitivity of the returns to equity relative to variations in returns to the market as a whole it will be closely related to the sensitivity of revenues to returns to the market as a whole (a detailed analysis of this is set out below).

Table 3: Comparison and Recommendation for WACC parameters for QR Access Proposal

	QR	QR	QR proposal	QCA draft	Recommendation	Comments
Year	2002	2006	2009	2009	2010	
Credit rating	A-	BBB+	BBB+	BBB+	A or higher	With a revenue cap, the credit rating should be higher than for utilities.
Risk free rate	5.97	5.21	6.70	5.29	5.29	The QCA risk free rate seems reasonable.
Risk free rate premium			0.45			As noted by the QCA there is no justification for an uplift factor.
Market risk premium	6.00	6.00	6.75	6.00	6.00	There is evidence the market risk premium is lower based on the last 20 years data. But it is not possible to demonstrate a formal statistical difference to QCA draft. An uplift for asymmetric risk is not justified
Asset beta	0.45	0.50	0.58	0.45	0.17	For a strict total revenue cap the asset beta should be approximately zero.
Debt beta	0.12	0.12	0.12	0.12	0.12	The debt beta has minimal impact on the WACC.
Gearing (debt%)	55.00	55.00	55.00	55.00	65.00	Gearing can be increased given the form of regulation and secure cash flows.
Equity beta	0.76	0.90	1.07	0.80	0.27	The recommended equity beta is based on a weighted average of zero (given the effect of the revenue cap) and the average beta for a sample of 5 energy companies that are the closest comparators to QR Network. The weights for the recommended estimate are 0.375 and 0.625 respectively.
Gamma (franking credit benefit)	0.50	0.50	0.13	0.50	0.50	There is evidence that gamma is higher and the AER raised it to 0.65. However, recognising uncertainty and the relationship to the market risk premium a gamma of 0.5 is adopted.
Equity margin	4.56	5.40	7.67	4.80	1.62	
Cost of equity(using QCA inf)	10.53	10.61	14.37	10.09	6.91	
Debt margin	1.20	1.30	2.80	3.43	2.68	Higher debt margins reflect the fall out of the financial crisis and may not be sustained over the regulatory period.
Debt transactions costs	0.00	0.13	0.16	0.13	0.13	
Total debt margin	1.20	1.43	2.96	3.56	2.81	
Cost of debt	7.17	6.64	9.66	8.85	8.10	When adjustments are made for tax effects, the cost of equity and debt are similar
WACC margin	2.71	3.22	5.08	4.12	2.39	
WACC (vanilla)	8.68	8.43	11.78	9.41	7.68	

As beta is a statistical measure, note that negative betas are possible but unusual. An asset beta of zero means that there is no correlation between the returns to the asset and general market returns. A negative beta means that the asset's returns vary inversely with market returns. The theoretical interpretation of a negative beta is that the inclusion of such an asset in a portfolio reduces the overall risk of that portfolio. The presentation below will show that it is possible to have a negative beta when revenue is fixed by a guaranteed revenue cap.

Brealey and Myers (1991, p.200) in their widely used textbook on the theory and practice of corporate finance set out the relationship between a revenue beta and its components as follows (see Appendix 1 for a derivation):

(1) $\beta_{revenue} = \beta_{fixed\ cost} \times PV(\text{fixed cost})/PV(\text{revenue}) + \beta_{variable\ cost} \times PV(\text{variable cost})/PV(\text{revenue}) + \beta_{asset} \times PV(\text{asset})/PV(\text{revenue})$

where PV is the discounted present value of the relevant revenue or cost stream and βs are defined with respect to market returns for revenue, fixed cost, variable cost and the asset.

The intuition of this relationship is that just as an asset beta is a weighted average of equity and debt betas with the weights being the shares of equity and debt in the total value of the asset, the asset beta can be expressed as a weighted average of its underlying revenue and cost components which can be re-arranged to define a relationship for a revenue beta which measures the sensitivity of revenue to market returns as a whole. A formal statistical decomposition of an asset beta is provided in Appendix 2.

The fixed cost beta is by definition zero. So from (1) the following relationship for β_{asset} holds:

(2) $\beta_{asset} = [\beta_{revenue} \times PV(\text{revenue}) - \beta_{variable\ cost} \times PV(\text{variable cost})]/PV(\text{asset})$

Brealey and Myers note that the betas of the revenues and variable costs should be approximately the same (although this may not be true in some circumstances) and this would implies:

(3) $\beta_{asset} = \beta_{revenue} \times [PV(\text{revenue}) - PV(\text{variable cost})]/PV(\text{asset})$

Using the relationship that PV (Asset) = PV(revenue) – PV(fixed cost) – PV (variable cost) implies:

(4) $\beta_{asset} = \beta_{revenue} \times [1 + PV(\text{fixed cost})/PV(\text{asset})]$

which shows that firms with a high proportion of fixed costs have high operating leverage and high betas.

However, this point is not relevant for QR network because of the implications of the revenue cap for QR network's revenue beta and in turn its asset beta, as will be shown below.

The main point of setting out this relationship is to show that the asset beta is fundamentally dependent on the revenue beta and to note that **when there is a guaranteed revenue cap, the beta for the revenue covered by the guaranteed revenue cap would be strictly zero, assuming there is no impact from lagged price adjustments.**

It is recognised that certain directly variable costs are not part of the revenue cap for QR network and are covered under a separate tariff. This complicates the relationship between the asset and revenue betas but it can still be shown that the asset beta is likely to be near zero or even negative.

Assume that: some directly variable costs are not covered by the revenue cap but recovered with separate revenue while the remaining directly variable costs are still associated with revenues defined by the revenue cap. Define the former as 'other variable costs' and the latter as 'revenue cap variable costs'. Also assume that total revenue comprises 'revenue cap revenues' and 'other revenues', then the following relationship would be relevant:

(5) $\beta_{\text{revenue cap}} \times \text{PV(revenue cap)/PV(total revenue)} + \beta_{\text{other revenue}} \times \text{PV(other revenue)/PV(total revenue)} = \beta_{\text{fixed cost}} \times \text{PV(fixed cost)/PV(total revenue)} + \beta_{\text{revenue cap variable cost}} \times \text{PV(revenue cap variable cost)/PV(total revenue)} + \beta_{\text{other variable cost}} \times \text{PV(other variable cost)/PV(total revenue)} + \beta_{\text{asset}} \times \text{PV(asset)/PV(total revenue)}$

Note that the left hand side is simply a decomposition of the revenue beta in terms of a revenue cap beta and the other revenue beta (see Appendix 2 for the formal statistical decomposition of the left hand side) and the right hand side shows a similar decomposition as for equation (1) but with additional terms for revenue cap variable cost and other variable cost.

Recognising that the fixed cost beta is zero and the revenue cap beta is also zero for a regulated fixed revenue cap, where lags can be ignored, this can be rearranged to:

(6) $\beta_{\text{asset}} = [\beta_{\text{other revenue}} \times \text{PV(other revenue)} - \beta_{\text{other variable cost}} \times \text{PV(other variable cost)}]/\text{PV(asset)} - \beta_{\text{revenue cap variable cost}} \times \text{PV(revenue cap variable cost)}]/\text{PV(asset)}$

We understand that the 'other revenue' component is less than 10 per cent of allowable maintenance costs or less than about 2 per cent of total allowable revenue for QR Network and in any case if the PV of other revenue and the PV of other variable cost are the same (a reasonable assumption in the regulatory context) and the respective betas are approximately the same, then the first two terms cancel out and :

(7) $\beta_{\text{asset}} = - \beta_{\text{revenue cap variable cost}} \times \text{PV(revenue cap variable cost)/ PV(asset)}$

It would be reasonable to assume the revenue cap variable cost beta was on average positive so that if the above relationship held it would imply a negative asset beta on average. More specifically, with a revenue cap, the revenue cap variable cost beta would likely be positive for a general decline in market conditions but zero for an increase in general market conditions.

The intuition of the foregoing proposition is as follows. For any directly variable costs that are effectively covered by revenues in the revenue cap, there would be scope to reduce variable costs if volumes declined as a result of general market conditions, but since there is a guarantee of fixed revenue (ignoring lags or similar factors that relax the revenue cap), in these circumstances there would be a subsequent adjustment to increase prices implying an increase in returns to the regulated asset (because variable costs have declined as volumes have declined). In contrast if there was a general increase in market returns (and associated market conditions) there would be no incentive for the regulated firm to supply larger volumes (since if it did it would incur higher revenue cap variable costs but without any increase in the revenue cap) so that the revenue cap variable cost beta would be zero. Thus the revenue cap variable cost beta is likely to be positive when market returns decline and zero when market returns increase.

Note that the ratio PV(revenue cap variable cost)]/ PV(asset) is likely to be relatively small but not negligible and the $\beta_{\text{revenue cap variable cost}}$ may also be relatively small so that the negative impact on the asset Beta is likely to be small. In fact to the extent that the variable costs are more akin to fixed costs because of the planning and commitment of maintenance and other operational activities the beta would be zero. Ignoring lags or similar factors with respect to the receipt of revenues under the regulatory cap, this analysis would imply an asset beta of near zero or slightly negative if there was some scope to vary some maintenance and operational costs.

Thus the above analysis supports an asset beta for assets that are substantially subject to a revenue cap, of approximately zero with a reasonable likelihood of it being slightly negative. With an asset beta of near zero and a debt beta of near zero the equity beta would also be near zero.

Expert reports and regulatory precedents for beta

The ACG report

The Allen Consulting Group (ACG) (2009) was engaged by the QCA to prepare a report on certain cost of capital parameters including an appropriate equity beta. ACG (2009) noted inter alia the following:

- 'Uncorrelated demand - The demand for coal that is fuelling the industrialisation process taking place in Asia and South America has been largely uncorrelated with Australian economic growth and the Australian stock market, and with world economic growth and the world stock market index.' (p. v).
- 'Certainty of revenue stream - Various factors make the revenue stream faced by QR-Coal relatively certain. Within regulatory periods, QR-Coal's revenue is protected through a revenue cap framework. This framework guarantees that QR-Coal will receive the forecast revenue for a given regulatory period, albeit potentially with a lag of up to two years. Demand for Queensland coal has demonstrated strong growth since 2006, and recent independent forecasters predict demand will continue growing strongly to 2030. In addition around 30 per cent of QR-Coal's revenues are subject to take or pay contracts, which will cushion some of the impact of demand changes spanning regulatory periods. The contracts written under the 2006 Access Arrangement are 100 per cent take or pay, although these are a small proportion of railings.' (p.v).

ACG (2009, pp. viii-x1) noted that a number of comparators proposed by Synergies Economic Consulting (2008) for determining an appropriate equity beta were not close comparators and that this was also true in general for the comparators they considered, given the key characteristics of QR-Coal's operations.

It also noted that in its 2005 report it stated (ACG 2009, p.22):

> 'In other words QR-Coal's revenue beta with respect to the Australian market can be expected to be low.'

In considering the regulated revenue cap structure that applied in 2004-05 ACG said (p.24):

> 'This collar and cap pricing arrangement had the capacity to reduce the impact of systematic risk on QR-Coal, by de-coupling its revenue from the Australian economic and market cycles. However, as noted above, any residual risk is likely to be limited by other factors, such as competitiveness of the Australian coal industry, the likely low level of systematic variation in cash flows, and the impact of take-or-pay contracts, which promote relative stability of cash flows.
>
> More recently, QR-Coal has been under a hybrid revenue cap model, which requires any over (under) recovery of its approved revenue cap is returned through tariff adjustments two years later. Under this arrangement QR-Coal is guaranteed to receive the revenue provided at the beginning of a regulatory period based on volume assumptions made at that time, although with a potential delay of up to two years on a component of the revenue. This new arrangement would further reduce the volatility in QR-Coal's cash flow.

> Lastly, we note that the QCA has requested that we provide advice on the basis that the undertaking will retain its current limit on regulator-initiated asset optimisation or standing (Schedule FB) and also assuming that the QCA would accept accelerated depreciation as a means of managing in advance potential stranding risk if the risk is demonstrated. In our view, this regulatory policy implies a low level of regulator-initiated stranded asset risk and, when combined with the large coal reserves, strong demand and high relative cost efficiency, suggest a low level of market-driven stranded asset risk.'

Economic Insights agrees with the broad impression provided by the above information set out by ACG. However, we do not agree with the following proposition by ACG (2009, p. 28):

> 'We consider that the key characteristics of QR's below-rail regulated coal haulage business (i.e. take-or-pay-contracts for a significant component of volume, demand that is relatively uncorrelated to the domestic market, and a revenue cap pricing framework) would indicate a level of systematic risk for this business that is unlikely to be empirically distinguished from energy transmission or distribution.'

In particular we do not agree that QR Network would have a beta similar to energy distribution businesses where those businesses are subject to a price cap or cost-of-service regulation or include significant unregulated activities. **We maintain that reference to energy business or other betas would only be relevant where their revenue streams had the characteristics of the existing hybrid revenue cap that applies and is proposed to continue to apply to QR Network for the next regulatory period.** This is based on: the analysis presented above that shows that for an entity where its revenues are predominantly guaranteed by a fixed total revenue cap (including a hybrid revenue cap of the form currently in place for QR Network) the asset beta is most likely to be approximately zero or slightly negative and the fact that the energy transmission and distribution studies that the Allen Consulting Group refers to are generally not subject to a guaranteed revenue cap or not subject to such a cap for substantial parts of their business (an exception to this is GasNet for the bulk of its revenues).

The ACG (2009 p.28) report refers to a 2 September 2008 report prepared for Energy Networks Association, Grid Australia and APIA where it noted that it estimated betas for Australian firms involved in energy distribution and transmission. The ACG (2008) report dated 17 September 2008 appears to be a later draft of the 2 September 2008 report, as it presents very similar estimates for nine Australian gas and electricity transmission and distribution businesses. The ACG (2008) report uses a range of widely used econometric techniques to estimate beta for listed companies.

The ACG report (2008, p.5) noted that all of the Australian firms in its study were subject to a form of CPI-X regulation. The report included estimates for 21 US firms, five of which had some form of price-based incentive regulation with the rest being subject to cost- of- service (rate-of-return) regulation (p.54) and found the average betas (with 60 per cent gearing) for the incentive regulated firms to be 0.98 compared to 1.01 for the rate-of-return regulated firms, which was interpreted as approximately the same. However, the report did not investigate the impact of total revenue cap regulation which apparently did not apply for any of the firms in the sample.

We consider that it is **not reasonable** to use the results in the ACG report (2008) to draw a conclusion that the systematic risk for an entity with a regulated guaranteed maximum revenue cap, as applies to QR Network would not be empirically distinguishable from that which applies to energy transmission or distribution businesses that were subject to price or rate-of-return regulation. This is essentially because a guaranteed revenue cap by definition means no revenue variation for revenues covered by the revenue cap (apart from lagged effects) which is the prime driver of variability of returns as shown above, and the entities in the ACG study were generally not subject to a guaranteed total revenue cap or not subject to such a cap for a substantial part of their business (the exception is GasNet where the central measure of the equity beta ranged from 0.31 to 0.38 and lower bound confidence intervals were zero or slightly negative). Thus we consider that although the ACG (2009) report for the QCA has recognised that the revenue cap arrangements reduce the beta risk for QR Network, it has not made a meaningful adjustment to the beta estimates that it draws on in making its recommendations.

