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QR NATIONAL

25 September 2012

Mr John Hall
Chief Executive Officer
Queensland Competition Authority
GPO Box 2257
BRISBANE QLD 4001

Dear Mr Hall,

Re: QR Network's Electric Traction DAAU

Please find attached QR National's submission, together with supporting materials, in response to the Queensland Competition Authority's (QCA) Draft Decision of July 2012 on QR Network's Electric Traction Draft Amending Access Undertaking (DAAU).

QR National regards sustainable, efficient pricing mechanisms for electric traction as being of fundamental importance to continued industry confidence in the regulatory framework. To this end, QR National has been working with its customers and with QR Network to progress a commercially viable solution to the complex set of issues raised by the DAAU.

We remain firmly of the view that electric traction is the most efficient supply-chain solution for the Blackwater and Goonyella systems, and that the regulatory arrangements should promote efficient utilisation of the overhead power system.

QR National welcomes some aspects of the Draft Decision, most notably the recognition by the QCA that the current AT5 may not be promoting efficient outcomes. However, QR National is concerned that the Draft Decision does not appear to appreciate the need for the judicious resolution of this problem, and believes that continued deferral of the issue will undermine investment certainty and increase costs to industry.

For that reason, QR National would encourage the QCA to constructively engage with QR Network and other stakeholders to identify a commercially satisfactory solution that will promote ongoing investor confidence in the Queensland coal sector.

Should your have any questions in relation to the attached materials, please contact Robin Laver, Regulatory Advisor, on (07) 3046 9516 or via email at Robin.Laver@qrnational.com.au.

Yours sincerely

[redacted]

PER

Andrew MacDonald
Senior Vice President
Commercial and Planning

QR National

Submission on QR Network's Electric Traction Draft Amending Access Undertaking (DAAU)

Public Submission to the

Queensland Competition Authority

25 September 2012

QR NATIONAL

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Attachments

Attachment A: *Economic Aspects of Electric Traction Charges*, Paper prepared for QR National by Henry Ergas, Alex Robson and Joe Owen, September 2012

Attachment B: QR Network, 10 May 2012, Traction Working Group, Meeting 3 presentation

Attachment C: International reference study - Bombardier Transportation, *Electric locomotives for freight corridors* January 2007

Attachment D: International reference study - Japan International Corporation Agency, *The Feasibility Study on The Development of Dedicated Freight Corridor for Delhi-Mumbai and Ludhiana-Sonnagar in India, Final Report*, Ministry of Railways Government of India, 2007

Attachment E: International reference study - Siemens, *Diesel versus Electric 2012*

Attachment F: International reference study - China CNR, *Datong Electric Locomotive Co., Ltd*

Attachment G: International reference study - Bombadier, *New Electric locomotives for the UK: The 20th Annual Rail Freight Group Conference*, 29th May 2012

Attachment H: International reference study - Transnet, *Heavy Haul Operations in South Africa, Presentation to IHHA Calgary Canada,* 2011

1 Executive Summary

This submission sets out QR National's (QRN) view on the QCA's proposed rejection of QR Network's Electric Access Draft Amending Access Undertaking (DAAU).

QRN has responded in considerable detail to the QCA's Draft Decision as it believes the QCA's approach to this issue could have significant implications for future investment in the coal rail network, as well as the potential to extend into other regulated sectors. In QRN's view, the QCA's final decision could have significant implications for investor certainty, with potential negative implications for future infrastructure investment at a critical time for the Queensland resources sector.

(a) The Draft Decision does not recognise supply-chain coordination failure

QRN has a clear interest in ensuring that industry supported, and QCA endorsed, investment in electric below-rail capacity is priced efficiently, because QRN has based fleet acquisition decisions on this information.

Consequently, QRN is concerned that the Draft Decision does not appear to recognise that the current pricing arrangements for electric traction are giving rise to persistent and costly supply-chain coordination failure across the electrified CQCN. In this regard, the Draft Decision does not adequately take into account that the current regulatory arrangements give users an ability and incentive to select a traction technology to further their own commercial interests, despite the fact that all users would be better off if choices were coordinated to select the most efficient traction type. This aspect of the tariff arrangements means that decisions by even a small number of users across Goonyella or Blackwater (or both) can result in costs being imposed on other users, with the further consequence that the Queensland coal industry does not attain the efficiencies that would come from coordinating traction choice and realising economies of scale.

In this respect, QRN finds it difficult to reconcile the Draft Decision with the QCA's prior recognition of coordination problems in the Queensland coal system. For example, in relation to coordination issues in the DBCT supply-chain, the QCA has said on a previous occasion that:

> *The supply chain coordination issues have not arisen by accident or by chance. Indeed, these issues are the accumulated result of individual entities acting in their own best interests and, inadvertently, not in the collective interests of the supply chain as a whole.*[1]

Further, the QCA appears to regard the DAAU, and the underlying TCO model, as re-agitating whether or not the electrification of Blackwater was a superior alternative to increased diesel use, whereas QRN regards that question as beside the point in circumstances when both above and below-rail electric investments are already sunk. The key issue, which the Draft Decision does not address, is identifying the most efficient way forward for the current Blackwater network, given substantial investment in electrification and the prevailing coordination failure.

In this respect, while QRN understands the commercial position of customers in Blackwater considering whether or not to contract for diesel hauls, it does not consider that the current tariff arrangements, which allow users to impose the cost of their own traction decisions on other users, to be efficient. QRN is particularly concerned about the impact of these arrangements on its customers with electric hauls, who are currently facing the prospect of increasing below-rail tariffs simply because they, and QRN as their operator, have relied upon a regulatory pre-approval process which has proven to be flawed. QRN therefore welcomes the Draft Decision's finding that AT5 may not be sending an appropriate price signal for the efficient use of electric infrastructure.[2]

However, QRN is disappointed that, although the QCA regards this problem as solvable by efficient below-rail pricing, it has not actually proposed or implemented an efficient price in the Draft Decision. In QRN's view, it is insufficient for the QCA to indicate that an efficient price would resolve this problem, but then not actually provide

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1 QCA, October 2008, *Issues Paper: QR Network 2009 Draft Access Undertaking*, p.iv

2 QCA, July 2012, *Draft Decision QR Network Electric Traction Services Draft Amending Access Undertaking,* p.5

industry with any guidance on what that price will be or how it will be calculated. In this respect, it is notable that the QCA Act contemplates that the QCA, when it refuses to approve a DAAU, will propose ways in which a DAAU might be amended to make it acceptable.[3] QRN regards resolving this issue on the protracted UT4 timetable as being both unnecessary and incompatible with the commercial reality of the rail haulage market.

(b) The Draft Decision has generated uncertainty about below-rail cost recovery with negative implications for investor certainty

QRN regards the certainty provided by QCA pre-approval of capital expenditure as being essential to investor confidence and the efficient operation of the Queensland coal supply-chain. QRN notes that the Blackwater Electrification Project was supported by the Blackwater user group and endorsed by the QCA as prudent.[4] Moreover, supply-chain participants, including QRN, have invested in rollingstock and entered into haulage agreements after relying on a below-rail master plan prepared by QR Network and voted on by users pursuant to the QCA's framework.[5] It follows that QRN regards maintaining the integrity of the pre-approval process as vital. QRN is therefore supportive of the Draft Decision's finding that electric assets will be protected from asset stranding,[6] and will not be stranded merely because of ex post discontent about the voting process, or because some users are electing not to utilise a sunk investment that they previously supported.[7]

However, despite indicating that it will not strand assets, the QCA has not provided an indication of the pricing mechanism by which it means to avoid that occurrence. QRN must necessarily therefore assume that, if users opt for diesel contracts, the cost of QR Network's investments will be increasingly shared across all of its customers in the Blackwater system (both diesel and electric), given the inability of a declining electric user base to economically support the entire asset. It is therefore critical for QRN, as it seeks to manage its contractual commitments and its customers' expectations, to understand how the QCA would approach such an eventuality, and in this respect, as noted, the Draft Decision provides no guidance.

Further, QRN notes that failure by the QCA to appropriately and fully deal with these issues in its Final Decision, may have potential negative implications for future supply-chain investment at a critical time for the Queensland resources sector. All supply-chain participants, not only QR Network, but also above-rail operators and port authorities, must be able to rely on the supply-chain planning process as providing certainty and investor confidence.

(c) The Draft Decision relies on incorrect facts or inadequate consideration of relevant facts

The Draft Decision finds that QR Network's TCO analysis does not adequately demonstrate the efficiency of electric traction over diesel in Blackwater.

In making that assessment, the QCA has relied on representations by stakeholders. QRN notes that responding to a QCA investigation is a self-selecting process and it is therefore incumbent on the QCA to fairly assess the relative merits of all submissions and to independently verify factual representations. QR Network has informed QRN, given that the above-rail information in the TCO model is confidential to QRN, that neither the QCA, nor any stakeholder, have sought access to the model, despite being invited to do so. In those circumstances, QRN regards the Draft Decision as having been made without adequate regard to available facts.

Moreover, the Draft Decision relies on factual findings that are incorrect, most notably, that Siemens is a monopoly supplier of electric, heavy-haul locomotives. This and other factual errors could have been avoided had the QCA

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3 *Queensland Competition Authority Act 1997,* s 142(3)

4 QCA, Regulatory Pre-approval for Coal Master Plan 2008 capacity expansion projects, letter to Mr L Hockridge, 23 April 2009

5 The QCA approved the master planning process in the 2006 Undertaking and it has essentially been maintained in successive undertakings. See QCA, June 2006, Final Approval QR's 2006 Draft Access Undertaking, p.4 *"Underpinning the global capital expenditure provision and carry-over mechanism, QR's 2006 DAU includes a detailed master planning process that covers a minimum three year period…. In addition, QR included processes for industry consultation, by means of a Coal System Master Planning Forum….To address QR's earlier concerns about regulatory uncertainty, the 2006 access undertaking provides for coal system customers, or the Authority, to pre-approve the scope and/or standards of identified capital expenditure projects."*

6 Draft Decision, p.ii, "*The Authority does not intend to strand assets that have been included in the regulated asset base through the processes in the current and previous access undertakings."*

7 Draft Decision, p.40, "*The Authority does not consider it appropriate to unnecessarily expose QR Network to asset stranding risks on the basis of expressions of dissatisfaction with the process after the event…"*

made reasonable efforts to check the accuracy of the facts underpinning the Draft Decision. While QRN understands that the QCA must necessarily be able to rely on material it is given, particularly where it is not possible to independently verify it, it also believes that the QCA, having declared an investigation in relation to QR Network's DAAU,[8] is reasonably expected to exercise an independent judgment based on independent verification of relevant facts. On major factual issues in the Draft Decision, such as the TCO model or competition in the locomotives market, the QCA does not appear to have done so.

(d) The Draft Decision does not meet the substantive requirements of s 138(2) of the QCA Act

In QRN's view, the Draft Decision does not adequately address the requirements of s 138(2) of the QCA Act. In particular, the Draft Decision:

- applies an unsound interpretation of the objects clause to underpin a finding that the QCA is solely concerned with the promotion of below-rail efficiency, as against supply-chain efficiency;
- even on that narrow view, does not promote the efficient use of the Blackwater electric assets, despite recognising that the current arrangements may not be producing efficient outcomes;[9]
- concludes that the DAAU would harm competition in markets, a finding based on factual inaccuracies about the locomotive market, and a failure by the QCA to distinguish between 'protecting a competitor' and 'protecting competition'. In particular, the Draft Decision appears to regard diesel as synonymous with Pacific National and electric with QRN, as if each operator had irrevocably committed to a single traction type, with any changes in below-rail tariffs only impacting one operator but not the other;
- does not give adequate weight to the interests of access seekers, as it does not consider the interests of QRN's customers with electric haulage contracts at all – even while noting that the AT5 has the prospect of driving up costs for these users.[10] Further, the Draft Decision discounts the interests of QRN on the basis of unsubstantiated suggestions of anticompetitive intention, while accepting that Pacific National's ex ante tariff expectations override the interests the Blackwater electric users in having inefficiencies corrected;
- contains methodological shortcomings in its application of the pricing principles, including not addressing the prevailing inefficiency in pricing, giving little weight to the need for the assets to generate sufficient revenue to be viable, and the need to maintain an incentive to invest in productivity improvements;
- does not exercise the public interest discretion methodically or transparently.

(e) Way Forward

As noted, QRN is disappointed that the Draft Decision recognises that the current tariff arrangements are inefficient, yet does not propose a solution to this issue. QRN considers that the DAAU is a serious attempt by QR Network to resolve this issue, and the most recent of several occasions where the QCA has been made aware that AT5 is inefficient. In this respect, QRN is increasingly concerned about the continued regulatory uncertainty facing above-rail operators and end users in Blackwater at a time where significant contracts are being negotiated and investment decisions are being made. Blackwater users and operators have a legitimate expectation that the QCA will elaborate on how it proposes to resolve this issue. QRN therefore strongly encourages the QCA to address this issue judiciously and comprehensively, through constructive engagement with QR Network and industry, and to develop a resolution to this problem that promotes and supports investment in the Queensland resources sector.

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8 Letter dated 21 December 2011 from the QCA to Mr M Carter notifying of the Authority's intention to conduct an investigation to decide whether to approve, or refuse to approve, QR Network's Electric Traction Services DAAU. Available at http://www.qca.org.au/files/R-QCA-Letter-NoticeOfInvestigation-ETS-1211.pdf.

9 Draft Decision, p.5, "*The Authority acknowledges QR Network's argument that AT5 is an average cost price and therefore may send inappropriate signals for the efficient utilisation of the overhead electric network.*"

10 Draft Decision, p.45, "*Wesfarmers said … that these users* [the existing Blackwater electric users] *would be unfairly prejudiced by future increases in the AT5*"

2 Introduction

QR National (QRN) welcomes the opportunity to respond to the Queensland Competition Authority's (QCA) Draft Decision of July 2012 on QR Network's Electric Traction Draft Amending Access Undertaking (DAAU). This submission presents QRN's view as a privately owned, competitive above-rail operator in the Central Queensland Coal Network (CQCN) with customers in both the electrified networks of Goonyella and Blackwater. QRN operates electric trains in Goonyella and both electric and diesel trains in Blackwater.

QRN is considered to be the world's largest rail transporter of coal from mine to port for export markets, hauling an average of 500,000 tonnes per day. QRN operates in each of Australia's six major coal systems, of which the electrified Goonyella and Blackwater systems, located in the CQCN, are a part.

As an operator of electric trains in Blackwater and Goonyella, and a proponent of electric traction as well as the interests of users with electric traction commitments, QRN regards sustainable electric traction pricing as being of fundamental importance to industry confidence in the regulatory arrangements. QRN considers that this issue requires a thorough and transparently objective analysis by the QCA of the complex issues involved, with a view to the QCA identifying a commercially acceptable solution for all stakeholders.

In this respect, QRN is concerned that the Draft Decision does not appear to give any weight to the need for commercial certainty, and leaves open the mechanism by which the QCA proposes below-rail electric costs will be recovered. Further, QRN is concerned that the Draft Decision does not provide any guidance on how the interests of end-users with existing commercial electric traction haulage contracts will be protected by the QCA.

2.1 Background

Access to the Central Queensland Coal Network (CQCN) is regulated as a monopoly service.[11] However, the QCA has, since the inception of regulation, required QR Network to 'unbundle' the single monopoly service into two substitutable services, namely, a 'track access' component (AT1-AT4) and an additional 'electrical access' component (AT1-AT4 *plus* AT5). The QCA has, in effect, created an environment where two different services – electric and diesel traction – compete with one another within the scope of the single, regulated service.