The nine Australian firms in the study with Bloomberg tick codes, their primary business and date of listing (as this affects the sample size) reported by ACG (2008, pp. 21-22) are:

- AAN- Alinta – vertically integrated energy company, major business was gas but has had substantial activities outside regulated infrastructure, listed in October 2000 and delisted in August 2007.
- AGL – Australian Gas Light – vertically integrated energy company, delisted in October 2006.
- APA - APA Group (Australian Pipeline Trust) – a pipeline business (Murraylink (electrical transmission), GasNet in Victoria and Allgas gas distribution in Queensland) listed in June 2000 - APA.
- DUET – major business is Dampier to Bunbury gas pipeline, but also has electricity and gas distribution businesses in Victoria and an interest in the US business Duquesne Power, listed in August 2004 - DUE.

- ENV - Envestra – engaged mainly in gas distribution in Victoria and South Australia, listed in August 1997.
- GAS - GasNet- major business is gas transmission in Victoria, listed in December 2001 and delisted in November 2006 and now owned by APA.
- HDF - Hastings Diversified Utilities Fund – Australian operations are largely gas, also has interests in UK water sector, listed in December 2004.
- SPN - SP AusNet – Electricity transmission system for Victoria, electricity distribution to eastern Victoria and gas distribution in western Victoria, listed in December 2005.
- SKI - Spark infrastructure – Electricity distribution in two parts of Victoria and in South Australia, listed in December 2005.

Assessment of the suitability of the 9 Australian energy businesses for determining an appropriate beta for QR Network

Overview

Table 4 reproduces the beta estimates and confidence intervals reported in the ACG (2008) study, along with a summary comment on the suitability of the business for determining a relevant beta for QR Network. It also presents estimates of beta based on a sample of 5 of the firms that we consider have revenue (and beta) risk characteristics with considerably lower revenue risk than the other 4 firms and which would be more representative for determining a beta for QR Network. Our reasons for choosing the sample of 5 firms are summarized below and presented in more detail in Appendix 3 .

However, we consider it the case that a beta estimate based on the recommended 5 firms would still contain an upward bias as it is clear that 4 of the 5 firms clearly are subject to more revenue risk than QR Network and GasNet may also have higher revenue risk than QR Network given a 5.5 per cent volume tolerance that applies.

Although some of the companies in the ACG (2008) study may have some businesses (particularly electricity and gas transmission businesses) that are subject to some form of guaranteed revenue cap, most contain activities that are not subject to a guaranteed total revenue cap, with many activities being subject to a price cap or lightly regulated or not subject to formal price regulation.

Table 4: Australian Energy Related Beta Estimates (with gearing of 60 per cent)

Stock	N	OLS			Re-weighted OLS			LAV			Comment
		L	M	H	L	M	H	L	M	H	
AAN	68	0.02	0.81	1.6	0.17	0.9	1.62	0.22	0.95	1.68	Substantial activities outside of regulated infrastructure
AGL	155	0.43	0.84	1.26	0.32	0.67	1.02	0.17	0.84	1.51	Substantial activities with revenue variability
APA	77	0.22	0.68	1.14	0.26	0.70	1.15	0.43	0.81	1.20	Major business is gas transmission, mix of regulated and unregulated pipelines
GAS	59	0.00	0.38	0.77	-0.02	0.31	0.64	-0.04	0.34	0.72	Closest comparator to QR Network, given from of revenue cap
ENV	78	0.00	0.36	0.73	-0.01	0.33	0.67	-0.31	0.04	0.4	Gas distribution and transmission business with stable revenue streams
DUE	36	0.12	0.38	0.65	0.13	0.3	0.47	0.02	0.38	0.73	Major business is gas pipeline, also has electricity and gas distribution businesses including US energy distribution and transmission business with revenue variability
HDF	41	-0.10	0.54	1.17	0.10	0.64	1.19	0.13	0.80	1.46	Owns 3 natural gas transmission pipelines , currently not regulated, and a UK water utility that until recently was subject to a price cap with revenue variability
SPN	27	-0.12	0.25	0.61	-0.11	0.23	0.57	-0.71	0.06	0.83	Mix of electricity transmission (39% of revenues) and distribution and gas distribution
SKI	29	0.24	0.57	0.91	0.23	0.56	0.89	0.09	0.59	1.09	Electricity distribution in Victoria and South Australia with price cap and average revenue cap arrangements respectively
Portfolio average	174	0.43	0.72	1.02	0.40	0.65	0.90	0.50	0.80	1.10	ACG (2008, p.5) notes that the weight of firms in the portfolio will be affected by the length of their trading history.
Average of 9		0.09	0.53	0.98	0.12	0.52	0.91	0.00	0.53	1.07	This is a simple average of the individual estimates
Average of 5 - APA, GAS, ENV, DUE,SPN		0.04	**0.41**	0.78	0.05	**0.37**	0.70	-0.12	**0.33**	0.78	The 5 firms are considered to be substantially more representative of QR Network's beta risk characteristics than the sample of 9
Average of 5 with 0.5 weight and weight of 0.5 for zero estimate		0.02	0.21	0.39	0.03	0.19	0.35	-0.06	0.16	0.39	Theory suggests some reasonable weight (0.5 is adopted here) should be given to a beta of zero when revenue is guaranteed
Average of 5 with 0.75 weight and weight of 0.25 for zero estimate		0.03	**0.31**	0.58	0.04	**0.28**	0.53	-0.09	**0.24**	0.58	A conservative weight (0.25 is adopted here) is given to a beta of zero when revenue is guaranteed
Overall average range for of 5 based on weights in above two rows					**0.19 to 0.28**						This is an average across the means for the 3 techniques and across the averages in the preceding two rows.

Source: the individual estimates and portfolio average are from ACG (2008, p.43)

Our approach suggests that 4 of the 9 firms in the ACG study would not be reasonable benchmarks given they either have substantial activities outside of regulated infrastructure or the regulatory arrangements provide considerable scope for revenue variability, because a total revenue cap does not apply and volumes are at risk.

The mean beta estimates for the 5 firms that are preferred for forming a benchmark upper estimate for the beta for QR Network, range from 0.33 to 0.41, which is well below the portfolio average of 0.65 to 0.80 reported by ACG. However, as noted by ACG the portfolio average is not a simple average of the individual beta estimates but rather an industry average from pooled data with the weight of firms in the portfolio affected by the length of their trading history. In this respect note that AGL, which is considered to be clearly not suitable as a benchmark, would have the greatest weight given it has the most observations. We consider that the portfolio average is not a suitable benchmark as it contains 4 firms that clearly have higher revenue (and beta) risk characteristics than QR Network and it gives proportionately more weight to one of those firms.

We note that the most suitable benchmark company in terms of similarity of the regulatory arrangements is GasNet (GAS) although as explained below it is still likely to have more scope for revenue variability than QR Network. The estimates for the mean for a beta for GasNet were in the range 0.31 to 0.38 which is similar to the average for the 5 companies in our preferred sample.

As explained below and in Appendix 3, we consider that the average beta for the sample of 5 firms would be biased upwards compared to a beta that would be most appropriate for QR Network. This assessment reflects the view that most of these firms have risk characteristics that imply the variability of revenues (and sensitivity to market returns) would be higher than for QR Network.

We have also shown above how an asset beta for QR Network would be directly dependent on its revenue beta. Thus as nearly all of QR Network's total revenue (with the exception of a small amount of revenue to cover less than about 10 per cent of maintenance costs or less than about 2 per cent total annual allowable revenue) is subject to a guaranteed maximum revenue cap (with any shortfalls or excesses corrected for within 2 years) the revenue beta should be approximately zero.

While first principles point to a beta of zero in this case, we recognise that the QCA may also want to draw on experience observed in the marketplace. However, there are very few firms that have similar guaranteed maximum revenue provisions to QR Network and even fewer that are share market listed. While the energy sector provides one avenue for comparison, it is important to recognise that very few energy sector firms have anywhere near the degree of revenue certainty provided by the regulatory provisions applying to QR Network. Thus in

forming an estimate of an appropriate beta for QR Network that draws on energy sector experience, it is necessary to make a significant adjustment for the likely upward bias to the estimates for the 5 companies in the preferred benchmark sample.

One option is to take a weighted average of the first principles value and the average from the (less than fully comparable) energy sector sample. A weighted average that applied equal weights to the first principles value and the average of the 5 energy sector firms would be likely to be most appropriate given the current state of knowledge. This produces a weighted average equity beta estimate of 0.19, assuming a gearing of 60 per cent. A conservative approach (in favour of QR Networks) would form a weighted average where a 25 per cent weight was given to an estimate of zero beta and a 75 per cent weight was given to the average beta estimate for the 5 companies in the preferred benchmark sample.

The weighted average using this conservative method, and averaging over the 3 estimation methods is 0.28.

Thus, the estimated range we propose for an equity beta for QR Network assuming gearing of 60 per cent is 0.19 to 0.28. For the purpose of calculating the WACC we will adopt the mid-point of the range, i.e. 0.24 for assumed gearing of 60 per cent.

As discussed below we consider that gearing of 65 per cent and an A credit rating should apply to QR Network. **With gearing of 65 per cent our preferred estimate for an equity beta for QR network would be 0.27.**

Review by company

In Appendix 3 we consider the mix and nature of business of each of the firms in Table 4 and the nature of regulatory arrangements that currently apply or have applied in recent years to determine whether it is reasonable to use them as benchmarks for determining a benchmark beta relevant to QR Network. In undertaking this analysis we assume that the key features of the regulatory arrangements based on recent information also applied for most of the period of the ACG study. This may require further investigation should our approach be considered as suitable for providing a more representative estimate of a suitable beta for QR Network.

AAN – Alinta has substantial activities outside of regulated infrastructure including energy generation and retailing. It has also been involved in substantial asset acquisitions, with complicated financial structures and flotation of some assets during the period of the ACG study. Given the importance of unregulated activities and the likely impact of the rapid asset acquisition and restructuring activities on share price volatility we consider that Alinta is clearly not suitable as a benchmark for establishing a beta relevant to QR Network.

AGL – Australian Gas Light has a mix of energy businesses in Australia and New Zealand, including generation assets and like Alinta has been involved in substantial restructuring and merger activity. Some 75 per cent of its revenue is derived from retailing. The AER (2009, p. 258) raised concerns about the beta for AGL in setting a benchmark equity beta for a benchmark efficient Network Service Provider, noting one third of its income was from foreign or unregulated activities.

APA Group has a mix of regulated and unregulated gas pipeline businesses. The pipeline businesses are likely to have relatively low revenue variability but unregulated revenues, although often supported by take or pay contracts are unlikely to be capped providing scope for upside variability greater than for QR Network. The rapid growth of the APA portfolio may also have had an important influence on share price variability. However, given that the APA Group is the major ASX-listed energy transmission group in Australia we propose that it be included as a benchmark but with the likely upward bias in the beta estimate being recognised.

The DUET Group has a portfolio of electricity and gas transmission and distribution businesses in Australia and a 29 per cent interest in a US electricity transmission and distribution business which also has an unregulated business selling electricity to large customers. Gas transmission is the single most important part of the business (generating about 37 per cent of total revenue). The other businesses are subject to more volume and revenue risk. We propose that it be included as a benchmark, but its beta should be interpreted in a group of companies for determining an upper estimate of a relevant beta for QR Network, because of the upward bias arising from greater overall revenue variability than for QR Network.

Envestra owns gas distribution and transmission pipelines that operate as regulated monopolies in key population centres. Cash flows are reported to be highly predictable and overall revenue volatility has been estimated to be very similar to QR Network. We consider that Envestra would be relevant for inclusion in a sample to estimate a benchmark beta for QR Network.

Gas Net's main asset is the Victorian gas transmission system which is subject to a maximum guaranteed revenue cap but with a 5.5 per cent volume tolerance. Although its revenue variability and beta are considered to be likely to be higher than what is relevant for QR Network, it is considered to be one of the most suitable benchmarks for determining a beta for QR Network, provided it is recognised that the estimate would be higher than what is most appropriate for QR Network

Hastings Diversified Utilities Fund currently comprises two investments: 100 per cent ownership of Epic Energy in Australia and a 30 per cent economic interest in South East Water (the largest of 11 regulated water only companies) in the United Kingdom. Epic energy comprises the three natural gas transmission pipelines of Moomba to Adelaide, South West Queensland and the Pilbara Pipeline. Although the gas transmission assets of HDUF provide a relevant benchmark for QR Network, the interest in the UK water asset and the nature of the contribution of that asset to the HDUF portfolio suggest that HDUF would not be suitable as a benchmark for determining a beta for QR Network.

SP AusNet is the largest diversified energy infrastructure business in Victoria. It owns and operates the state-wide electricity transmission network, as well as an electricity distribution network in eastern Victoria and a gas distribution network in western Victoria. The electricity distribution network is subject to price regulation that entails volume and revenue risk unlike the hybrid revenue cap for QR Network. However, electricity transmission is likely to have low revenue risk given the nature of the business and reflecting a maximum revenue cap mechanism that is in place. In 2009 electricity transmission regulated revenues were 39 per cent of combined revenue (SP AusNet 2009a, p.21). If SP AusNet is considered in determining a relevant beta for QR Network it is clear that it could lead to an upward bias in the beta estimate for QR Network. Recognising this qualification we nevertheless consider it would be relevant to consider SP AusNet for calculating an upper estimate for a benchmark beta for QR Network.

SKI - Spark Infrastructure is a specialist infrastructure fund. Spark Infrastructure's current portfolio comprises a 49% interest in three high quality Australian electricity distribution businesses, ETSA Utilities in South Australia and CitiPower and Powercor in Victoria (Spark Infrastructure 2009). CitiPower and Powerco are regulated under a price cap which is distinctly different from the hybrid revenue cap that applies for QR Network. ETSA Utilities is regulated by an average revenue control which also involves volume and total revenue risk.

The form of regulation in terms of a price cap or an average revenue cap has significantly different implications for volume and revenue volatility compared with the hybrid revenue cap that applies for QR Network. Given these characteristics, virtually all of Spark Infrastructure's revenue is subject to volume risk, so we consider that it is clearly reasonable to conclude that Spark Infrastructure is not a suitable benchmark for determining a beta for QR Network.

ACG's views

In its report for the QCA, ACG (2009, p.viii) concluded that there was no persuasive evidence to depart from its previous recommendation for the equity beta of a range of 0.6 to 0.9 and a preferred value of 0.8 for QR-Coal geared at 55 per cent. The recommendation was based on an assessment that the equity beta for QR-Coal should be broadly similar to the beta of the regulated Australian energy businesses that it reviewed in an earlier empirical study. The following excerpts from the ACG (2008) empirical study referred to are instructive:

> 'For the Australian firms, the average geared beta for the whole period (excluding the technology bubble, which we defined as between 1 July, 1998 and 31 December, 2001) ranged between 0.65 and 0.9 depending on the estimation technique. Upper bounds of the 95 per cent confidence interval ranged between 0.9 and 1.2. The results for the most recent five years were central beta estimates of 0.65 to 0.7 across all three estimation techniques with the upper bounds of the 95 per cent confidence intervals ranging from 0.85 to 1.0.' (p. 42).
>
> 'The OLS results also indicate that 4 out of 9 individual stocks had a lower 95 per cent confidence interval that is either zero or negative. Since it is unreasonable to expect a zero or negative beta for a 60 per cent geared electricity or gas transmission or distribution business (which would imply a business with zero systematic risk), this finding is an artefact of the quality of the data and the inherent imprecision of beta estimates and exemplifies the limited capacity of statistical analysis to adequately describe the level of uncertainty around the estimates.' (p. 43).

There are a number of points of clarification in relation to the above excerpts:

- First, the range of 0.65 to 0.9 is not indicative of a statistical confidence interval but rather just the range of the central estimates from 3 different estimation methods.
- Second, as explained earlier beta can be zero or negative in certain circumstances and could be expected to be very low the less uncertain are the revenue streams. For entities where revenue was not guaranteed and assuming 60 per cent gearing then it would normally be unreasonable to expect a zero or negative equity beta. However, as shown above a zero or negative equity beta could be expected if the revenues of a regulated entity were predominantly guaranteed.
- Third, the quality of the data can be such as to lead to imprecise estimates and may well contribute to near zero or negative confidence intervals in some cases. However, the proposition that the relative certainty of revenues is a contributing factor to low estimates of the lower bound confidence intervals cannot be ruled out as well.
- Fourth, the use of estimates that relate to the full combined sample periods of 1990 to 1998 and 2002 to 2008 is questionable compared to using estimates that relate to the

last 5 years of monthly data. This is particularly the case where the regulatory arrangements in the latter period or other economic factors are distinctly different than in the early period. In addition, the standard practice is to use the most recent data which would imply lower central estimates of the equity betas. The most recent data provide central beta estimates of 0.65 to 0.7 across all three estimation techniques.

- Fifth, note that for GasNet, where a form of guaranteed revenue appeared to be in place, for the period studied it is notable that the central estimates of the equity beta ranged from 0.31 to 0.38 and the 95 per cent confidence intervals from -0.04 to 0.77.
- Finally, as discussed in detail earlier in this section, consideration of regulatory and risk characteristics of the 9 Australian energy companies in the ACG study, compared with QR Network, highlighted that 4 of the companies are not suitable as benchmarks for determining a beta for QR Network. The remaining 5 companies are more suitable reflecting the importance of activities with regulatory arrangements with similar characteristics to those for QR Network in terms of the impact on revenues. However, they are still considered to be likely to provide a beta estimate with some upward bias. Preferred estimates were presented in Table 5. For gearing of 60 per cent the preferred estimate for an equity beta for QR Network, based on the analysis presented, is 0.24.

The AER

Given the importance attributed to beta estimates for Australian energy businesses it is relevant to consider the recent recommendations and reasoning provided by the Australian Energy Regulator (AER) (2009a) in its final decision with respect to an equity beta for gearing of 60 per cent:

- ‘Market data suggests a value lower than 0.8. However, the AER has given consideration to other factors, such as the need to achieve an outcome that is consistent with the NEO (in particular the need for the efficient investment in electricity services for the long term interests of consumers of electricity), the revenue and pricing principles (in particular providing the service providers with a reasonable opportunity to recover at least efficient costs, providing service providers with efficient incentives for efficient investment, and having regard to the economic costs and risks of the potential for under and over investment), the importance of regulatory stability. Having taken a broad view, the AER considers the value of 0.8 is appropriate.’ (p xvii)

Thus the AER appeared to be mainly concerned about appropriate investment incentives for efficient investment and regulatory stability. In a situation where there is a revenue cap that

effectively removes volume risk but still allows profits to increase from cost reduction initiatives, long term demand prospects are secure and a reasonable risk-adjusted return is allowed then it is unlikely that investment will be too low. As these characteristics apply to QR-Network to a greater extent than regulated energy businesses as a whole, it is suggested that there is scope to choose a beta that is considerably lower than 0.8. In terms of the impact on regulatory stability, the important point is that regulatory stability is surely only one aspect of a more encompassing criterion of regulatory credibility. This entails honoring commitments but also ensuring that consumers and business users are protected from the exercise of monopoly power. If investment efficiency is not compromised by a lower beta and monopoly power rents are lower, then regulatory credibility would be enhanced. It is suggested that this perspective is most relevant in considering the draft access undertaking for QR Network.

The AER also noted that the form of regulatory control can affect the sensitivity of returns to market wide factors. However, it did not examine the impact for an entity with a guaranteed revenue cap and large fixed costs in any meaningful detail. The AER (2009a, p.251) made the following points

1. All TNSPs are under a revenue cap form of control, whereas for DNSPs various control mechanisms exist.
2. Essentially the difference between the control mechanisms relates to volume risk.
3. The relevant volatility is volatility in returns rather than volatility in revenue and to the extent that demand and cost are related a price cap would lead to lower or at least equivalent exposure to non-diversifiable risk.
4. The relevant risk is non-diversifiable risk and it is arguable as to whether volume risk is a systematic risk factor.

The first point has been considered above in the discussion of the mix of businesses in the sample used to estimate betas. If an energy business has a mix of transmission businesses that are subject to a guaranteed total revenue cap and other businesses not subject to a guaranteed revenue cap then the beta estimate obtained will not be appropriate for a regulated business where its revenues are predominantly defined by a guaranteed revenue cap.

We agree with the second point about volume risk.

In relation to the third point, we agree that the relevant volatility is volatility in returns but for an entity with large fixed costs it is clearly not the case that a price cap would lead to lower exposure than a guaranteed revenue cap as explained in detail at the beginning of this section and shown in equations (1) to (7).

In relation to the fourth point, we agree that the relevant risk for choosing an appropriate beta is non-diversifiable risk. However when a guaranteed revenue cap applies it means that the sensitivity of volumes to market conditions is offset by a price adjustment to ensure revenues are maintained (albeit with a lag) and this in turn reduces the sensitivity of returns for the entity relative to market returns (the beta). In fact as shown at the beginning of this section if volumes decline due to a decline in general market conditions and some costs decline, returns can improve since revenues will not decline. This would imply a negative beta. The AER has not discussed these features in its final decision.

We consider that the issue of the impact of a guaranteed revenue cap on a beta for a regulated entity has not been properly considered by regulators in Australia and it would be important for regulatory credibility to address this weakness.

Asset stranding and asymmetric risk

An important assumption in applying the standard CAPM and selecting an appropriate beta is that investors only care about the mean and variance of returns. This in turn implies that either returns are normally distributed or that measures of skewness in the distribution of returns can be ignored. A specific parameter related to the possibility of skewness in the distribution of returns has not been proposed in the CAPM for the access determination and given the nature of the regulatory arrangements and the risks faced by QR Network (in particular the minimal risk of asset stranding) it is considered that it would not be appropriate to include a measure of skewness or make ad hoc adjustments to other parameters for such characteristics. This position appears to be consistent with the recommendations made by ACG (2009). In addition, the AER (2009, p. 248) in its recent comprehensive review of WACC parameters has noted:

> '**AER's conclusion**
>
> As is consistent with CAPM theory and the wording of the NER, the equity beta should only compensate service providers for exposure to non-diversifiable (systematic) risk, and not compensate for diversifiable (non-systematic) risk. Non-diversifiable risk refers to the macroeconomic or market-wide risk factors that effect the returns of all businesses in the economy—though to varying degrees—and include factors such as changes or volatility in inflation, GDP growth, interest rates, commodity prices and foreign exchange rates and changes in tax laws.
>
> The equity beta set by the AER should reflect the exposure of a benchmark efficient NSP's returns to these macroeconomic risk factors, and not that faced by any actual individual TNSP or DNSP.'

The QCA

In considering the appropriate beta for QR Network the QCA (2009, p. 19-20):

- agreed with ACG that the most relevant comparators are the Australian regulated energy businesses;
- noted the results of a recent study by Professor Olan Henry (2008) prepared for the AER (2009) for its final decision on WACC parameters for electricity transmission and distribution businesses, where it noted that Henry recommended an equity beta range of 0.35 to 0.62 (the Henry study covered 9 Australian companies from 2002 to 2008, 7 of which were also in the ACG sample);
- considered that QR Network's riskiness would tend to sit below that of regulated energy businesses and noted various factors in the 2009 draft access undertaking that it was proposing to accept would further reduce QR Network's exposure to covariance (non-diversifiable or systematic) risk;
- concluded that given the measures it was proposing to accept and the demand and cost conditions of Queensland coal producers, QR Network's asset stranding risk is minimal;
- concluded there was a strong case for an equity beta lower than 0.8;
- but proposed 0.8 as a conservative estimate given statistical uncertainties in beta estimation and the risk mitigation measures available to QR network; and
- invited evidence on whether a lower beta estimate is justifiable in the circumstances.

We consider that this report has presented clear evidence that a lower beta is justifiable in the circumstances.

The QCA in its draft decision has recognised the key factors that would reduce the sensitivity of QR Network's returns relative to market returns and relative to comparators in the regulated energy sector but did not propose an adjustment to the equity beta compared to the recent decision by the AER with respect to regulated energy businesses.

One consideration that may be influencing QCA's thinking is that in its previous determination (QCA 2005, p.28) noted that the hybrid price cap, volume trigger mechanism, take-or-pay arrangements and degree of upside potential that applied at the time:

> 'address any impact on QR resulting from its adoption of a price cap regime rather than a revenue cap regime.'

However, this interpretation does not diminish the proposition that a pure revenue cap effectively eliminates revenue risk and implies an asset beta of zero. Similarly if a hybrid revenue or price cap effectively has the same effects in terms of virtually eliminating revenue risk as a pure revenue cap, then that also implies a beta of approximately zero. From this perspective it is considered that to the extent that previous regulatory arrangements for QR Network effectively eliminated revenue risk the previous beta parameters and cost of capital would have meant an excess return to QR Network. This perspective highlights the importance of ensuring that excess returns associated with an overestimate of beta do not continue to occur at the expense of users.

We consider that there is a strong theoretical argument that the equity beta for QR-Network should be near zero. This follows from the nature of the hybrid revenue cap that applies for the regulatory period and the formal definition of the beta as only relating to non-diversifiable risk from the perspective of an investor. The hybrid revenue cap effectively provides a guarantee for revenue defined under the cap, with a small proportion of directly variable costs being regulated separately and effectively recovered with a separate tariff. Indexation of revenue over time eliminates inflation risk for invested capital, some of which would be systematic risk as well. To the extent that the revenue cap does not strictly apply or there are some opportunities to reduce costs that are correlated with economy-wide developments then there would be an influence on beta. But the latter would tend to reduce beta while the former influences could go either way and the revenue cap influence is considered to be likely to dominate in any case.

We also consider that this important influence on beta has not been properly recognised for relevant regulated entities in Australia and that failure to recognise it is not consistent with effective regulation of monopoly power.

It should be clear that it is not appropriate to use estimates of beta for companies that do not have similar regulatory arrangements and demand prospects as QR-Network and in particular to base estimates on companies with a mix of businesses and regulatory arrangements that do not lead to similar revenue certainty as for QR-Network.

Furthermore the data for the most recent 5 year period in the ACG (2009) study and the Henry (2009) study support a lower beta estimate for regulated electricity businesses and the AER has not recognised the full impact of guaranteed total revenue cap arrangements on beta.

These considerations along with the essential effect of a guaranteed total revenue cap provide strong support for a substantially lower equity beta then 0.8 for a gearing of 55 per cent. The certainty of revenue also provides support for QR network to have a better credit rating and also higher gearing than the average for regulated energy businesses. The credit rating and gearing parameters are considered further below.

Recognising the difficulties in setting regulatory precedents and the limited empirical information, but giving due recognition of the significant impact of a guaranteed revenue cap on volume risk and the variability of returns we are proposing an equity beta of 0.24 for assumed gearing of 60 per cent. However, we consider that the relative certainty of cash flows of QR Network compared with comparator companies, together with their gearing levels would justify a higher gearing and higher credit rating for QR Network. As discussed below we consider that gearing of 65 per cent and an A credit rating should apply to QR Network. **With gearing of 65 per cent our preferred estimate for an equity beta for QR network would be 0.27.**

3.3 Capital structure and credit rating

The hybrid revenue cap that applies to QR Network has important implications for the credit rating and efficient gearing that should apply to QR Network. As discussed in the consideration of an appropriate beta, the hybrid revenue cap that applies to QR Network effectively guarantees most of its revenue and all of its revenue relating to the asset base (apart from the net effect of lags in addressing under or over-recovery of revenue) as long as the revenue cap arrangements are in place. With low volatility of all but a small portion of its revenue and some scope to lower maintenance and variable costs, QR Network's credit rating should be higher than the average for the energy utilities that have been used as a key benchmark. The security of revenue and the higher credit rating should provide incentives and the scope for higher gearing.

In its draft decision, the QCA (2009a, p.20) has noted that:

> 'Companies that face less risk in their operating environment are generally able to sustain greater risk in their financial profile (i.e. higher gearing) for a given rating category.'

In its draft decision, the QCA (2009, p. 21) has proposed a credit rating of BBB+ and gearing of 55 per cent. It is suggested that based on the analysis presented in relation to revenue volatility for QR Network and the longer term demand prospects facing the coal industry that the risk of QR Network has been overstated in developing the credit rating and capital structure recommendations.

Some additional evidence in support of a higher credit rating than BBB+ for QR Network has been provided in a recent Discussion paper by IPART (2009). Table 5 below is based on Table 5.2 in the IPART (2009, p.33) report. It shows the cumulative default rate for global issues between 1981 and 2006 for issues rated, BBB, A, AA and AAA. For example, it shows that the probability of default for a BBB rated issue is 5.4 per cent in a 10 year period and 0.2 per cent in a 1 year period.

Table 5: Cumulative default rates by credit rating for global bond issues, 1981-2006 (%)

Year	AAA	AA	A	BBB
1	0.0	0.0	0.1	0.2
10	0.7	0.9	1.9	5.4
15	0.8	1.3	2.8	7.9

Source: IPART (2009, p.33) based on Standard & Poor's 'Corporate Ratings Criteria' (2008).

In interpreting the default rates, IPART (2009, p.33) notes:

> 'Probabilities of default are the core rates measured by credit ratings. Intuitively it is highly improbable that any Australian utility regulated by IPART would default in a 1 year period. Even for the longer time periods, the default rates for the BBB credit ratings look rather high in the context of an Australian regulated utility.
>
> As it is in the lower end of the benchmark ratings for investment grade bonds, BBB may be seen as a floor rating level for regulatory benchmarks. This then becomes a ceiling for debt costs. Regulators, such as IPART, have given further credence to BBB to BBB+ as a floor for financial performance by using the maintenance of BBB to BBB+ as a test for the financial sustainability of the outcomes. That is, proxy credit rating levels have been calculated on the basis of cash flows and regulators have sought to ensure these are consistent with maintenance of at least a BBB to BBB+ credit rating.
>
> However, while this implies that BBB to BBB+ is the minimum benchmark credit rating, it does not directly address the issue of the appropriate benchmark credit rating for an efficient well-managed firm. Indeed, although regulatory reviews typically identify scope for efficiency gains, the projected benchmark credit ratings have often been above these levels.