The effect of unbundling electric access from track access has been that only network users which use the electric overhead infrastructure in Goonyella and Blackwater are required to pay for it. This exposes the electric infrastructure to asset stranding risk, as, should utilisation fall, the ability of QR Network to recover its costs would be increasingly compromised. There are a number or measures in the 2010 Access Undertaking which provide protection against asset stranding, including the regulatory pre-approval process[12] and the very limited circumstances in which assets can be removed from QR Network's regulated asset base (RAB).[13]

For a number of years, QR Network has expressed a concern that these tariff arrangements expose it to a risk for which it is not compensated and is unable to mitigate.[14] Further, QRN, as an operator, has argued that these tariff arrangements increase the risk to above-rail operators and miners with electric traction commitments that greater selection of diesel traction will lead to an inefficiently escalating AT5 tariff.[15] These concerns have, previously, been echoed by industry[16] and by competing rail operators,[17] and have been the subject of one recent, prior attempt to

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11 Section 250 of the QCA Act provides that QR Network must make access available to a service for the 'use of a coal system for providing transportation by rail'. Coal system is relevantly defined to include the bundle of assets that comprise the 'below-rail' infrastructure, including the overhead wiring that provides electric energy to locomotives.

12 2010 Access Undertaking, Schedule A, cl 3.1

13 2010 Access Undertaking, Schedule A, cl 1.4

14 QR Network's return on its electric infrastructure is limited to the regulatory WACC that applies to all other CQCN infrastructure.

15 QR Coal, Response to Draft Decision on QR Network 2009 Draft Access Undertaking, 12 February 2010, p.4.

16 See: QCA, December 2009, Draft Decision, QR Network 2009 Draft Access Undertaking, p.169; Ensham, Submission on QR Network's Draft 2009 Access Undertaking: Response to Issues Paper, 14 November 2008, p.4.

17 Asciano, November 2008, Submission to the Queensland Competition Authority QR Network 2009 Draft Access Undertaking, p. 56

resolve through a regulatory process other than the DAAU.[18] Indeed, the Draft Decision acknowledges the veracity of the argument that the current AT5 tariff may lead to inefficient outcomes.[19]

2.1.1 The DAAU

QR Network submitted a voluntary Electric Traction Draft Amending Access Undertaking (DAAU) to the QCA on 16 December 2011. The DAAU sought to mitigate asset stranding risk for electric assets in Blackwater and to address the concern that the current pricing structure of AT5 is inefficient and is distorting the choice between diesel and electric traction. To this end, QR Network argued (using, amongst other sources, above-rail operator data obtained from QRN) that efficient utilisation of the electric infrastructure would not only resolve the asset stranding concern, but would also lead to more efficient supply-chain outcomes.

QR Network's DAAU closely followed a similar proposal that had been lodged during the development of UT3, and which had found support, amongst others, from both QRN and Asciano:[20]

> *Asciano accepts the merit of QR Network's argument for a single AT5 tariff to apply to the two systems (and presumably also to Newlands once the GAP is commissioned). To this extent, Asciano supports the proposal for a uniform AT5 tariff in UT3.*[21]

The QCA published the DAAU and supporting material and invited stakeholder comments. QRN responded with a submission on 16 April 2012. QRN supported QR Network's proposal, but indicated that it was open to other regulatory solutions that maximised electric traction utilisation as the least-cost supply chain solution.

On 27 July 2012, the QCA released its draft decision refusing to approve QR Network's DAAU (Draft Decision).

The *Queensland Competition Authority Act 1997* (QCA Act) requires that, where the QCA refuses to approve a DAAU, it must state the reasons for the refusal and the way in which it considers it appropriate to amend the DAAU.[22] The QCA Act does not expressly contemplate a situation where the QCA rejects a DAAU in its entirety, but rather places an obligation on the QCA to propose ways in which issues identified by it in a DAAU process can be resolved. In this respect, despite recognising in the Draft Decision that, (i) an asset stranding risk had been created by the tariff arrangements;[23] (ii) that it does not intend to strand QR Network's assets;[24] and, (iii) the AT5 may be producing inefficient outcomes,[25] the QCA has not provided any guidance to stakeholders on how the DAAU might be amended. It has, in QRN's view, circumvented what is contemplated by the legislation by not providing direction on how it proposes to resolve the electric pricing problem.

2.1.2 Industry consultation

Concurrently with the QCA's consideration of the DAAU, QR Network initiated an industry consultation process that was designed to allay concerns with respect to the TCO modelling that had been conducted, and to identify potential alternative solutions to the electric traction pricing problem. QRN was a participant in that process, and has been conducting regular briefing sessions with both Blackwater and Goonyella users to keep them abreast of developments. As the current electric operator in Blackwater, QRN has an interest in ensuring that customers with

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18 QR Network, December 2011, Submission to QCA: Electric Access Draft Amending Access Undertaking, p.7, "*QR Network sought to partially address this issue as part of the 2010 AU, by proposing a single electric network tariff."*

19 Draft Decision, p.5, "*The Authority acknowledges QR Network's argument that AT5 is an average cost price and therefore may send inappropriate signals for the efficient utilisation of the overhead electric network."*

20 At the time, not only was QR Network's proposal supported, but was regarded as supporting continued investment of electric infrastructure across non-electrified growth corridors, including GAP and Newlands (as shown by Asciano's support for AT5 socialisation across Newlands).

21 Asciano, November 2008, Submission to the Queensland Competition Authority QR Network 2009 Draft Access Undertaking, p. 56

22 *Queensland Competition Authority Act 1997*, s. 142 (3)

23 Draft Decision, p.39, "*The Authority accepts that the proposed amendments to the 2010 undertaking are likely to be in the interests of QR Network… addressing QR Network's concerns regarding asset stranding and certainty for future investments."*

24 Draft Decision, p.40, "*The Authority does not consider it appropriate to unnecessarily expose QR Network to asset stranding risks on the basis of expressions of dissatisfaction with the process after the event…"*

25 Draft Decision, p.5, "*The Authority acknowledges QR Network's argument that AT5 is an average cost price and therefore may send inappropriate signals for the efficient utilisation of the overhead electric network."*

electric traction commitments are not exposed to increasing access tariffs due only to traction choices made by other users.

QRN wrote to the QCA on 23 April 2012 to inform the QCA that constructive engagement between QR Network and all user groups was occurring, and that it was giving preference to a process likely to result in a mediated, mutually-acceptable outcome, rather than the contentious DAAU process.[26] In this respect, QRN reasonably expected that the QCA would gauge the status of industry negotiation and consultation prior to the release of a Draft Decision, with a view to the QCA constructively engaging with stakeholders. That the QCA has not done so, and released a Draft Decision without consulting with an industry forum, is disappointing. It is QRN's view that a commercial solution to this problem remains in the interests of all stakeholders, yet the release of the Draft Decision suggests that the QCA has little confidence in the ability of industry participants to resolve commercial issues via commercial negotiations.

QRN notes that through that process, QR Network expressed a willingness to adopt commercially pragmatic solutions to the electric traction issue, and a preparedness to consider transitional arrangements that would have addressed some of the concerns in the Draft Decision.[27] In QRN's view, had the QCA elected to gauge the status of the working group process, it may have approached the electric traction issue in a more constructive way.

QRN also notes that, through the course of its industry negotiation, QR Network offered users and above-rail operators the opportunity to view and comment on the TCO model. It also indicated its readiness to have the TCO model audited, and explored options with stakeholders for an independent supply-chain modelling exercise. QRN has publicly indicated to its customers that it has accepted QR Network's offer to review the TCO model, and that it supports the methodology. QRN understands that identical offers were made by QR Network to the QCA, but that it did not accept. In those circumstances, for the QCA to now express dissatisfaction with the TCO model, suggests that the Draft Decision was prepared without proper attention to, or assessment of, readily available facts.

2.2 Submission outline

This submission is structured as follows:

- Section 3 (*Key Issues*) sets out QRN's principal concerns with the Draft Decision, and explains what it regards to be fundamental shortcomings and errors in the QCA's approach;
- Section 4 (*QR Network's TCO Model*) sets out QRN's view on the Draft Decision's analysis of the TCO model, and the efficiency of electric traction in Blackwater more generally; and
- Section 5 (*Statutory Decision-making Criteria*) sets out QRN's view of the Draft Decision's application of s 138(2) of the QCA Act.

[26] Letter from P Scurrah to J Hall, 23 April 2012

[27] QR Network has repeatedly made industry aware of its willingness to consider transitional arrangements. QR Network, December 2011, Submission to QCA: Electric Access Draft Amending Access Undertaking, p.30, *"As noted earlier, Pacific National currently runs a significant electric fleet in the Goonyella system and has a low market share in the Blackwater system – as such, QR Network expects that Pacific National will similarly be able, by July 2012, to run at least 90% of feasible electric services (over both systems) with electric locomotives. If Pacific National can show that this will not be the case, QR Network is happy to consider additional transitional measures"*:: Attachment B, presentation to Traction Working Group 10 May 2012, p.3 "*QR Network will work closely with each of our customers to ensure smooth transition to the proposed pricing structure."*:

3 Key Issues

The Draft Decision suffers from a number of significant shortcomings, underscored by the QCA not recognising that the current pricing arrangements for electric traction are giving rise to major, costly supply-chain coordination failures across the electrified CQCN. Further, where the Draft Decision does identify problems, in particular, the prospect of asset stranding[28] and the inefficiencies created by the AT5 tariff,[29] it does not propose acceptable alternatives or solutions to the important issue of sustainable electric traction pricing.

It is QRN's view that the current coordination failure in the Blackwater system is enabled and sustained by a regulatory failure and that it is therefore essential for the QCA to act in a considered and appropriate way to resolve this issue. In this respect, the Draft Decision is deficient in that, while recognising a problem, it does not recommend an objective and reasoned solution. This creates regulatory uncertainty and, more generally, discourages investment in the Goonyella and Blackwater systems.

QR Network has made industry and the QCA aware of the potential for coordination failure in traction choices for a number of years. For example, the QCA noted in October 2008 that QR Network had raised concerns that AT5, as an average cost price, was not providing appropriate economic signals for utilisation of electric infrastructure in Blackwater.[30] QR Network also highlighted concerns over asset stranding in its October 2009 Working Paper 4.5 *Rationale for Electric Traction System Upgrades in the Central Queensland Coal Network*[31] and throughout the development of the 2010 Access Undertaking. Further, QR Network proposed a solution to the problems with AT5 during the course of UT3, which received both operator and user support.[32] At the time, the QCA rejected QR Network's proposal, again without proposing alternative tariff arrangements for electric traction pricing.

QRN considers that the DAAU is a serious and genuine attempt by QR Network to resolve this issue, and the most recent in a long list of occasions where the QCA has been made aware that AT5 is inefficient. QRN is increasingly concerned about the continued regulatory uncertainty facing above-rail operators and end users in Blackwater at a time where significant contracts are being negotiated and investment decisions are being made. Blackwater users and operators have a legitimate expectation that the QCA will elaborate on how it proposes to resolve this issue.

QRN is particularly concerned at the QCA's failure to act given that coordination failure is self-reinforcing. That is, economies of scale begin to unravel, above-rail demand growth slows and an increasing AT5 further discourages users from selecting electric traction. Once identified, it is therefore incumbent on the QCA to act to halt this negative spiral. In this regard, despite acknowledging that this is a real issue, the Draft Decision does not propose a solution that would minimise costs for all stakeholders, and in particular, protect electric users in Blackwater which are potentially facing inefficiently escalating below-rail electric tariffs.

Each of the following major issues is addressed in the sub-sections below:

- The Draft Decision incorrectly assumes that setting a price that reflects the costs of providing access to electric infrastructure will result in an economically efficient outcome, without having regard to the prospects of regulatory error and market failure, and the consequent risks of managing coordination failure in such a way;

- More broadly, the Draft Decision does not apparently recognise that the Blackwater system, and conceivably, the Goonyella system in the future, are experiencing coordination failure for a range of reasons

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28 Draft Decision, p.39, "*The Authority accepts that the proposed amendments to the 2010 undertaking are likely to be in the interests of QR Network… addressing QR Network's concerns regarding asset stranding and certainty for future investments."*

29 Draft Decision, p.5, "*The Authority acknowledges QR Network's argument that AT5 is an average cost price and therefore may send inappropriate signals for the efficient utilisation of the overhead electric network."*

30 QCA Issues Paper on QR Network's 2009 DAU, October 2008, p.17, *"QR Network considers that current pricing for the electric infrastructure (AT5) is inefficient and inequitable"*

31 QR Network, October 2009, 2009 Coal Rail Infrastructure Master Plan, Working Paper 4.5 Rationale for Power Systems Upgrade in the Blackwater System, p. 37, "*It is essential that a pricing model and risk allocation for electric traction infrastructure are developed to ensure that all wider system economic benefits can be realised and the stranding risks for both QR Network and rail operators are minimised."*

32 QCA, December 2009, Draft Decision QR Network 2009 Draft Access Undertaking, p.169

that are enabled by the unbundling of electric access from track access, and the imposition of average cost pricing;

- These problems appear to originate with the mistaken interpretation that the QCA has given to its statutory objective, namely, the suggestion in the Draft Decision that the QCA's role is to promote lowest-cost below-rail service provision, rather than overall economic surplus and supply-chain efficiency;

- By failing to address the need for the approved, prudent costs of QR Network's electric infrastructure assets to be recovered, yet acknowledging that asset stranding risk is inconsistent with the regulatory model and the CAPM methodology, the Draft Decision has compounded market uncertainty about the eventual way in which those costs will be recovered, to the detriment of QRN's customers; and,

- The Draft Decision fails to consider the interests of end users or operators with electric traction commitments, in order to preserve 'traction choice', or more accurately, to maintain Pacific National's below-rail tariff expectations to the detriment of QRN's customers.

3.1 The QCA's reliance on uncoordinated decision-making

The underlying problem with the QCA's Draft Decision is that it does not recognise the true nature of the economic problem that the DAAU sought to address, namely, that uncoordinated decision-making will not necessarily result in an efficient outcome in a network industry characterised by horizontal and vertical negative externalities[33] and by investment hold-up risks.[34] In this respect, the QCA's characterisation of traction-selection as a matter for market forces misses what QRN understands to be the primary point of the DAAU.

The QCA has assumed that 'efficient' below-rail tariffs for electric traction can be set and that market forces will determine the optimal mix of electric and diesel locomotives in the Blackwater system, and that this, in turn, will then ensure an economically efficient outcome, where private and social net benefits are aligned. For example, the Draft Decision states that:

> *… a price that reflects efficient costs of providing access to electric infrastructure will allow the relative efficiency of the traction choices to be assessed in the competitive above-rail market. Market forces will ensure that the traction solution that provides the best result for above-rail operators and their customers will be the one that is selected.*[35]

Despite this theme, the Draft Decision does not acknowledge that attempting to reach an optimal outcome through price signals will be complex and prone to error. The Draft Decision acknowledges that the current approach to AT5 is in fact failing to provide an appropriate price signal and may be producing inefficient outcomes.[36] It states that the extent of any distortion of choices between diesel and electric traction would depend on how sensitive the decision to operate electric locomotives is to a change in the AT5 tariff and on the extent of any capacity constraints that may physically limit the ability of train operators to opt for electric locomotives.[37]

However, while acknowledging that AT5 is not an efficient price and that it may be distorting the choice between electric and diesel traction, the Draft Decision also says that because of the monopoly nature of the below-rail market, AT5 cannot be an efficient price that is based on marginal costs. Marginal cost pricing for a monopoly creates problems with revenue adequacy.[38] The AT5 tariff is currently an average price, which behaves in the

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[33] For example, the costs imposed on all users by an above-rail operator choosing to run diesel trains, increasing the costs to electric traction users while not reducing the costs to diesel train users.