Information on the default rates was not provided for BBB+ credit ratings but it would be reasonable to infer that the associated default rates were between the A and BBB credit ratings. This suggests that for a BBB+ credit rating the probability of default is between 0.1 and 0.2 per cent in a one year period and between 1.9 and 5.4 per cent in a 10 year period. It is difficult to conceive that QR Network has a probability of default higher than 1.9 per cent over the next 10 years or higher than zero in a one year period. This follows from the nature of the regulatory arrangements over the next five years and the likelihood that there would be little risk of significant regulatory changes in the following regulatory period that would put sunk capital at risk, take or pay contracts and the prospects of the coal industry in that time frame. The information on default rates for credit ratings suggests that a credit rating of AAA would be appropriate for an entity with QR Network's risk characteristics and this would in turn support higher gearing for QR Network than 55 per cent at that rating.

In support of this proposition it is also noted that, according to information presented by IPART (2009) GasNet (which is considered to have regulated revenue cap arrangements with similar characteristics to QR Network) has an S&P rating of AAA (IPART 2009. P.15) and gearing of approximately 65 per cent (IPART 2009 p.39). As discussed in the section on the beta parameter, the nature of the regulatory arrangements for GasNet suggest it is the closest comparator in terms of revenue risk to QR Network.

Information on the credit rating and gearing for 4 of the 5 firms that were discussed for determining an upper estimate for a mean beta for QR Network are presented in Table 6. Information was not available for the fifth, firm the DUET Group. All of the firms have higher gearing than the 55 per cent selected by the QCA in its draft decision and two have a higher credit rating than BBB+. The credit rating for the other two firms may be lower because the gearing is higher. In the case of Envestra, the gearing is currently 76 per cent and the credit rating is BBB-.

Table 6: Cumulative default rates by credit rating for global bond issues, 1981-2006 (%)

Company	*Credit rating (S&P)*	*Gearing %*	*Source*
APA	BBB	65-70	APA (2009 b)
Envestra	BBB-	76	Envestra (2009)
GasNet	AAA	65	IPART (2009)
SP AusNet	A- to A+	58-67	SP AusNet (2009b, c)

Further information supporting the low variability of QR Network's revenue has been provided by ACG (2009). As noted earlier ACG (2009 p. 12) reports that a measure of the volatility (variance of the residuals for a regression of the natural log of time against the natural log of an EBITDA index) of Envestra (Gas Distribution) was 0.003, which was slightly less than 0.004 for QR-Coal. However this was an exception for the comparator companies (mostly transport businesses) that ACG used in measuring the variance of EBITDA, with the volatility estimates for most companies in the comparator group, reviewed by ACG, being 5 to 120 times that of QR-Coal.

ACG (2009, p. 15) noted that there was a lack of close comparator firms having the characteristics of QR-Coal's below rail coal haulage business. In relation to the transport businesses that it reviewed, it noted that there were a number of Australian transport businesses with gearing levels in the range of 52 to 57 per cent that experience higher EBITDA variability than QR-Coal but two New Zealand businesses (Auckland International Airport Ltd and Lyttelton Port Co Ltd) with EBITDA variability similar to QR-Coal and

gearing levels below 55 per cent. The specific variability measures for these New Zealand businesses were not reported but the variance of EBITDA for the transport New Zealand category reported by ACG (2009, p. 12) was 0.076, which was 19 times higher than that reported for QR-Coal. It would be useful to obtain further information about the regulatory, risk and credit rating (the latter were not provided in the ACG report) characteristics of these New Zealand entities. However, it is still a reasonable proposition that typically low revenue volatility ceteris paribus supports a higher credit rating and higher gearing, although individual businesses may have various reasons for adopting a low level of gearing.

Given the above information and recognising the extremely low revenue volatility of QR Network that derives from the existing regulatory arrangements and QR Network's robust business prospects that reflect the strong growth prospects and competitive position of the Queensland coal industry, it is considered that a BBB+ credit rating and 55 per cent gearing are not economically efficient benchmarks. It is considered that based on the default rate information an AAA or AA credit rating could be supported, along with gearing of at least 65 per cent. This is consistent for example with the credit rating and gearing of GasNet which has similar regulatory arrangements to QR Network.

Based on a credit rating of A or higher and information on fair value yield curves presented by ACG (2009, p.42) we suggest that the debt risk premium would be at least about 75 basis points below a BBB+ debt margin for a 5 year time horizon. We recognise that this adjustment is an approximation and suggest the QCA may want to investigate a more accurate estimate should it decide that a higher credit rating is appropriate in the circumstances. We accept the small margin for debt transactions costs proposed by the QCA.

However, one final issue we would like to highlight is the likelihood that debt margins may decline significantly over the next 5 years as financial markets recover from the global financial crisis. This raises the issue of whether the cost of debt should be adjusted on an annual basis. We have not investigated that issue at this stage.

3.4 Risk free rate

An estimate of 5.29 for the risk free rate as proposed in the QCA's draft decision is considered to be reasonable, taking account of historical records for risk free rates and expected inflation over the regulatory period.

However, we would like to reserve our view on the extent to which the risk free rate and the cost of debt should be indexed over the regulatory period to reflect market developments.

3.5 Market risk premium

After reviewing several methodologies and studies the QCA (2009, p.14) proposed a market risk premium of 6 per cent in its draft report. The information presented below suggests that there is scope to reduce the market risk premium to about 5.5 per cent based on estimates from 1988 to 2009. The estimates that have been prepared recognise that it is relevant to include an adjustment to the market risk premium to take account of the return to investors from franking credits. Without this adjustment the observed market risk premium would be lower. However the estimates have very large confidence intervals for both the period 1980 to 2009 and 1988 to 2009 and with virtually the same degree of dispersion when normalised on the mean estimate. The use of estimates for the past 20 years is considered to be more representative of investor expectations than a longer time period of 30 years provided the statistical precision is similar. However from a formal statistical perspective it is not possible to be conclusive about whether a lower or higher market risk premium should apply. For that reason we are unable to provide persuasive evidence that the market risk premium should be lower than 6 per cent, although recent data since dividend imputation was introduced in 1987, which are as reliable statistically as data for the 30 year period from 1980 to 2009, provide support for a lower premium. We also note that if one argues for a higher market risk premium that would seem to be inconsistent with the contention that gamma should be lower, if one accepts that investors who value imputation credits have a collective influence on share market prices. The reasoning and data that support our position are presented below.

When the Officer (1994) version of the CAPM is applied, as it has been by the QCA, it is necessary to add the return represented by franking credits to the observable market risk premium. This was recognised by Officer and has also been recognised by others such as Brealey, Myers, Partington and Robinson (2000) and Lally and van Zijl (2003).

For clarity, the observed measure of R_e (or the measure in the absence of dividend imputation) is:

$$R_{et}^{observed} = \left(P_t - P_{t-1} + d_t\right) / P_{t-1}$$

However, in addition to the capital gains component $\left(P_t - P_{t-1}\right)/P_{t-1}$ and the dividend component d_t / P_{t-1}, which appear in $R_{et}^{observed}$, shareholders receive franking tax credits C_t which have an average value of γ and this does not appear in $R_{et}^{observed}$. The return or yield from these franking tax credits is $\gamma C_t / P_{t-1}$ which must be added to the $R_{et}^{observed}$, to determine the true overall return to shareholders.

This adjustment yields the measure:

$$R_{et} = R_{et}^{observed} + \gamma C_t / P_{t-1}.$$

This measure represents the market return and the market risk premium is simply the market return less an appropriate measure of the risk free rate.

Table 7 contains estimates of the market risk premium with and without this adjustment for a range of estimates of gamma (γ). The estimates are based on the arithmetic nominal annual return of the ASX 200 accumulation index (which incorporates capital gains and dividend returns) from the end of one year to the end of the next year and the annual yield at the start of each year on 10 year government bonds. Ten years is the standard time frame that has been adopted in estimating a market risk premium but the average difference between 5 year and 10 commonwealth government bonds over the time frame reviewed was only about 0.17 per cent.

Dividend imputation was introduced on 1 July 1987 and an adjustment for the return on imputation credits involves adding the product of the dividend yield for each year (averaged over each of 12 months) and an estimate of the market ratio of imputation credits to cash dividends. This ratio is simply the ratio of the relevant corporate tax rate to 1 minus the relevant corporate tax rate i.e. t/(1-t). The intuition is that the amount that has to be added to the observable market return, is gamma times the tax rate times the dividend yield grossed up (divided by (1-t)) to a before company tax basis. If gamma is zero there is effectively no adjustment to the observable market risk premium.

An issue is whether to use an effective company tax rate or the statutory company tax rate. The effective company tax rate is preferred here since it reflects the average actual benefit in terms of an impact on the observable market risk premium. However estimates in the lower half of the table are reported based on the statutory tax rate which applied for each year.

An average effective company tax rate of 0.18 per cent was used based on the average reported by the Commonwealth Treasury (2006) for the period 1959-60 to 2004-05. This implies a ratio of imputation credits to cash dividends of 0.22 which is identical to the market ratio used by Lally and van Zijl (2003, p. 196) based on information provided by JP Morgan. For an effective tax rate assumed to be equal to the statutory tax rate of 30 per cent, the ratio of imputation credits to cash dividends is 0.43.

First consider the top half of the table where the value of imputation credits to cash dividends is based on an effective company tax rate of 0.18. Estimates are provided for the period 1980-2009 and 1988-2009 corresponding to 30 and 22 observations respectively. Estimates are provided for the mean, coefficient of variation (standard deviation divided by the mean when allows for comparisons of variability across different sample distributions) and 95 per cent confidence intervals.

Table 7: Market risk premium with adjustments for dividend imputation

	Market risk premium			
		Ratio of imputation credits to cash dividends = t/(1-t) where t = average effective corporate tax rate of 0.18		
	Unadjusted returns ASX accumulation index - risk free rate	Adjusted for imputation credits for $\gamma = 0.5$	Adjusted for imputation credits for $\gamma = 0.65$	Adjusted for imputation credits for $\gamma = 1.0$
		Mean		
1980-2009	5.9	6.3	6.4	6.6
1988-2009	**4.7**	**5.2**	**5.3**	5.6
		Coefficient of variation		
1980-2009	3.9	3.7	3.6	3.5
1988-2009	4.0	3.7	3.6	3.4
		95% confidence intervals		
1980-2009	± 8.4	± 8.3	± 8.3	± 8.3
1988-2009	± 8.0	± 8.0	± 8.0	± 8.0
		Ratio of imputation credits to cash dividends = t/(1-t) where t = statutory tax rate for each year		
	Unadjusted returns ASX accumulation index - risk free rate	Adjusted for imputation credits for $\gamma = 0.5$	Adjusted for imputation credits for $\gamma = 0.65$	Adjusted for imputation credits for $\gamma = 1.0$
		Mean		
1980-2009	5.7	6.8	7.0	7.6
1988-2009	4.7	5.8	6.2	6.9
		Coefficient of variation		
1980-2009	3.9	3.4	3.3	3.0
1988-2009	4.0	3.3	3.1	2.7
		95% confidence intervals		
1980-2009	± 8.4	8.3	8.3	8.3
1988-2009	± 8.0	8.0	8.0	7.9

Source: Reserve Bank of Australia F7 Share Market and F2 Capital Market Yields Tables, Commonwealth of Australia (2006, chart 5.4)

The observable (unadjusted) market risk premium is estimated to be 5.9 for the period 30 year period 1980 to 2009 and 4.7 for the 22 year period 1988-2009, following the introduction of dividend imputation in mid-1987. When adjustments are made for dividend imputation the market risk premium increases as shown in the third fourth and fifth columns. For a gamma of 0.5 the adjusted market risk premiums are shown to be 6.3 for the full 30 year period and 5.2 for the period from 1988 to 2009.

It is well recognised that there is considerable variability in the market risk premium from year to year over time. Synergies (2008, p. 86) concludes that an analysis over a period of less than 30 years will not result in a meaningful estimate. This is based on reference to the variability of means when estimated for 10 year periods and a reference to a view presented by Gray and Officer (2005, p. 21). We agree that 10 years is generally likely to be too short a period to estimate a reliable market risk premium, however the reliability of the estimate depends on the variability of the data so that it might not be necessary to have 30 years of data and a shorter, more recent period is likely to be more representative of the current market risk premium. This is also recognised by Gray and Officer (2005, p. 21):

> 'A long period of data provides better statistical precision (the mean estimate has a lower standard error) but data from long ago may be less representative of current circumstances.'

The coefficient of variation allows comparison of the relative dispersion across samples. Comparison of this measure for the different time periods and estimates of the market risk premium indicate there is virtually no difference in the normalised variability of the estimates for the samples of 30 and 22 years. Given this characteristic and recognising that more recent estimates are more likely to be more representative of current circumstances we prefer the mean estimates for the period 1988 to 2009. As our preferred estimate is based on the effective corporate tax rate when calculating the impact on the market risk premium and we consider that an estimate of gamma of 0.65 is more representative than 0.5, our preferred estimate of the market risk premium to be used in the Officer model is 5.3. We do however note that the confidence intervals for this estimate are plus or minus 8 percentage points, providing considerable scope for a lower or higher estimate.

We also note that the Brailsford et al (2006) study for the period 1988-2005 found a market risk premium of 5.1 per cent. This was the closest period to the period of our estimates.

Now consider the results in the lower half of Table 6. As noted these results adjust for dividend imputation based on assuming the effective tax rate equals the statutory tax rate. This provides more benefit to an average shareholder so the adjusted market risk premiums are higher than in the upper half of the table. If the preferred period of 1988-2009 is adopted

and a gamma of 0.5 is adopted the adjusted market risk premium is 5.8, which increases to 6.2 for a gamma of 0.65. However, we consider that these estimates are maximum mean estimates since the effective corporate tax rate will be considerably less than the statutory tax rate on average, consistent with long term average estimates.

In summary our preferred estimate for the market risk premium for a gamma of 0.65 is 5.3, as highlighted in the table. However, we recognise that from a formal statistical perspective it is not possible to be conclusive that the market risk premium should be lower than the current estimate of 6.0. We have assumed that a market risk premium of 6 per cent applies when calculating the overall WACC as presented in table 3.

3.6 Gamma

The QCA chose a value of gamma of 0.5 in its draft decision (QCA 2009, p.24). It rejected the proposition that gamma should be zero based on a view that the value of gamma should be the value that the marginal investor places on one dollar of imputation credits and that as foreign shareholders are the marginal investors and do not benefit from Australian dividend imputation the value should be zero. The QCA noted that a value of 0.5 was consistent with its practice to date and that the other estimate QR Network provided was 0.5. It also noted that this was a conservative estimate for the value of gamma and that the AER (2009a) recently increased its estimate of gamma from 0.5 to 0.65.