[34] For example, by stranding assets, that have been assessed as prudent, users may be forced to pay for infrastructure they do not use.

[35] Draft Decision, p. 12

[36] Draft Decision, p.5, "*The Authority acknowledges QR Network's argument that AT5 is an average cost price and therefore may send inappropriate signals for the efficient utilisation of the overhead electric network.*"

[37] Draft Decision, p. 21, "*The extent of this distortion will depend on how sensitive the decision to operate electric locomotives is to a change in the AT5 tariff and, of course, the extent of any capacity constraints that may physically limit the ability of train operators to opt for electric locomotives.*"

[38] Draft Decision, p. 50, "*An efficient price is one which reflects the marginal cost of producing a good or service. For a natural monopoly, where costs are declining, this pricing rule is problematic as the marginal cost price will generate revenues that are insufficient to cover costs.*"

opposite way to an efficient marginal price.[39] Despite this, the Draft Decision provides no guidance on what is meant by an 'efficient cost' – instead indicating that efficient cost pricing based on marginal costs is problematic for a monopoly and that some compromise is required in order that costs can be recovered. To claim this issue as being one of identifying an efficient cost is, in QRN's view, a non-precise and unhelpful way to characterise the process of setting an access price that promotes *efficient outcomes*.

The QCA's view that the traction problem is merely one of efficient pricing discounts substantial open-access experience in network industries (including experience with CQCN access) which suggests that the inherent complexity (and prospects of error) in price-setting makes coordinating a supply-chain through price-signals extremely difficult. This is particularly so as regards multi-user railroads,[40] given strong economies of scale and density, the lumpiness of efficient investment in capacity, the high degree of interdependency between above and below-rail operations, the prospects of hold-up, strong horizontal and vertical externalities in train operations and the above/below rail divide, and the incentive for users to engage in strategic behaviour to impose costs on rivals. As described in the attached Ergas report (Attachment A:

> *… it is well known that where production systems involve chains of processes, with each link in the chain being 'lumpy', in the sense that investments involve minimum increments of fixed, often large, size, efficient investment and use decisions may not be made without some degree of coordination, above and beyond that provided by price signals.*[41]

A reliance on 'efficient' pricing fails to recognise the interdependency between the above and below-rail operations that form part of the efficient, integrated rail transportation service. Once those interdependencies are recognised, and the limitations of regulatory pricing appreciated, it is clear that the appropriate regulatory response must go beyond a faithful reliance on above-rail 'market forces'. Calibrating perfectly efficient access prices is a costly, Sisyphean task, and ultimately an imprecise and error-prone way of ensuring coordination across a network industry. The QCA's general approach to access regulation would tend to confirm this, in its tendency to adopt or impose non-price forms of supply-chain coordination and cooperation, and its general focus on supply-chain economics and planning in QR Network's Access Undertaking.

In a vertically integrated business, internal tradeoffs and coordination decisions can be made to maximise overall efficiency, without the distorting effects of individual elements of a supply chain seeking to maximise their own interests irrespective of the consequences for other users. However, in the absence of vertical integration, or when a vertically-integrated firm is subject to separation requirements, it is for the regulator to approximate the economic benefits of integration[42] while sustaining a competitive above-rail market. While this is not necessarily an easy task, QRN is opposed to the QCA's 'hands off' approach to this issue. QRN believes it is the role of the regulator to ensure that AT5 is structured in way that minimises the inefficiencies and coordination failures that stem from vertical separation and a disaggregated supply chain. This part of the QCA's role is better characterised as competent and effective regulation, rather than as central planning.[43]

In any case, in circumstances where the QCA relies heavily upon efficient pricing signals driving efficient outcomes, it has failed in the Draft Decision to actually implement or propose an efficient price. In QRN's view, it is improper for the QCA to indicate that an efficient price would resolve this problem, but then not actually propose the methodology by which it intends to identify that price. QRN strongly encourages the QCA to address this issue judiciously and comprehensively, through constructive engagement with QR Network and industry, and to develop a solution to this problem that will be to the benefit of supply chain efficiency.

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39 Draft Decision, p. 21

40 See Gomez-Ibanez, Jose A.,(July 2010). *The Simple Analytics of Open Access with Illustrations from Railroads*, Harvard Universty, available at http://www.accc.gov.au/content/item.phtml?itemId=941057&nodeId=70467d46a732cb193c8ee6eb4b8f75ce&fn=Jose%20A.%20Gomez-Ibanez%20-%20paper.pdf, downloaded 21/09/2012

41 *Economic Aspects of Electric Traction Charges*, Paper prepared for QR National by Henry Ergas, Alex Robson and Joe Owen, September 2012, p.8

42 The Australian Competition Tribunal has referred to this as the need to promote transactional efficiency, that is to say, promoting practices that "minimise transaction costs (including information costs) … and reduce exposure to opportunistic behaviour or 'hold ups'". See: *Re Fortescue Metals Group* [2010] ACompT 2 at [802]

43 CEG have argued that QR Network is behaving as a central planner by estimating the efficient above rail technology and then proposing a pricing methodology that "strait-jackets" industry in adopting that technology. CEG then argues that it is generally accepted that market based solutions should prevail as it is impossible for a central planner to acquire and use all of the information on the costs and preferences of third parties to make efficient allocation of resources. Refer Asciano Submission, Appendix 3 – CEG Paper – QR Proposed Electrics Undertaking Pricing, pp.5-7

Moreover, QRN notes that attempting to promote efficient traction choice through efficient pricing in the current circumstances is beside the point, given that a series of capital investment decisions have been made (and endorsed by the QCA and end users) that effectively selected electric traction as the primary traction mode for Blackwater. For the QCA to now, ex post, suggest that this choice should now be dealt with through efficient pricing signals exposes all investors to the risk of their sunk costs being expropriated, and all users to the risk that compensation by adversely affected parties will be sought. In essence, what the Draft Decision proposes is equivalent to a suggestion that road pricing should 'efficiently' permit a choice between left and right hand drive in circumstances where everyone has already agreed (and invested in) right hand drive.

3.2 The QCA has not recognised coordination failure

In support of the DAAU, QR Network argued that the situation in Blackwater is one of coordination failure, in that the tariff arrangements give users an ability and incentive to select a traction technology to further their own commercial interests, despite the fact that all users would be better off if choices were coordinated to select the most efficient traction type. This aspect of the tariff arrangements means that even a small number of users across Goonyella or Blackwater (or both) can impose costs on other users without bearing any costs themselves, with the further consequence that the Queensland coal industry does not attain the efficiencies that would come from coordinating traction choice and realising economies of scale.

As noted, the Draft Decision does not identify or resolve the underlying issue that the DAAU sought to solve – namely, that regulated pricing is contributing to coordination failure in the Blackwater system. QRN considers the fundamental issue remains one of vertical and horizontal market failure, caused by a range of factors, some of which are the inadvertent consequences of supply-chain management decisions, some of which are the potential result of strategic behaviour, and some of which are the result of regulatory decisions. The underlying cause is the manner in which unbundling (vertical separation) of the market has been implemented by the QCA, which provides an opportunity within the declared service for an access seeker to bypass the electric overhead infrastructure.

Many of the factors leading to coordination failure could have been otherwise internally managed in a vertically integrated business. In the circumstances of QR Network's DAAU, the benefit of continued competition in above-rail markets must be traded off against efficiency consequences stemming from the loss of a vertically integrated incumbent that had the ability to coordinate the investment trade offs and timing differences between different elements of the supply chain. In effect, the task for QR Network and other stakeholders, and the challenge for the QCA, is to eliminate the cost of the present coordination failure while sustaining the vitality of the above-rail market. In QRN's view, the Draft Decision does not deal with this task.

The suggestion that QRN is able to manage the coordination of the Blackwater system by leveraging its market share is not reasonable.[44] Given that QRN's market share is not fixed because of open access, a decision to behave as a vertically integrated business by trading off above and below rail costs in order to facilitate coordination would not only sit uneasily with separation arrangements, but would also be vulnerable to failure. It would essentially involve QRN bearing the costs and risks of selecting electric traction without additional return, while the efficiency benefits and costs savings are captured by all market participants. Conversely, it would allow market entrants to extract short term private benefit by increasing the cost base of other users at the expense of long term efficiency.

Failure to coordinate between above and below-rail functions in a vertically separated supply chain is not inevitable. As the QCA has recognised on a prior occasion, supply chain coordination issues do not arise by accident or by chance.[45] There are a range of factors that increase the likelihood of coordination failure, and it is the responsibility of the QCA to identify and mitigate against these through the regulatory arrangements. These factors include the vertical separation of above and below-rail services and the introduction of third party access, the cost structure of a network business, the differences between above-rail operators, the opportunities for strategic behaviour and the effect of regulatory decisions. Each of these is addressed in more detail below.

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[44] Draft Decision, pp.20-21, "*Asciano noted that QR National provided 80% of the haulage services in the Blackwater system. Accordingly, this meant QR National could, without coordination with other access holders, bring electric traction's share in Blackwater to 80%, which made QR Network's claimed difficulties in coordination non-credible.*"

[45] QCA, October 2008, *Issues Paper: QR Network 2009 Draft Access Undertaking*, p.iv

3.2.1 Unbundling of electric access from the declared service

Vertical separation of above and below-rail services and mandatory third party access has resulted in a competitive above-rail market, but has necessarily introduced the scope for divergent incentives across the supply-chain. This trade-off between coordination and competition is well-recognised in the network economics literature.[46] However, in the particular circumstances of electric traction, the QCA has amplified the risk of coordination failure across both above and below-rail, by delineating two substitutable below-rail services (i.e. a service for diesel access and a service for electric access) yet only regulating energy provision for one service.

The QCA's approach to a single declared service that encompasses multiple network elements,[47] has been to impose multi-part tariffs that, in essence, give operators a choice as to which part of the relevant 'service' they consume. In other words, the QCA has required QR Network to offer a separate service for diesel access and a separate service for electric access. Both services are necessarily substitutes (on an electrified network) as inputs to meeting downstream demand; that is, it is economically viable to bypass remote generation and distribution of energy (electric) by using on-board generation (diesel).

As a consequence of the interdependence of the above and below-rail services, the competitiveness of each below-rail service is effectively determined by the economics and selection choices of the competing above-rail operators. In this respect, in requiring QR Network to offer two substitutable services, with different cost structures, the QCA has created an inherent tension between the two combined above and below-rail rail transport options. It is beyond QR Network's power to control the traction choice, which is a decision made in the competitive above-rail market; a market that, notably, is currently characterised by ongoing, systemic pricing failure (as acknowledged by the QCA).[48] Likewise, it is beyond the power of an above-rail operator relying on one energy source (electric), but not the other (diesel), to control the energy component of its cost structure. In these circumstances, coordination, which involves internal trade-offs between the higher below-rail costs for electric traction and lower above-rail costs in electric locomotive operation, and vice versa for diesel traction, is not assured.

What is particularly concerning about these arrangements, is that the division between a (regulated) below-rail cost of energy provisioning and an (unregulated) above-rail cost of energy provisioning has not been determined by market forces – rather, it is the product of the arbitrary line between 'monopoly' and 'dependent market' that has been set by the QCA Act. By using the QCA Act to intervene with respect to one cost, but not with respect to the other, substitutable cost, the QCA clearly introduces the scope for one form of traction to be inefficiently promoted (or, conversely, disadvantaged) relative to the other.

Furthermore, as QR Network is required to offer the declared service (being both diesel and electric traction) on a non-discriminatory basis to all, it is problematic for QR Network to adopt strategies that would maximise use of the electrical overhead. In other words, the regulatory framework requires QR Network to not only make available electric access, in circumstances where vertical unbundling prevents it from ensuring the investment is used, but has also prevented QR Network actively promoting its use by independent access seekers.

3.2.2 The cost structure of electric infrastructure

A key factor contributing to the current coordination failure is the cost structure of the below-rail assets, including the electric infrastructure, as against the cost structure of the substitute, namely, diesel traction. In particular:

- existence of economies of scale and high fixed costs, so that for example, electric traction technology infrastructure is only efficient if it has widespread adoption;

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[46] OECD, Structural Reform in the Rail Industry, DAF/COMP (2005); Fisher, P. et al, 2001. "Analysis of Economies of Size and Density for Short Haul Railroads' MPC Report No. 01-128; Pittman, R. 2005, Structural Separation to Create Competition? The Case for Freight Railways' Review of Network Economics 4(3); Bureau of Transport and Research Economics, Rail Infrastructure Pricing: Principles and Practice, Report 109, (July, 2003); Productivity Commission, Road and Rail Freight Infrastructure Pricing, Report No. 41 (22 December 2006)

[47] *Transport Infrastructure Act 1994*, Schedule 6, Definitions.

[48] Draft Decision, p.5, "*The Authority acknowledges QR Network's argument that AT5 is an average cost price and therefore may send inappropriate signals for the efficient utilisation of the overhead electric network.*"

- large, indivisible increments to capacity (sometimes referred to as "lumpy" investment) that are not necessarily matched with the profile of above-rail demand growth. That is, whereas ramp up volumes can be managed in a vertically integrated business, in a market where the services are vertically separated, incremental below-rail capacity may not match the more gradual incremental above-rail demand growth;

- interdependency between the efficiency of above and below-rail operators. That is, the declared service is only useful to consumers of the service when it is combined with above-rail services. Consequently, it is essential that these services be coordinated in a manner that results in the least cost, most efficient outcome for users of the *combined* rail transportation service; and

- network effects, in which the conduct of one party in relation to the same function (such as rail haulage) has implications for the level of service available and/or costs incurred by another. This provides opportunities for raising rival's costs behaviour, to the detriment of the entire system in the form of higher overall costs. By promoting the use of diesel traction and decreasing the use of electric traction, the economies of scale that make electric traction a low cost technology choice cannot be realised.

The cost structure of the electric infrastructure in Blackwater combined with the regulatory framework and historical sequencing of above-rail market entry and investment decisions has predisposed electric assets in Blackwater to potential coordination failure. The Draft Decision does not appear to recognise or address any of these issues, in that it:

- treats the economies of scale of electric infrastructure as a disadvantage or cost rather than a realisable benefit for the Blackwater user base;[49]

- regards underutilisation of the electric infrastructure as reflecting a potential prudency problem rather than being a normal consequence of lumpy investment;

- takes a view of efficiency and s 69E of the QCA Act that regards transferring costs to above-rail operators as promoting infrastructure efficiency; and

- does not address at all the economic consequences of maintaining the incentive for a single user to raise the costs of all other users, thereby not only inefficiently disadvantaging its rivals, but also undermining the economies of scale that make electric the most efficient traction type.

3.2.3 The potential for strategic behaviour

Opportunities for strategic behaviour exist in Blackwater because there are currently only two above-rail competitors, with QRN publicly committed to electric traction. Given the economies of scale that apply to below-rail electric infrastructure and the average cost pricing methodology of AT5, it is possible for individual operators to select diesel traction in order to further erode utilisation of electric traction in Blackwater and drive up the cost for users of electric traction, all of which are currently QRN's customers.