The AER (2009a, pp. xix, xx) notes:

> 'The gamma is a measure of value of imputation credits and is defined as a product of the 'imputation credit payout ratio' (F) and the 'utilisation rate' theta (θ).'
>
> 'The most appropriate estimate of the payout ratio is 1.0, which is consistent with the influential Officer WACC framework and the modelling assumptions in the AER's PTRM. Importantly, the AER considers there is not a significant issue of time value loss associated with the value of retained credits such that the adoption of an estimate for the payout ratio of 1.0 is unreasonable.'
>
> 'The AER maintains its position from the explanatory statement with respect to the market definition. Under a domestic CAPM framework, foreign investors in the Australian market will be recognised in defining the representative investor, but only to the extent they invest in the domestic capital market.'
>
> 'Based on the empirical evidence available, the AER considers that the 2006 Beggs and Skeels study provides the most comprehensive, reliable and robust estimate of theta inferred from market prices in the post-2000 period. Accordingly the AER has placed significant weight on the 2001-2004 estimate of theta from this study, of 0.57.'

> 'The AER maintains its view that the methodology provided by the Handley and Maheswaran (2008) study provides a relevant and reliable upper bound estimate of theta in the post- July 2000 period. A reasonable range of theta estimated from tax statistics is 0.67 to 0.81 for the post-2000 period, which gives a point estimate for theta from tax statistics of 0.74.'
>
> 'Based on the available evidence the AER considers that a reasonable estimate of the 'assumed utilisation of imputation credits' (i.e. gamma) is 0.65.'

If one accepts the AER analysis there is scope for a gamma that is higher than 0.5. However, as explained in the section on the market risk premium, gamma would have an influence on the premium with a higher gamma associated with a higher premium. As noted, based on data for the period 1988 to 2009 there is evidence that the market risk premium is lower and we estimated a mean observable premium of 4.7 for this period. However, in the Officer WACC framework it is necessary to make an adjustment to this premium to include the effective tax yield on imputation credits. When an adjustment is made based on effective tax rates (which we consider is the appropriate tax measure) the market risk premium increases to 5.2 to 5.3 depending on whether gamma is 0.5 or 0.65. If a longer time frame of 1980 to 2009 is used the market risk premiums are higher but the difference between the market risk premiums for the two sample periods is not statistically significant.

Given the uncertainty about the market risk premium and gamma we will assume that the regulatory precedents of a gamma of 0.5 and a market risk premium of 6.0 are maintained.

4 THE TIME PROFILE FOR DEPRECIATION CHARGES

In establishing a time profile for depreciation charges for a long lived sunk asset, there are several economic efficiency and fairness considerations. The key economic efficiency issue is to ensure that the profile of charges will recover the cost of capital invested, while also ensuring that the time profile of charges encourages optimal use of the asset.

For example, it may be economic to install excess capacity for a new infrastructure project because of the lumpiness of investment and expected growth in demand. In these circumstances inter-temporal efficiency considerations might justify smaller user charges for the early periods in the lifetime of the project reflecting the low marginal cost of usage and to encourage use of the infrastructure asset but these charges would progressively increase as demand growth occurred and capacity utilisation increased towards full capacity.

A potential problem with this form of 'peak load' pricing, however, is that there may be a mismatch between the users who benefit from relatively low prices in the early years of the asset's life and those who have to pay high prices as full capacity is approached, raising fairness concerns. However, if an approach is adopted that 'front loads' access prices then future users would benefit from lower prices at the expense of current users and they are not necessarily going to be the same users, and in addition greater utilisation of the asset may be discouraged when there is excess capacity.

An approach that 'back loads' real access prices assumes that there is minimal risk of asset stranding, however, this is considered to be a reasonable assumption for the rail network for the major rail corridors hauling coal in central Queensland.

Given that the medium and long term prospects for both thermal and metallurgical coal can be reasonably assessed as strong and secure, the rail infrastructure assets used for the haulage of coal are considered to have a long economic life. In particular, the risk of substantial asset stranding within a 20 year period is considered to be extremely low. In addition beyond that period there are still substantial coal reserves in Queensland and the industry is one of the lowest cost producers in export markets.

The calculation of deprecation, assuming substantial assets have a 20 year life rather than a life of 50 years or more (depending on their economic life) has a significant impact on capital charges in the early years of the life of the asset and is **not necessary when there is minimal (near zero) risk of asset stranding.** The risk of asset stranding for new assets also needs to take account of the prevalence of take or pay contracts and the scope for users to make capital contributions for new projects when infrastructure expansions are being negotiated.

The QCA (2009, pp.35-36) draft decision: supported the existing depreciation rates for pre-existing assets (in the 2001 valuation); did not consider it appropriate to re-open the depreciation rates applied to capital expenditure undertaken during the 2006 and 2008 undertakings; and proposed a rolling 20 year life and not a fixed 20 year life for new investments (depreciation would be calculated on the basis of the remaining useful life or 20 years whichever is the lesser).

The QCA decisions are consistent with a view that the asset stranding risk for QR Network is less than is maintained by QR Network. However, it is suggested that it is not necessary to adopt a rolling 20 year life for the purposes of calculating depreciation charges given the minimal risk of asset stranding for QR Network over a much longer time frame.

5 OPTIONS FOR THE RECOVERY OF RAIL INFRASTRUCTURE EXPANSION COSTS

5.1 The socialisation issue

This section considers the issue of the structure of charges for the recovery incremental sunk rail infrastructure and particularly the issue of capital charges for users who do not use or benefit in any significant way from the incremental rail infrastructure.

QR Network has a preference for an option for cost recovery that it describes as full socialisation (QR Network 2009c, p13). Full socialisation of capital costs entails the allocation of capital costs across all users of a rail network, usually in proportion to some measure of their use of the network (e.g. tonnage or tonnage-kilometers). The economic efficiency rationale for the socialisation of costs essentially requires that overall economic efficiency be enhanced. For a network asset this requires that network benefits and any savings in transactions costs be realised to a sufficient extent to offset any efficiency detriment (e.g. deterring use or investment by users or downstream activity). QR Network (2009c, p. 13) recognises that wider network benefits are necessary to provide a rationale for full socialisation of costs.

In considering this issue, in its draft report, the QCA (2009, p.31) noted:

> 'However, all customers, expanding and non-expanding, export and domestic benefit from being linked to a large rail network that connects them to multiple mines and provides them with:
>
> (a) economies of scale in transportation, from sharing a variety of costs they would have to bear on their own if there was not a coal export industry; and
>
> (b) the ability to receive coal in a competitive market from a larger number of mines than would be able to operate if there were only domestic customers.
>
> Moreover, all customers, including the domestic customers, have benefited from lower tariffs for many years when growth in demand was able to take advantage of excess capacity and economies of scale across the CQCR. Therefore, it would, in general, be inequitable and inefficient to lock in the benefits of the lower tariffs for some customers but not others.
>
> The authority believes this is most evident in relation to a domestic customer, such as the Gladstone Power Station, whose location means it consumes train paths that could be used for trains serving export markets. However, the case is less clear for Stanwell which, as noted by QR Network, does not use the more expensive infrastructure around Gladstone.

> Therefore in making its assessment, the Authority has not focussed on the type of projects forecast in the capital expenditure program, nor whether individual customers should be exempt from paying them, but rather, has focussed on the reasonableness of the quantum of the indicator.'

It is suggested that this issue needs more comprehensive consideration, as the case for acceptance of the socialisation of the costs of incremental rail infrastructure, as a general principle, essentially depends on:

(1) demonstrating that network benefits and savings in transaction costs from such an approach to pricing can be justified;

(2) showing that (1) applies, even where it can be shown that customers do not receive any meaningful benefits and incur significantly higher costs; and

(3) an alternative approach would not compromise the realisation of network benefits or other aspects of economic efficiency.

The issue is important since QR Network has already proposed full socialisation as its preferred option in its Regulatory Pricing Principles for the Southern Bowen Basin Expansion (QR Network 2009c) which if implemented would imply a price increase of some 2.5 times, the current multiple for existing users of the Moura system, following the next increment of capacity of 25 mtpa, even for those users who do not use the additional capacity.

5.2 Regulatory and pricing principles

To assess the justification for prices that are based on the full socialisation of costs it is important to have regard to the relevant requirements of the QCA Act and assess the coherency and application of the pricing principles proposed by QR Network.

The QCA Act

Section 138(2) of the QCA Act states that the Authority may approve a DAAU only if it considers it appropriate to do so having regard to:

> (a) promoting the economically efficient operation of, use of, and investment in, infrastructure by which services are provided, with the effect of promoting competition in upstream and downstream markets;
>
> (b) the legitimate business interests of the owner or operator of the service;
>
> (c) the public interest;
>
> (d) the interests of people who may seek access to the service;
>
> (e) the effect of excluding existing assets for pricing purposes;

(f) the pricing principles mentioned in section 168A of the QCA Act, including, among other things, that the price of access to a declared service should:

(i) generate expected revenue for the service that is at least enough to meet the efficient costs of providing access to the service and include a return on investment;

(ii) allow for multi-part pricing and price discrimination when it aids efficiency; and

(iii) provide incentives to reduce costs or otherwise improve productivity; and

(g) any other issues the Authority considers relevant.

QR Network's Proposed Pricing Principles (QR Network 2009a)

'The key principles associated with Part 6 are set out below.

- QR Network may establish different Access Changes to maximise the commercially viable use of Capacity while meeting the common costs of providing the Rail Infrastructure. However, within a particular traffic type within a particular geographic area, QR Network is restricted in differentiating between Access Seekers except to reflect differences in QR Network's cost or risk associated with those Train Services.
- QR Network cannot establish Access Charges for the Train Services of QR business groups which would prevent or hinder access by a competing Third Party Access Seeker.
- When establishing Access Charges, QR Network must consider:
    - The upper and lower limits for Access Charges for individual Train Services, or combinations of Train Services, so there is no cross subsidy;
    - The upper limit for Access Charges is the level required to recover the standalone cost of providing Access, and the lower limit is the level required to recover the expected Incremental Cost; and
    - The revenue limit is the maximum amount of allowable revenue, taking into consideration revenue earned through Access Charges and transport service payments.
- Where Capacity is limited, and expansion of the Capacity to meet the requirements of all current or likely Access Seekers is not commercially justified, QR Network may establish an Access Charge based on the highest Access Charge that any user of that Capacity could pay.
- As long as QR Network complies with the pricing constraints, it is entitled to earn revenue from the provision of Access that is sufficient to

achieve full recovery of efficient costs, including an adequate rate of return on the value of assets.

- QR Network may develop Reference Tariffs as an Access Charge for a Reference Train Service. QR Network may submit proposed new Reference Tariffs to the QCA for endorsement, and in certain circumstances the QCA can require QR Network to propose new Reference Tariffs.
- QR Network may request that an Access Seeker agrees to additional Access Conditions to the extent reasonably necessary to mitigate QR's exposure to financial risks.'

5.3 Assessment of the 'socialisation of costs' option

If access and usage charges per tonne-kilometre were broadly similar before and after proposed capital expansions or if all users had similar benefits from infrastructure expansions there would not be a concern by users with respect to the socialisation of capital costs. These characteristics are relevant in considering options for cost recovery since they may apply over the life time of the asset that is used but only under certain conditions. In examining the issue of the socialisation of costs it is also relevant to consider the requirements of the QCA Act, including economic efficiency and fairness from the perspective of users, and QR Network's proposed pricing principles.

More specifically a complete assessment should ideally address the following questions in developing an appropriate option for the recovery of incremental infrastructure costs (where those incremental costs may involve a substantial increase in charges for users who do not benefit directly from the infrastructure):

(1) Are there clear network benefits from the infrastructure expansion that will benefit all users including existing users?

(2) Can it be reasonably established that some users do not receive material benefits and yet are likely to pay significantly higher charges as a result of full socialisation?

(3) What would be the impact on profits, competitiveness and investment incentives for all users from full socialisation?

(4) Does socialisation breach the cross subsidy criterion for an upper limit i.e. the level required to recover the standalone cost of providing access? And if it does are there economic efficiency justifications for such a breach?

(5) Is the size of the increase in user charges that arises because of the socialisation of costs well in excess of what investors, who are major users of existing infrastructure, expected from contractual arrangements and commercial discussions and negotiations

with QR, including both below rail and above rail operations of QR before they committed to major investments?

(6) If a substantial proportion of users does not receive material benefits from an expansion and their charges were not adjusted for incremental infrastructure would correspondingly higher charges for new users deter their investment in coal mines?

(7) Is it too administratively costly to allow for charges to be adjusted in circumstances where some users clearly receive no real benefits from incremental infrastructure?

(8) Can the time profile of additional amortisation charges be extended based on an assumption of full utilisation of additional capital (i.e. minimum long run average incremental capital costs) while still ensuring adequate investment incentives for QR Network?

Without specific information for a specific case study it is not possible to provide a complete assessment in relation to the above questions, however, the following discussion expands on the questions and attempts to address them at a conceptual level. Note that since it is assumed that each option must fully recover incremental capital costs there will still be a price signal provided that signals the marginal cost of expansion but the recovery of costs requires consideration of other efficiency and regulatory objectives.

In relation to benefits (questions (1) and (2)) it may well be the case that some users and some downstream activities e.g. coal-fired power stations benefit from an expanded network in the form of the realisation of certain economies of density or diversification of supply. However, for some proposed expansions, economies of density may not arise until capacity is near fully utilised and even if some users benefited in various ways, there may be instances where it is clear that there are no real benefits. In addition, domestic users of coal might benefit from network externality effects but coal companies may not which does not appear to be explicitly recognized in the quote provided earlier in this section (QCA 2009, p13). Furthermore, some existing projects may become uneconomic which may in turn emphasise the need to consider other options for cost recovery.

In relation to question (3) it may be difficult to quantify the impacts but where a substantial increase in charges follows from full socialisation for users who clearly do not benefit from the proposed infrastructure expansion, it is reasonable to consider alternative approaches that still meet the objectives and criteria in the QCA Act. This is particularly the case where the increase in charges is so large that it could potentially jeopardise the viability of an existing mine.

For example, Anglo American is currently the only significant user of the line from Banana to Wooderson and does not require any further capacity on the line from Banana to Wooderson. QR Network (2009c) in its pricing paper on the upgrades in the Southern Bowen Region (which includes the upgrade to the Banana to Wooderson line) has indicated that current users may have to pay up to around 2.5 times their current tariff if costs are fully socialised. This is a very large increase and although the impact on viability has not been examined the size of the increase does highlight that blanket acceptance of socialisation of costs is not reasonable and that there is a need to consider the specifics of individual circumstances, particularly when large increases in charges are being proposed.

The ability of the value of the product to bear large cost increases also needs to be considered. For example, if an expansion of the system was to accommodate metallurgical coal (which has a substantially higher value than thermal coal) the new entrant may be able to pay the higher transportation costs but any existing thermal coal mine may not be viable at the higher transportation costs.