In this respect, Pacific National has said that it was forced into investing in diesel locomotives as a result of limited electric capacity in Blackwater at the time it entered the market. As noted, Pacific National expressed a preparedness to use electric locomotives at that time, and has previously indicated interest in a cross-system electric fleet.[50] As the new entrant, Pacific National is competing with QRN, as the incumbent with larger market share in

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[49] Draft Decision, p.12, *"Diesel technologies have greater flexibility… [*which] *derives from a number of different aspects of the operation of diesel and electric locomotives. For example, network electrification has high upfront fixed costs and lower on-going operational costs. The relative efficiency of electric over diesel requires relatively high utilisation of the installed capacity."*

[50] Asciano Submission, p.9, "*Prior to entering this market* [Queensland coal rail haulage market] *Asciano had to make a decision as to whether to operate diesel locomotives or AC electric locomotives. At the time this decision was made in 2007 Asciano was informed… that the Blackwater system could not accommodate AC electric locomotives."* In addition in their November 2008 Submission to the Queensland Competition Authority on QR Network's 2009 Draft Access Undertaking, p. 56, Asciano supported the socialisation of the AT5 tariff "*conditional on being able to use electric locomotives interchangeably between the systems".* Pacific National also noted here that "*QR Network is working towards resolving the technical issues that prevent the new generation locomotives using the Blackwater system... Asciano understands that remedial work is currently being scoped but at this time completion is not expected until around 2012."* QRN has inferred from this a preparedness by Pacific National to operate electric locomotives in the Blackwater system at the time of the investment and at a point in the future.

Blackwater. While the original decision to invest in diesel locomotives for Blackwater may have been for practical reasons, an environment exists where Pacific National may have an incentive to maintain its current fleet allocation to raise its rivals' costs in Blackwater by continuing to preference diesel traction, even though the result could potentially be to impose large costs on QRN's customers and the coal system as a whole.

An environment where this sort of raising rivals' costs behaviour may arise, while privately profitable to an individual above-rail operator, even when the decision to operate diesel traction is inefficient, is socially undesirable in that it increases total cost compared to a more efficient alternative. By choosing diesel and, as a consequence, increasing the cost of electric traction, the diesel above-rail operator is able to gain market share, essentially at the cost of other market participants. That is, the electric operator and its customers will face higher electric traction charges simply because they, and QRN as their operator, have relied upon a regulatory framework that has proven to be flawed. Even though the total cost of diesel is above the total cost of electric traction (at efficient electric utilisation rates), and hence electric could be thought more competitive in a well-functioning market, the diesel operator has managed to increase its market share.

The Ergas report (Attachment A describes an empirical model for this potential behaviour, and concludes:

> *In particular, it emerges from the model that the mere fact that the marginal costs of electric are lower than those of diesel need not result in the choice of electric. Rather, so long as the effect of the choice of diesel is to sufficiently increase costs for the firm committed to electric, its uncommitted rival may choose diesel even if that increases costs overall. That requires that the quantum of the uncommitted rival's volume is sufficient to materially shift the average cost of electric, to the point where the resulting price increase more than offsets the rise in the uncommitted firm's costs. Of course, whether such strategies are viable in any given situation is an empirical question; what makes such strategies particularly plausible in this context is the combination of an average cost pricing rule with the scope for at least one firm to engage in what amounts to partial by-pass of the regulated assets.*[51]

Although Pacific National has invested in 100% electric traction in Goonyella, where the cost competitiveness of electric traction has been realised through high utilisation rates and a depreciated asset base, Pacific National has no incentive to support this outcome in Blackwater.

The result may be that the economies of scale that result in electric traction delivering the lowest cost, most efficient traction to users may not be realised. In the current regulatory environment, while Pacific National has an opportunity to initially capture a private competitive benefit in avoiding the below-rail costs of access to the below-rail electric infrastructure, it incurs the higher above-rail costs, which must be passed on to customers. In doing so, it may result in electric traction service being bypassed forcing all users to incur the higher overall costs of diesel traction. Moreover, whatever traction choices Pacific National ultimately makes, the Draft Decision makes clear that the QCA will not strand infrastructure assets that were endorsed by it and the Blackwater user group.[52] It follows that the likely outcome of potential strategic traction selection will not only be the higher cost of diesel traction, but also the costs to stakeholders of whatever mechanism the QCA ultimately devises for the recovery of infrastructure costs.

Finally, it is important to note QRN's objection to the QCA in the Draft Decision making an unsubstantiated accusation against QR Network of seeking to discriminate in favour of QRN as its related party above-rail operator,[53] but failing to recognise the incentives that Pacific National has to engage in raising rival's costs behaviour to the detriment of all industry participants. QRN also queries why Pacific National has been able to capture significant market share in Goonyella using electric traction, yet appears to now regard diesel as being essential to its commercial interests in Blackwater. Indeed, QRN has previously been requested by QR Network in 2011 to make its electric paths in Blackwater available for the purpose of Pacific National testing electric locomotives. This is in a context where Pacific National was not only aware of the electrification of Blackwater, but actually supported a QR

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51 *Economic Aspects of Electric Traction Charges*, Paper prepared for QR National by Henry Ergas, Alex Robson and Joe Owen, September 2012, at [26]

52 Draft Decision, p.40, "*That is, investments already in the regulatory asset base should be protected from asset stranding notwithstanding subsequent concerns about the sense of those earlier decisions."*

53 Draft Decision, p.49, "*Unless evidence is provided to the contrary, there is an assumption that QR Network has the economic incentive to advantage its own related party train operator (QR National)…"*

Network regulatory proposal for full socialisation of electric costs across Blackwater and Goonyella to mitigate the inefficiencies of average cost pricing.[54]

3.2.4 The impact of regulatory failure

QRN believes that regulatory failure in addressing the problems associated with traction choice in Blackwater is exacerbating coordination failure. In seeking to address monopoly power through regulation, it is important that potential market failure is not exacerbated or prolonged by regulatory error, in particular, the apparent unwillingness of the QCA to deal with these issues in a comprehensive and judicious way.

Given the capital intensive, high fixed cost nature of QR Network's investment in below-rail assets, the potential for economies of scale not to be realised is increased where the QCA continues to defer attempts to address the issue. The QCA noted that QR Network raised concerns over the relative competitiveness of electric and diesel traction during the development of the 2010 Access Undertaking but that it did not accept QR Network's proposed solutions to address these concerns.[55] Similarly the Draft Decision has rejected QR Network's proposed solutions to address the problem but fails to state meaningful ways in which the DAAU could be amended, as is contemplated by s142(3)(b) of the QCA Act. In this respect, QRN is concerned about the successive failure of the QCA to resolve this issue, and the lack of appreciation in the Draft Decision about the implications of this on investor certainty.

In effect, the QCA continues to exacerbate the effects of coordination failure by deferring consideration of electric traction pricing. Without any explanation, the Draft Decision has stated that the appropriate structure of AT5 should be dealt with during the development of UT4, meaning that this issue may not be dealt with until 2014. In QRN's view, dealing with this issue on such a protracted timetable could greatly increase the costs to industry, and its customers, without any offsetting benefit. Deferral of the resolution of this issue fails to resolve the uncertainty about future traction technology in Blackwater and is incompatible with the commercial reality of the rail haulage market. A number of large above-rail contracts are currently in negotiation. Dealing with this issue once those contracts are concluded may result in higher costs to industry than would have been the case had the QCA acted to resolve this issue through a constructive process and appropriate timetable.

3.3 The QCA has misinterpreted its statutory objectives

Underlying the Draft Decision's failure to identify or resolve coordination failure is its misinterpretation of its statutory objective in the Draft Decision. Effective regulation of the CQCN necessarily requires the QCA to design and implement regulatory arrangements that promote efficient supply-chain outcomes.