An additional consideration is that if the access price increase does lead to a decline in production of existing mines this will in turn imply lower profits, lower royalties and taxes and lower national income associated with the decline in production. There will be a net loss in Queensland and national income (consistent with an overall reduction in economic efficiency) compared with the counterfactual scenario where alternative cost recovery options are available that would not lead to lower production of existing mines while also not deterring new production.

In relation to question (4), it is suggested that full socialisation of capital cost is likely to entail numerous examples where a cross subsidy might arise because existing users are already paying an appropriate capital charge for the service they purchase and do not require any additional capital for that service over the physical life of the existing infrastructure.

It is noted that the QCA (2009) draft decision has accepted QR Network's proposal (QR Network 2009a, p. 72) 'for specific arrangements to breach the pricing principles in circumstances where QR Network can demonstrate, to the QCA's satisfaction, they are beneficial to the transport supply chain'.

The criteria for ensuring that cross subsidies do not arise are well established in regulatory economics and were developed because of a concern about the exploitation of monopoly power. It is suggested that there would have to be a very well-founded economic efficiency or fairness rationale to allow breaches of the stand-alone cost criterion, particularly if there was a reasonable option for ensuring the recovery of incremental costs that did not involve charges exceeding stand-alone costs for a particular service.

An additional point is that if a cross subsidy does exist or there are different capital costs entailed in providing services to different users, then charging of differential prices for access would not entail price differentiation as defined by QR Network.

Question (5) is important for addressing the problem known in economics as 'the hold-up problem' and its implications for investment incentives, regulatory credibility and fairness. The 'hold-up problem' refers to a situation where one party exploits the other party to an agreement or understanding after that other party has committed to an investment of a sunk nature. The potential for a hold-up problem reduces the incentive to invest in the first place which means a loss of economic efficiency where investments that would otherwise be viable do not go ahead because of the potential for 'hold-up'. In situations where a hold-up problem does arise there is also clearly an issue with respect to damaging the interests of users and a possible impact on regulatory credibility which also may affect investment incentives more widely.

Question (6) involves an assessment of the impact of higher charges on the economics of projects that are driving the infrastructure expansion which may be difficult but still merit investigation for major infrastructure expansions.

Question (7) relates to the issue of complexity in charging from an administrative perspective. The complexity issue can be overstated where all that is required is for some differential adjustments in circumstances where there are clearly minimal benefits for some users but significant cost impacts. Indeed there are precedents for such an approach, including the discount provided to Stanwell.

Question (8) effectively suggests investigating an alternative that would be relevant where the asset stranding risk for QR Network is minimal and future users should pay their share of the capital costs for the utilisation of a major asset with a long physical and economic life. This question essentially asks what is the optimal level and profile of capital charges over the life of the asset taking a comprehensive view of economic efficiency.

For example, as explained in Section 4, it may be economic to install excess capacity for a new infrastructure project because of expected growth in demand. In these circumstances intertemporal efficiency considerations might justify smaller user charges for the early periods in the lifetime of the project reflecting the low marginal cost of usage and to encourage use of the infrastructure asset but these charges would progressively increase as demand growth occurred and capacity utilisation increased towards full capacity.

With such an option user charges are not only indexed by the CPI but also by demand with the user charges increasing proportionally with higher demand (and hence utilisation). This is in effect a form of 'peak load' pricing. This approach also seems to be most consistent with

the matching principle in accounting that suggests that sunk costs should be matched with user benefits.

A potential problem with this form of 'peak load' pricing, however, is that there may be a mismatch between the users who benefit from relatively low prices in the early years of the asset's life and those who have to pay high prices as full capacity is approached. However, if an approach is adopted that 'front loads' access prices then future users would benefit from lower prices at the expense of current users who are also not necessarily going to be the same users, and in addition greater utilisation of the asset may be discouraged when there is excess capacity.

An approach that 'back loads' real access prices assumes that there is minimal risk of asset stranding, however, this is considered to be a reasonable assumption for the rail network for the major rail corridors hauling coal in central Queensland.

As the QCA (2009, p.151) notes with respect to asset stranding risk:

> 'The Authority accepts that QR Network faces a degree of asset stranding risk in that its access agreements generally have a shorter duration than the technical and economic lives of the below-rail assets to which they apply. The risk is however offset to a substantial extent by the large, low-cost reserves of coal remaining in central Queensland, and the likelihood that QR Network will recover its sunk cost from another user, even if the original user does not renew its access agreement.'

Section 2 of this report presented information consistent with QR Network facing minimal risk of asset stranding. This is particularly the case for rail corridor assets where users have made substantial capital contributions which together with historical user charges effectively mean that QR Network has already fully or substantially recovered any financial capital that it invested to fund the asset or that it is not entitled to capital charges given it did not provide any funding.

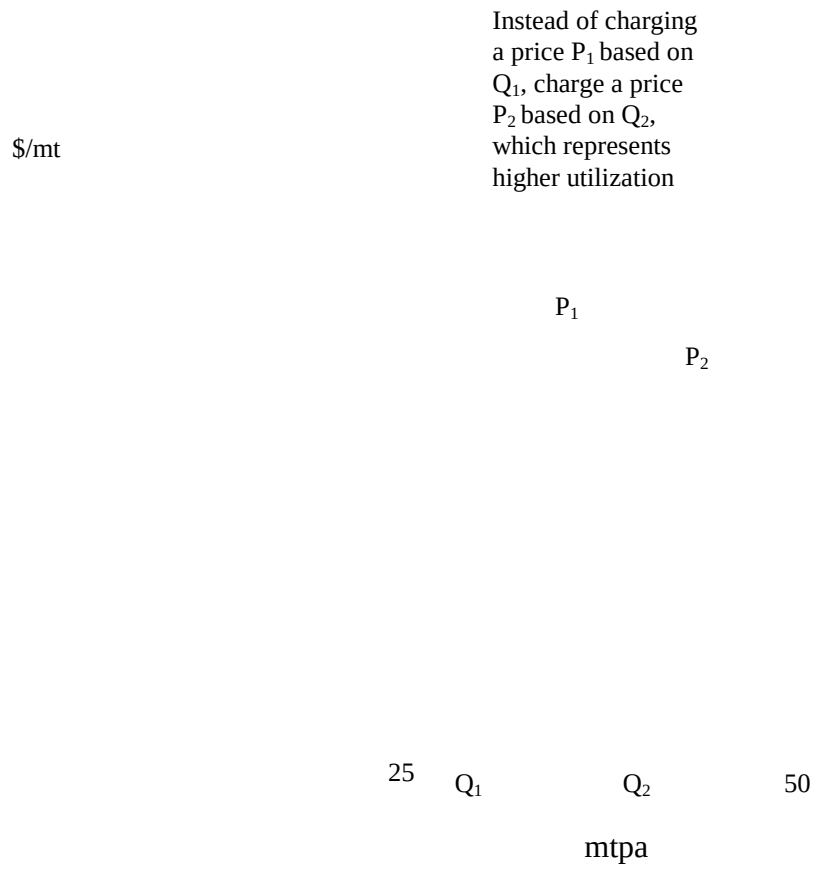
An important issue with the above approach is that it does not recognise that some users do not need the additional capacity and the increased cost of capacity is specifically related to the additional demand of other users. In a fully competitive market no distinction is made between different users and all users or customers have to pay the same competitive price which is fundamentally related to the marginal cost of supply. However, in a fully competitive market there is no sunk cost or market power problem and in order to analyse the issue one needs to rely on economic efficiency rather than a competitive market paradigm to establish reasonable charges.

Another issue with the above approach is that capacity expansions are very lumpy in nature and there are declining average total costs until capacity is reached at which time there may be a substantial discontinuity in average total costs for certain output levels.

A variation of the approach set out above that would minimise the scope for existing users to subsidise new or expanding users would be to set amortisation charges based on assuming that the next increment of capacity that is installed is near fully utilised, provided that the amortisation charge would cover the present value of the investment over its physical life. This approach recognises that when substantial new capacity is installed long run average (incremental) costs may increase significantly compared to current average costs until that capacity is near fully utilised but as volumes increase average total costs again decline.

Figure 1, which is based on QR Network (2009c, p.14) shows the profile of long run average costs and long run average incremental costs over a range of output that includes two major expansions (increments). The long run average cost curve is formed by tracing the lower envelope of each of the long run average incremental cost curves.

Figure 1: Long run average costs for rail infrastructure



When a major expansion in capacity occurs (in this case the next increment of 25 mtpa) average costs, as indicated by the $/mt figure, increase significantly and at an output level of Q_1 the corresponding price required to recover costs would be P_1. But as output expands to Q_2 a price of P_2 would recover total costs. Note that the depiction is highly stylised and does

not consider the time frame over which output remains at a specific level and the associated time frame for the recovery of capital. This has important implications for the size of any shortfall or surplus that might arise if prices deviated from average total costs for different output levels.

The proposal set out here is to charge users who do not require the additional capacity a price represented by P_2 even when output is well below Q_2 in order to avoid the sharp increase in prices implied by low capacity utilisation. However, for full cost recovery to occur there would be a shortfall, at a point in time, represented by the product of the difference between the two prices and output level Q_1. In other words, $(P_1 - P_2) \times Q_1$ is the shortfall that would arise assuming that an output level of Q_1 is sustained. However, the shortfall diminishes as output expands and as output is maintained at higher levels over time. Nevertheless the shortfall would need to be recovered by charging some users a higher price than average costs for a sufficient period of time.

QR Network (2009c, p.16) discusses a 'partial socialisation' option that would entail differential pricing and has some similarity to the option just presented except that, in one interpretation, it proposes that the shortfall just described would be socialised to non-expanding users while expanding users would pay a lower price based on the long run average cost of the relevant expansion. Such an approach is worse than full socialisation from the perspective of non-expanding users, as they would pay higher user charges than under full socialisation of costs.

QR Network (2009c, p.15) notes that an alternative would be to split the various expansion projects into: those that will primarily benefit Surat Basin users; and other Moura upgrades which are more likely to benefit all users. QR network (2009c, p.15) notes that the distinction between expanding and non-expanding users will become less relevant over time but that':

> '. . . the more appropriate question may be whether there are any users that would clearly not derive any benefit from the expansion.'

We agree with this proposition and propose that where existing users can be identified who do not clearly benefit from a rail infrastructure expansion they should not be required to pay for the expansion where it is reasonably feasible to establish differential charging arrangements and there are not other economic-efficiency or fairness based considerations that preclude differential charging arrangements. We note that the information presented earlier in this section supports differential charging for non-expanding users based on economic efficiency, fairness and other regulatory principles.

However, despite the principle it elucidated in relation to the question of 'any users that would clearly not derive any benefit from expansion' QR Network (2009c, p.18) noted that:

> 'For the reasons outlined above, QR Network does not consider it feasible - nor desirable - to implement a partial socialisation approach by seeking to explicitly distinguish between those users who might benefit and those who may not.'

The reasons that QR Network alludes to seem to mainly relate to the scope for all users to share in the benefits over time from infrastructure expansion or the difficulty in determining whether non-expanding users benefit from infrastructure expansion. As discussed above and consistent with QR Network's recognition of the importance attributed to the existence of benefits, **where there are expansions that clearly do not benefit non-expanding users to any real extent, there would seem to be no reasonable justification for precluding an adjustment to access charges to reflect the situation with respect to benefits.**

Where there is a substantial grey area QR Network may have a reasonable point but we understand that there are some significant examples where this is not the case. To reiterate, where it can clearly be established that non-expanding users do not receive any real benefits and face substantially higher usage charges, if full socialisation or certain forms of partial socialisation were implemented, then there would not seem to be a reasonable rationale for precluding differential usage charges for the infrastructure. It is also noted that full or partial socialisation, in these circumstances, would in fact mean that some users effectively face price discrimination in the sense that they were charged user prices that did not reflect the costs they impose in terms of usage of the infrastructure.

As a final point the Banana to Wooderson case illustrates that it is the specifics of an individual circumstance that will determine the relative merits of how these additional costs should be treated. In other words, there should be no general principle that socialisation of costs should ordinarily apply.

APPENDIX 1: WOOD MACKENZIE COAL PRICE AND VOLUME FORECASTS

Metallurgical coal

Wood Mackenzie, a premier supplier of research in the energy and minerals sector provides a coal price forecast service that includes an assessment of medium to longer term prospects. The Wood Mackenzie (June 2009a and b) reports on metallurgical coal price and export supply forecasts show that Queensland clearly has good prospects with respect to metallurgical coal. The following was highlighted in these reports:

- From 2009 to 2015 metallurgical coal average export prices are forecast to remain at low levels due to the easing of supply constraints and the development of projects in new metallurgical coal export countries, such as Indonesia, Mongolia and Mozambique. Infrastructure constraints for Australian exports are expected to be removed in this period as well.
- From 2016 to 2025 a strong and steady increase in prices is forecast as production closely matches demand. This reflects slowing supply growth in Queensland and price being influenced by rising marginal costs from increased supply sourced from higher cost countries such as Canada and the United States.
- The average annual increase in coal export volumes out of Queensland between 2009 and 2025 is estimated to be 4.5 per cent.
- Queensland low-volatile hard coking coal and medium-volatile hard coking coal form the largest single component of the seaborne coking coal trade.
- Queensland is a low cost producer of hard coking coal compared to other major exporting countries.
- Low-volatile hard coking coal and medium-volatile hard coking coal have superior value in use compared with high-volatile coking coals, attracting a price premium that is forecast to increase from 2009 to 2025.
- A large increase in low-volatile coking coal exports from Queensland is forecast peaking in 2020 at about 120 mt per annum, reflecting capacity expansion at Dalrymple Bay and improved rail infrastructure. Lower tonnage of Queensland low-volatile hard coking coal and medium-volatile hard coking coal is forecast from 2021 to 2025, but is still around an average of 100 mt per annum, compared with less than 60 mt per annum in 2009. It is noted that the lower supply in these latter years reflects a finite project pipeline in Queensland.

- A large increase in medium-volatile coking coal exports from Queensland is forecast - from about 30 mt per annum in 2009 to about 75 mt per annum in 2025.
- The volume of volatile coking coal exports from Queensland is small (less than 6 mt per annum in 2009) and expected to increase from 2009 to 2017 before declining substantially over the rest of the forecast period to about 4 mt per annum in 2025. The decline in high-volatile coking coal exports from Queensland declines as low- and medium-volatile coking coal exports increase.
- The volume of semi soft/PCI coal out of Queensland is forecast to rise from about 20mt per annum in 2009 to about 40 mt per annum in 2019 before fluctuating and declining to about 25 mt per annum in 2025, reflecting depletion of a number of mines.

Thermal coal

For thermal coal Wood Mackenzie (November 2009c) presents the following forecast information:

- Strong growth in thermal coal exports from Australia until 2012.
- Static prices for thermal coal until 2012 and sustained price recovery not expected until 2016 reflecting supply-demand balances, including strong growth in thermal coal supply capacity from Indonesia.
- A steady increase in nominal thermal coal prices from 2015 to 2025.
- The average annual increase in coal export volumes out of Queensland between 2009 and 2025 is estimated to be 7.8 per cent.
- Thermal coal exporters out of Queensland will benefit from considerable margins that are expected to increase steadily throughout the forecast period.
- Suppliers in Queensland are forecast to significantly increase volumes after 2016 with only minimal increases in cost (volumes increase from around 20-25 mt per annum for the period 2009 to 2014 to over 60 mt per annum by 2025) .

APPENDIX 2: DECOMPOSITION OF ASSET BETA

This appendix was prepared by Professor Tim Coelli, an Associate of Economic Insights Pty Ltd and Adjunct Professor, School of Economics, University of Queensland.

This appendix shows how an asset beta can be decomposed into its underlying revenue and cost beta components and how a revenue beta can be decomposed into revenue betas for different categories of revenue.

The beta for a stock is defined as the ratio of the covariance between that stocks' return and the market return divided by the variance of market returns.

For two random variables *x* and *y*, the definition of covariance is:

$$Cov(x, y) = E[(x - E(x))(y - E(y))] = E(xy) - E(x)E(y). \quad (1)$$

The covariance between a linear combination of two random variables and a third random variable is therefore:

$$\begin{aligned} Cov((ax+by), z) &= E((ax+by)z) - E(ax+by)E(z) \\ &= aE(xz) + bE(yz) - aE(xz) - bE(yz) \\ &= aCov(xz) + bCov(yz), \end{aligned} \quad (2)$$

where *a* and *b* are constants, and *z* is a third random variable.

This results shows that the covariance between a linear combination of two random variables and a third random variable, is equal to the linear combination of the constituent covariances.

Beta decomposition #1- the relationship between an asset beta and revenue and cost betas

Consider now the accounting relationship:

$$PV(\text{revenue}) = PV(\text{fixed costs}) + PV(\text{variable costs}) + PV(\text{asset}).$$

To construct a beta decomposition for this relationship we define five random variables. Namely:

$x_1 =$ one dollar of PV(revenue)
$x_2 =$ one dollar of PV(fixed costs)
$x_3 =$ one dollar of PV(variable costs)
$x_4 =$ one dollar of PV(asset)
$x_5 =$ one dollar of PV(market return).

Thus we need to use a multivariate version of the above linear combination result.

From page 870 of Greene (2003) we have:

$$Cov(\mathbf{a}'\mathbf{x}, \mathbf{b}'\mathbf{x}) = \mathbf{a}'\boldsymbol{\Sigma}\mathbf{b} \quad , \tag{3}$$

where $\mathbf{x}$ is a $n \times 1$ vector of random variables, a and b are $n \times 1$ vectors of constants, and $\boldsymbol{\Sigma}$ is the $n \times n$ covariance matrix of the random vector $\mathbf{x}$.

Consider now the linear combination:

$$-PV(\text{revenue})x_1 + PV(\text{fixed costs})x_2 + PV(\text{variable costs})x_3 + PV(\text{asset})x_4 ,$$

where the PV measures are constants.

For this case we define

$$\mathbf{a} = (-PV(\text{revenue}), PV(\text{fixed costs}), PV(\text{variable costs}), PV(\text{asset}), 0)'$$

and

$$\mathbf{b} = (0, 0, 0, 0, 1)' .$$

Thus we obtain

$$Cov(\mathbf{a}'\mathbf{x}, \mathbf{b}'\mathbf{x}) = \mathbf{a}'\boldsymbol{\Sigma}\mathbf{b}$$

$$= -PV(\text{revenue})\sigma_{15} + PV(\text{fixed costs})\sigma_{25} + PV(\text{variable costs})\sigma_{35} + PV(\text{asset})\sigma_{45}$$

where σ_{ij} is the covariance between x_i and x_j. That is, the ij-th element of $\boldsymbol{\Sigma}$.

Also note that the diagonal elements of $\boldsymbol{\Sigma}$ are variance measures. That is, σ_{ii} is the variance of x_i.

If we divide this equation through by $PV(\text{revenue})\sigma_{55}$ and rearrange terms we obtain:

$$\beta_1 = \beta_2 \frac{PV(\text{fixed costs})}{PV(\text{revenue})} + \beta_3 \frac{PV(\text{variable costs})}{PV(\text{revenue})} + \beta_4 \frac{PV(\text{asset})}{PV(\text{revenue})} ,$$

where $\beta_i = \sigma_{i5} / \sigma_{55}$.

Beta decomposition #2- the relationship between a total revenue beta and revenue betas for individual components of total revenue

Consider now the revenue decomposition:

$$PV(\text{revenue}) = PV(\text{regulated revenue}) + PV(\text{other revenue}).$$

To construct a beta decomposition for this relationship we define four random variables. Namely:

$x_1 = \text{one dollar of } PV(\text{revenue})$
$x_2 = \text{one dollar of } PV(\text{regulated revenue})$
$x_3 = \text{one dollar of } PV(\text{other revenue})$
$x_4 = \text{one dollar of } PV(\text{market return}).$

We then define the linear combination:

$$-PV(\text{revenue})x_1 + PV(\text{regulated revenue})x_2 + PV(\text{other revenue})x_3,$$

where the *PV* measures are constants.

Then, using again equation (3), we define

$$\mathbf{a} = (-PV(\text{revenue}), PV(\text{regulated revenue}), PV(\text{other revenue}), 0)'$$

and

$$\mathbf{b} = (0,0,0,1)'.$$

Thus we obtain

$$Cov(\mathbf{a}'\mathbf{x}, \mathbf{b}'\mathbf{x}) = \mathbf{a}'\boldsymbol{\Sigma}\mathbf{b}$$

$$= -PV(\text{revenue})\sigma_{14} + PV(\text{regulated revenue})\sigma_{24} + PV(\text{other revenue})\sigma_{34}.$$

Dividing this equation through by $PV(\text{revenue})\sigma_{44}$ and rearranging terms we obtain:

$$\beta_1 = \beta_2 \frac{PV(\text{regulated revenue})}{PV(\text{revenue})} + \beta_3 \frac{PV(\text{other revenue})}{PV(\text{revenue})},$$

where $\beta_i = \sigma_{i4} / \sigma_{44}$.

APPENDIX 3: ASSESSMENT OF THE SUITABLITY OF AUSTRALIAN ENERGY BUSINESSES FOR DETERMINING QR NETWORK'S ASSET BETA

This appendix reviews the 9 Australian energy businesses reported by ACG (2009, 2008) used to develop a recommendation for a beta for QR Network. It shows that most of the firms are clearly likely to have higher revenue variability and non-diversifiable systematic risk than QR Network. This is mainly because QR Network has a regulated maximum revenue cap for virtually all of its revenues where this is clearly not the case for all but one of the sample of 9 firms. Some firms have stable revenues but for most the nature of the regulatory arrangements and mix of business components means they are characterised by considerable volume and revenue risk that is not a characteristic of QR Network given its regulated maximum revenue cap.

We consider that 4 of the 9 firms are clearly not suitable for establishing a benchmark beta for QR Network given the nature of their revenue risk. On average the remaining 5 firms are also considered to be likely to provide beta estimates that are biased upwards compared with a beta estimate that would be appropriated given QR Network's risk characteristics. However, we consider the sample of 5 is more reasonable for forming a benchmark, provided the likely upward bias to the average beta for the sample is recognised.

Detailed discussion of the 9 firms, identified by their Bloomberg tick codes is presented below.

AAN - Alinta

Alinta is a vertically integrated energy business which as noted by ACG (2008, p.22) '

> 'has been involved in a series of mergers and takeovers since its listing and at times has had substantial activities outside regulated infrastructure.'

The Alinta Energy Website at http://www.alintaenergy.com/# at Feb 2009 presents the following information:

> 'Alinta Limited is a major Australian energy company with interests comprising energy generation, transmission, distribution and retailing. Alinta, or Alinta Gas as it was previously known, was originally owned by the Government of Western Australia. When the State Energy Commission of WA was broken-up in 1998, Alinta Gas was privatised and sold.

A note from a Company Profile Agency – that appears to relate to the period 2006 or 2007 – (http://www.linkedin.com/companies/alinta) says:

> 'Alinta Limited, through its subsidiaries, engages in the operation or ownership of a portfolio of energy assets in Australia and New Zealand. It operates in five segments: Energy Markets, Energy Distribution, Asset Management, Power Generation, and Energy Investments. The Energy Markets segment incorporates the retail sales of gas and electricity to customers in Western Australia; the Wesfarmers LPG contract; and the supply of wholesale energy in Western Australia, New South Wales, Victoria, and Tasmania. The Energy Distribution segment represents the AlintaGas Networks in which it holds a 74% ownership interest. The Asset Management segment comprises Alinta Asset Management and Alinta Energy for the operation, construction, and maintenance activities of the infrastructure assets in which it holds an ownership interest. The Power Generation segment includes the ownership, operation, construction, and commissioning of cogeneration units located at Alcoa's Pinjarra alumina refinery. The Energy Investments segment owns minority investments in infrastructure assets. The company is headquartered in Perth, Australia.'
>
> There was a major restructuring in 2006 as AGL and Alinta merged into two newly listed entities Alinta Ltd and AGLEnergy Ltd. Alinta has grown very rapidly since it was listed in October 2000, with much of the growth associated with substantial asset acquisitions, complicated financial structures and the flotation of some assets.

Given the importance of unregulated activities, including the contribution of generation assets and the likely impact of the rapid asset acquisition and restructuring activities on share price volatility we consider that Alinta is clearly not suitable as a benchmark for establishing a beta relevant to QR Network.

AGL – Australian Gas Light

AGL is also a vertically integrated entity where guaranteed revenues are not likely to be a prominent feature and it is noted that this company had a relatively high central estimate of beta in the range of 0.67 to 0.84 (ACG 2008, p.43) in the sample of 9 Australian energy related businesses.

AGL has a mix of energy businesses in Australia and New Zealand but the vast majority of revenue in the period of the study was from retail energy sales (some 75 per cent or more according AGL Annual Reports (2003, 2005, 2006, 2008)). AGL was also involved in substantial restructuring and merger activity in the period of the ACG study .

The AER (2009, p 258) noted the following about AGL when considering it in the context of benchmarking equity betas:

> '…. The AER also notes that from at least 1999 to 2006, approximately a third of AGL's total earnings before interest and taxes is from foreign (e.g. New Zealand or Chile) or unregulated activities. Accordingly, placing sole reliance on AGL to set an equity beta for a benchmark efficient NSP may result in a too conservative

> outcome. On the issue of the retail activities of AGL, the AER does not consider that the regulated standard contract 'safety nets' from FRC effectively reduced AGL's un-diversifiable risk. These standard contracts effectively provided a price cap in a market where retailers compete for customers. Accordingly, it could be argued that these standard contracts more than likely increased AGL's business risk and its corresponding equity beta. ….'

It is clear from this quote and the reliance on retail energy sales that AGL faces considerable volume risk and is not suitable as a benchmark for establishing a beta relevant to QR Network.

APA – APA Group (Australian Pipeline Trust)

APA Group is the major ASX-listed energy transmission group in Australian transporting more than half of the natural gas used in Australia. APA also provides management and operation services to its investments including gas distribution and transmission company Envestra (APA 2009b).

A preliminary review of the APA Group confirms that it has substantial gas pipeline assets that are not subject to price regulation. It is understood that take or pay arrangements generally apply, and although minimising or eliminating downside volume risk, they typically do not specify a total revenue cap so that upside potential is not precluded.

Table A3.1 shows the main pipelines with APA ownership or involvement. Several are not subject to economic regulation or have light regulation including the Moomba to Sydney gas pipeline. A review of the financial commentary in the APA annual reports for 2008 and 2009 also indicates that substantial revenues are not subject to a revenue cap that would effectively guarantee virtually all total revenue as is the case for the access arrangement for QR Network. In addition market returns would be affected by the nature and extent to which APA group was involved in substantial acquisitions and information in the annual reports confirm APA has been very active with acquisitions.

In relation to the Moomba to Sydney pipeline the 2008 (p. 7. P. 10 and p. 29) annual report noted that revenue increased primarily as a result of increased peak gas demand and new contracted services for the winter period and the 2009 (p.32) annual report noted that an increase in contracted and spot demand for capacity and storage services and an increase in throughput tariffs on this pipeline were among the main factors driving an increase in underlying profit. The APA (2008, p.7) annual report noted that the Victorian transmission system was boosted by both record gas throughput and higher regulated tariffs.

Table A3.1: Gas pipelines covered by regulation for APA

Pipelines with APA ownership or involvement	State	Covered by regulation	Valuation $m	Year of valuation	Current access arrangement
Carpentaria Pipeline (Ballera to Mount Isa)	Qld	Yes (light)	na		Not required
Roma (Wallumbilla) to Brisbane	Qld	Yes	296	2006	2007-2011
Moomba to Sydney Pipeline	SA-NSW	Partial (light)	835	2003	2004-2009
Central West (Marsden to Dubbo) Pipeline	NSW	Yes	28	1999	2000-2010
Central Ranges (Dubbo to Tamworth) Pipeline	NSW	Yes	53	2003	2005-2019
Victorian Transmission System (GasNet)	Vic	Yes	524	2007	2008-2012
SEA Gas Pipeline (Port Campbell to Adelaide)	Vic-SA	No	500	2003	Not required
Goldfields Gas Pipeline	WA	Yes	514	1999	2000-2009
Parmelia Pipeline	WA	No	na		Not required
Midwest Pipeline	WA	No	na		Not required
Kalgoorlie to Kambalda Pipeline	WA	Yes	na		None Approved
Bonaparte Pipeline	NT	No	170	2008	Not required
Amadeus Basin to Darwin Pipeline	NT	Yes	229	2001	2001-2011
Wickham Point Pipeline	NT	No	36	2009	Not required
Daly Waters to McArthur River Pipeline	NT	No	na		Not required
Palm Valley to Alice Springs Pipeline	NT	No	na		Not required

Source: AER (2009b), State of the Energy Market.

Another factor contributing to the increase in profit was strong growth from Western Australia's Goldfields Gas pipeline due to expanded capacity and new revenue contracts. Reduced operating expenses form synergy benefits and the removal of third party operating fees were also identified as factors increasing EBITDA (APA 2008, p.35).

Standard and Poors assigned APA its initial credit rating in June 2009 of BBB, noting that the stated gearing level was 65-70 per cent (APA 2009b).

Although APA has a portfolio of relatively low risk gas transmission assets there is considered to be likely to be more upside potential and hence revenue variability than for QR Network. The rapid growth of the APA portfolio also may well have had an important influence on share market prices and hence on the beta estimate in ACG (2009) raising the question of relevance for the more stable revenue provided under QR Network's guaranteed maximum revenue cap. However, given that the APA Group is the major ASX-listed energy transmission group in Australia we propose that it be included as a benchmark but with the likely upward bias in the beta estimate being recognised.

DUET – The Duet Group

The Duet Group has a portfolio of electricity and gas transmission and distribution businesses. Duet (2009a) has:

- a 66 per cent interest in United Energy Distribution, one of five electricity distribution networks in Victoria which are subject to price cap regulation;
- a 79.8 per cent interest in Multinet, the largest of three natural gas distributors in Victoria and subject to price regulation;
- a 25.9 per cent interest in WA Gas Networks, the largest distributor of natural gas in Western Australia;
- a 60.0 per cent interest in the Dampier to Bunbury natural gas pipeline, one of five major onshore natural gas transmission pipelines in Western Australia and which links the gas fields in the North-West shelf with the Perth region and mid and South-West Western Australia.
- a 29 per cent interest in Duquesne Light which is an electricity utility based in Pittsburg, north-east USA.

In 2009 the shares of consolidated revenue for gas transmission, gas distribution and electricity distribution were as follows (Duet 2009b, p. 93)

- Gas transmission – 36.6 per cent.
- Gas distribution – 18.8 per cent.

- Electricity distribution – 44.1 per cent.

The electricity distribution businesses in Victoria are subject to a regulated price cap and are subject to both volume and revenue risk. Information from SP AusNet's 2009 Annual Report in relation to its electricity distribution and gas distribution businesses in Victoria confirm that these businesses are subject to volume and revenue risk (see below) and as the same regulatory arrangements apply for United Energy Distribution and Multinet, they would be subject to similar risks. This is confirmed also by the Duet (2008 p.18 and 20) annual report where it was noted that growth in tariff revenue is driven by volume growth and regulated tariff changes for both United Energy Distribution (electricity distribution) and Multinet (gas distribution).

In relation to WA Gas Networks, this was formerly Alinta Gas Networks and the Duet (2008, p.22) annual report notes that

> 'Approximately 95% of AGN's total revenue comes from distribution tariffs, charged to customers for connection to, and use of, AGN's distribution system. Growth in distribution revenue is driven by regulated tariff charges, changing customer demand and volume growth from new connections.'

The Dampier to Bunbury gas pipeline is covered by regulation (AER 2009, table 9.1) and is likely to experience relatively low volume and revenue risk. However, information presented in the Duet (2009c, p. 14) Annual report confirms that a fully guaranteed revenue stream does not apply:

> 'Almost all of DBP's revenue comes from gas transportation tariffs, charged to wholesale and retail customers for shipping gas along the pipeline. DBP has entered into standard long-term contracts with the major shippers using the pipeline – other than Alcoa – and, under these contracts, approximately 80% of the tariff is paid on a capacity reservation basis (take-or-pay), with the remaining 20% depending on the actual throughput of the pipeline. Alcoa, as the foundation shipper, has an evergreen contract with tariff agreements that differ from other shippers.'

The following information was provided in the Duet (2008 p.15) Annual Report. Duquesne Light is an electricity utility based in Pennsylvania, US. Duquesne Light comprises a core regulated electricity distribution and transmission business, along with several affiliated unregulated businesses. In addition, Duquesne Light has an unregulated business selling electricity to large commercial and industrial customers. The transmission and distribution businesses are subject to rate-of-return regulation (Duet 2008 p.17 and http://www.duet.net.au/duet/asset-portfolio/duquesne.htm) but volume deliveries have been very stable over time. Rate-of-return regulation, like price cap regulation entails volume and revenue risk but as suggested in the Duet annual report this risk appears to be relatively small

for Duquesne Light (but nevertheless likely to be higher than for QR Network as revenue is not guaranteed).

Based on the characteristics and mix of DUET's asset portfolio, it is considered that it is likely to be the case that DUET has higher revenue and profit variability than QR Network. However the contribution of the gas transmission business and the nature of the associated regulatory arrangements suggest that it would be relevant to include DUET, but with qualifications, when determining a relevant benchmark for QR Network. We propose that it be included as a benchmark, but its beta should be interpreted in a group of companies for determining an upper estimate of a relevant beta for QR Network, because of the upward bias arising from greater overall revenue variability than for QR Network.

ENV - Envestra

Envestra Limited owns gas distribution and transmission pipelines that operate as regulated monopolies in key population growth centres in Victoria, South Australia and Queensland. APA currently currently owns 30 per cent of Envestra. According to a report on the full year results for 2009, cash flows are highly predictable and grow in line with customer connections and regulated tariff increases, supporting sustainable dividend payments to shareholders over the long-term (Envestra 2009a).

The 2009 (Envestra 2009b, p.14) annual report in discussing the revenue and income results noted:

> 'Envestra's revenue and income, which is generated mainly from the delivery of natural gas for retailers, was $389.1 million, up $43.1 million on the previous year. The improvement in revenue was due mainly to cooler weather than the prior year in Victoria and South Australia, the increase in distribution tariffs across all three major States (South Australia, Victoria and Queensland), as well as revenue from the 23,000 new consumers added to the Company's networks. Land sale proceeds and increased revenue from mains alterations works carried out during the year were further contributors to the higher revenue and income in 2008-09.'

This information shows that Envestra's revenue stream is not fixed and in particular can vary with the weather and customer connections. However, it is relevant to note that ACG (2009 p. 12) reports that a measure of the volatility (variance of the residuals for a regression of the natural log of time against the natural log of an EBITDA index) of Envestra (Gas Distribution) was 0.003, which was slightly less than 0.004 for QR-Coal. However this was an exception for the comparator companies (mostly transport businesses) that ACG used in measuring the variance of EBITDA, with the volatility estimates for most companies in the comparator group, reviewed by ACG, being 5 to 120 times that of QR-Coal.

The average gearing for Envestra as 76 per cent for the four years from 2006 to 2009 and the most recent Standard & Poors credit rating was BBB- (Envestra 2009a).

Based on the characteristics and mix of Envestra's asset portfolio, it is considered that it would be relevant to include Envestra in a group of companies for determining an estimate of a relevant beta for QR Network.

GAS – GasNet

GasNet's main asset is the Victorian gas transmission system. GasNet is now owned by the APA group. The exact regulatory arrangements that applied for the period when it was treated as a separate company in the ACG sample are not clear but it seems as if the regulatory arrangements that currently apply would entail similar revenue risk characteristics to QR Network, although the current arrangements specify a 5.5% volume tolerance (which does not apply in the case of QR Network). This view was formed by reviewing the Approved GasNet Australia Access Arrangement with a commencement date of 1 January 2008 and an explanatory note to a letter from the APA Group to the Australian Energy Regulator dated 17 November 2009. The explanatory note was as follows:

> 'APA GasNet is entitled to recover its approved revenue over the access period. The approved revenue is defined as a total net present value (NPV) for the access period. The approved NPV can vary within preset limits to reflect changes in system throughput compared to the original forecast. These limits protect APA GasNet from significant revenue shortfalls and Shippers from significant increases in their total charges. The final volume for 2008 was marginally in excess of the 5.5% tolerance allowed under Schedule 4.5 of the AA and it is estimated that this will also occur in 2009. In both cases this is largely due to the high gas fired electricity generator (GPG) demand compared with the original AA forecast.

GasNet (has an S&P rating of AAA (IPART 2009. P.15) and gearing of approximately 65 per cent (IPART 2009 p.39).

The risk characteristics of GasNet indicate that it is relevant for consideration in a sample for determining a beta for QR Network. Although its revenue variability and beta are considered to be likely to be higher than what is relevant for QR Network, it is considered to be one of the most suitable benchmarks for determining a beta for QR Network, provided it is recognised that the estimate would be higher than what is most appropriate for QR Network.

HDF - Hastings Diversified Utilities Fund

Hastings Diversified Utilities Fund currently comprises two investments: 100 per cent ownership of Epic Energy in Australia and a 30 per cent economic interest in South East Water (the largest of 11 regulated water only companies) in the United Kingdom. Epic

energy comprises the three natural gas transmission pipelines of Moomba to Adelaide, South West Queensland and the Pilbara Pipeline (HDUF 2008). According to the AER (2009) none of these pipelines is currently covered by economic regulation under the National Gas Law. However, regulatory coverage of the South West Queensland pipeline was only removed in mid-2008. It is understood that substantial revenues would be subject to take or pay agreements for these pipelines but the terms and conditions of such contracts are not known. However, for some pipelines there is upside potential to the extent that the pipelines can accommodate larger flows and contracts for those flows (e.g. for the Moomba to Adelaide pipeline (HDUF 2008, p. 11, p. 13 and p.17). The position with respect to spot sales is not known.

Also, review of the regulatory arrangements for South East Water that applied in the period used in the ACG study confirms that water utilities in England and Wales were subject to price control that allowed for considerable revenue variability. It is relevant to note that the recent Ofwat (2009 pp. 55) Framework and Approach paper for 2010-15 is proposing a revenue-corrected price cap instead of a price cap to address concerns about revenue outperformance. In contrast to the price cap arrangements that have been in place, the proposed revenue corrected price cap would correct for any revenue over- or under-recovery in net present value terms. The first time this mechanism will be used by Ofwat will be at the 2014 price review.

Finally review of the income and profit results by business segments indicates that although the pipeline business is the major contributor to income there can be significant variability from year to year from the water business and for the group's financing activities in relation to its investments. For example total segment income from the water utility was reported to be $12.1 m in 2007 but only $.05 m in 2008 while income from gas pipelines was $94.4 m in 2007 and $97.2 m in 2008 (HDUF 2008, p.63). In both years the water utility made substantial losses after tax while the gas pipeline business made profit after tax of $14.8 and $14.6 m respectively. Total profits after tax were $16.1 m in 2007 and $m 11.8 in 2008. Total income was $m 121.7 in 2007 and $m 99.5 in 2008. Thus despite the importance of the pipeline businesses (total pipeline assets were about 70 per cent of total assets in 2008) there was substantial variability in income and profits for HDUF in these years. It would be useful to consider a longer time frame to confirm similar variability over the time frame of the ACG study. However, this information does cast considerable doubt on including HDUF as a benchmark for determining a beta for QR Network, particularly as ACG (2009, p. 12) reports a variance of EBITDA for QR-Coal, which is extremely low (most companies in the comparator group of transport businesses, reviewed by ACG, had a variance of 5 to 120 times that of QR-Coal).

Although the gas transmission assets of HDUF provide a relevant benchmark for QR Network, the interest in the UK water asset and the nature of the contribution of that asset to the HDUF portfolio suggest that HDUF would not be suitable as a benchmark for determining a beta for QR Network.

SPN - SP AusNet

SP AusNet is the largest diversified energy infrastructure business in Victoria. It owns and operates the state-wide electricity transmission network, as well as an electricity distribution network in eastern Victoria and a gas distribution network in western Victoria. The electricity distribution network is subject to price regulation that entails volume and revenue risk unlike the hybrid revenue cap for QR Network. However, electricity transmission is likely to have low revenue risk given the nature of the business and reflecting a maximum revenue cap mechanism that is in place.

As explained by the AER (2008b, p.305) the transmission arrangements in Victoria differ from those in other states, given the roles and responsibilities that are ascribed to SP AusNet and VENCorp. In relation to pricing matters, SP AusNet undertakes the allocation of the AARR to each of the categories of prescribed transmission services, and is also responsible for pricing connection services. VENCorp is responsible for pricing prescribed TUOS services and prescribed common transmission services. Under these arrangements it is understood that VENCorp effectively pays SP AusNet its regulated maximum allowable revenue cap which is not subject to volume risk. However 3 per cent of SP AusNet's regulated transmission revenues are at risk under performance and availability incentive arrangements (VENCorp 2009, p.5).

Information presented in SP AusNet's 2009 Annual Report confirms that both the electricity and gas distribution parts of its business are subject to volume risk while the electricity transmission business is not subject to business risk:

- For electricity distribution (SP AusNet 2009a, p.22 SP AusNet 2009a,): ' Revenues were favourably impacted by weather conditions as well as the strong growth in customer numbers and an increase in tariffs.'

- For gas distribution (SP AusNet 2009a, p.22) 'Revenues were favourably impacted by the weather conditions which were cooler than the previous year leading to increased heating load. Revenues were also favourably impacted by a strong growth in customer numbers and from the Gas Access Arrangement Review Further Final Decision.'

- For electricity transmission (SP AusNet 2009a, p. 23): 'Transmission regulated revenue is not subject to volume risk.'

In 2009 electricity transmission regulated revenues were 39 per cent of combined revenue while electricity distribution regulated revenue was 37.4 per cent and gas distribution regulated revenue was 14.7 per cent of combined revenue (SP AusNet 2009a, p.21).

SP AusNet has a Moody's credit rating in the A range (SP AusNet 2009b, p.6) which corresponds to the A- to A+ range of Standard and Poors. Gearing has been in the range of 58 to 67 per cent over the years ended March 2009 and March 2008 and was 64 per cent based on the face value of debt or 67 per cent based on the market value of debt as at 31 March 2009 (SP AusNet 2009c, p.14).

Given the nature of the regulatory arrangements, the transmission part of SP AusNet's business is considered to have similar risk characteristics to QR Network. However, the rest of the business, some 60 per cent in terms of revenues, is concluded to have higher revenue variability than QR Network. Thus if SP AusNet is considered in determining a relevant beta for QR Network it is clear that it could lead to an upward bias in the beta estimate for QR Network. Recognising this qualification we nevertheless consider it would be relevant to consider SP AusNet for calculating an upper estimate for a benchmark beta for QR Network.

SKI - Spark Infrastructure

Spark Infrastructure is a specialist infrastructure fund. Spark Infrastructure's current portfolio comprises a 49% interest in three high quality Australian electricity distribution businesses, ETSA Utilities in South Australia and CitiPower and Powercor in Victoria (Spark Infrastructure 2009). Segment revenue for the trust holding the Victorian electricity distribution businesses was $220.7 m in 2008 and segment revenue for the trust holding the electricity distribution business in South Australia was $96.9 m in 2008.

CitiPower and Powerco are regulated under a price cap which is distinctly different from the hybrid revenue cap that applies for QR Network. ETSA Utilities is regulated by an average revenue control as explained by ESCOSA (2005, p.165):

> 'The EPO requires that the CPI-X approach be applied to average revenue. This means that the Commission will need to set a maximum revenue that ETSA may earn per unit, as opposed to (for example) a control on total revenue.'

However there is a mechanism in place to ensure some sharing of revenue in excess of or below forecast sales. ESCOSA (2005, p.174) notes:

> 'The Commission has therefore decided to alter its sharing ratio such that ETSA Utilities retains 15% of the financial impact of the difference between forecast sales and actual sales. For example, ETSA Utilities will receive 15% of the benefit flowing from sales that are higher than forecast and 85% of the additional revenue is returned to customers in the next regulatory year (and vice versa for lower sales.'

Spark Infrastructure's gearing was approximately 64 per cent at the end of 2008 and approximately 58 per cent in 2007 (Spark Infrastructure 2009, p.12).

The form of regulation in terms of a price cap or an average revenue cap has significantly different implications for volume and revenue volatility compared with the hybrid revenue cap that applies for QR Network. In addition, it is clear from the information provided in relation to SP AusNet that Victorian electricity distribution businesses are subject to volume and revenue risk and from the ESCOSA (2005) decision that ETSA Utilities is also subject to volume and revenue risk. Given these characteristics, so that virtually all of Spark Infrastructure's revenue is subject to volume risk, we consider that it is clearly reasonable to conclude that Spark Infrastructure is not a suitable benchmark for determining a beta for QR Network.

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