A major industry concern through the UT3 process was that the QCA had not gone far enough in terms of implementing regulatory measures that would promote overall, supply-chain efficiency. As put by Rio Tinto:

> *RTCA is a long-standing advocate for the development of management and operational strategies which encompass the entire coal chain … RTCA therefore is disappointed at the limited steps taken by the QCA to properly enforce the participation and conduct of QR Network in whole of coal chain master planning and integrated operational planning and execution. These and other related initiatives are intended to increase the efficiency of the coal chain, and ultimately would benefit all stakeholders, including QR Network.*[56]

The QCA was sympathetic to industry's view, and incorporated a number of measures into QR Network's undertaking that were directed at supply-chain efficiency – even going so far as to endorse the ability of QR Network

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54 Asciano, November 2008, Submission to the Queensland Competition Authority QR Network 2009 Draft Access Undertaking, p. 56, *"Asciano accepts the merit of QR Network's argument for a single AT5 tariff to apply to the two systems (and presumably also to Newlands once the GAP is commissioned). To this extent, Asciano supports the proposal for a uniform AT5 tariff in UT3."*

55 QCA, December 2009, Draft Decision QR Network 2009 Draft Access Undertaking, p.170, *"Decision 6.9: The Authority rejects QR Network's proposed amalgamation of the AT5 electric infrastructure tariffs for the Blackwater and Goonyella systems and requires that the reference tariff sections of the Undertaking are amended accordingly."*

56 Rio Tinto, 12 February 2010, QR Network 2009 Draft Access Undertaking: Queensland Competition Authority Draft Decision December 2009 - Rio Tinto Coal Australia's (RTCA) Submission, p.4.

to price outside the agreed pricing principles when to do so would promote overall efficiency.[57] Indeed, the QCA itself was responsible for adding and drafting the following addition to cl 2.3 of QR Network's undertaking:

> *The intent of this Undertaking is to … establish principles and processes to guide cooperation with all elements of the coal supply chain to maximise coal throughput across the supply chain on an annualised basis.*[58]

The QCA now seems to have reversed that position, and redefined its role extremely narrowly to the promotion of efficient operation and use of, and investment in, below-rail *to the exclusion* of the rest of the supply-chain.[59] In particular, the QCA has interpreted the specific reference to 'significant infrastructure' in s 69E, as limiting relevant considerations to *below-rail* infrastructure exclusively. This limits the object of the Act to the promotion of efficiency in a single element of the coal supply-chain, rather than overall efficiency or an increase in the consumer surplus more generally.

Following from that interpretation, the QCA has determined that the DAAU does not meet the object of Part 5 of the QCA Act, in that it does not promote efficient operation of, use of, or investment in, significant infrastructure.[60] As such, the QCA has rejected the DAAU, which promotes a traction mode that offsets lower above-rail costs with higher fixed below-rail costs, as against a hypothetical proposal that reduces below-rail costs by transferring them to above-rail.

As an operator with a clear interest in supply chain efficiency, QRN believes the QCA's finding is based on a misinterpretation of s 69E, is too narrow, and is inconsistent with the QCA's previous approach to s 69E. The inconsistency between this interpretation, and the larger regulatory framework, is demonstrated by the QCA's requirement that the access undertaking and other elements of the regulatory framework include measures aimed at promoting efficient operations across the Queensland coal supply-chain. QRN believes a correct interpretation of the efficient 'operation of, use of and investment in infrastructure', could not possibly result in a 'use' or an 'investment' that imposed costs on downstream or upstream markets that were not offset by benefits elsewhere. It seems plain that such a 'use' or an 'investment' could not in any sense be described as 'economically efficient', as it would impose greater costs than it would benefits.

For example, an investment in infrastructure that reduced costs for QR Network, such as the installation of slow speed turnouts rather than more efficient, but also more expensive, high speed turnouts,[61] would minimise the costs for QR Network, but would impose significant operational costs on above-rail operators in terms of reduced speeds and longer cycle times. Similarly, dynamic efficiency requires consideration of incentives to improve infrastructure as new technology becomes available. For example, signalling upgrades that allow reductions in train separation impose costs on the below-rail service provider in order to improve overall efficiency and reduce costs for above-rail operators. According to the Draft Decision, neither investment could be said to promote the statutory objective, even though each would result in a more efficient supply-chain and a greater surplus.

The economic harm of the QCA's misinterpretation of the statute is compounded by the fact that the electric assets are categorised as 'below-rail' through the operation of the QCA Act, rather than through a market-based mechanism. The promotion of 'lower cost' in a facility designated by public policy, rather than by market forces,

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57 QCA, September 2010 Final Decision QR Network's 2010 DAU, p.98, *"In the 2009 DAU, QR Network proposed that, in certain circumstances, it be allowed to establish a new reference tariff, or vary an existing reference tariff, that departed from the pricing principles. Such an access charge would be permitted if the departure from the usual requirements was 'for the primary purpose of promoting efficient investment by either QR Network or another person in the relevant transport supply chain'"* and " *The Authority considers that these arrangements* [pricing principles contained in the QCA Act and the anti-discrimination clauses contained in the undertaking and in the QCA Act] *sufficiently proscribe the circumstances in which QR Network could seek, and the Authority could approve, a departure from the undertaking's pricing principles."*

58 This clause was added originally added as 2.2(b)(v) to the 2009 DAU by the QCA. See QCA, December 2009, Draft Decision: QR Network 2009 Draft Access Undertaking, Appendix 2, p.255.

59 Draft Decision, p.26, *"the objects clause specifically refers to promoting efficient investment and use of significant infrastructure; that is, the declared service. QR Network's argument that this should extend to the whole of the rail haulage service is, therefore, not consistent with a proper reading of the objects of Part 5 of the QCA Act."*

60 Draft Decision, p.27, "*The Authority has formed the view that the DAAU does not meet the 'cause' part of the objects clause, and irrespective of its effect on effective competition in related markets, the DAAU is not consistent with the objects clause of Part 5."*

61 Turn-outs (switches) are typically designed to be traversed at a low-speed. However, many of the CQCN turn-outs are designed for high-speed traversal through lengthening the turn-out, shallower angles, higher-tensile steel, concrete supports, etc. These are regarded as efficient, despite higher below-rail costs, because they result in a greater throughput and hence lower overall costs.

seems likely to result in allocative inefficiencies. In this respect, distributed energy is provided by the regulated below-rail service, while diesel on-train energy is provided in the above-rail service. That one is regarded as an 'above-rail' cost and one a 'below-rail' cost is not the result of market forces, but the operation of s 250 of the QCA Act. To seek to promote efficiency in one, yet not the other, is economically confused – as the two are clearly substitutes. Instead, the relevant economic question is which of the two (or what combination of the two) is more likely to enhance social welfare (that is to say, over the long run, produce the greatest economic surplus).

3.4 The QCA has increased uncertainty about cost recovery

The Draft Decision indicates that the QCA does not intend to strand QR Network's investment in electric infrastructure. This conclusion necessarily follows from the fact that the Blackwater Electrification Project was endorsed by the QCA following a process that pre-approves the prudency of a project scope.

In order to encourage investment in the below-rail capacity, the regulatory framework provides QR Network with protections from asset stranding risk through the regulatory pre-approval process and provisions in the access undertaking limiting the circumstances where assets will be removed from the RAB.[62] The aim is to balance the interests of QR Network and users so that any risk transfer by QR Network to QRN's customers will include a mechanism for customers to control that risk.[63] In this respect, the regulatory pre-approval process is essentially a proxy for commercially negotiated contractual obligations that provides certainty to market participants, including operators who need to make complementary investments. As described by the QCA:

> *In the Authority's view, the [pre-approval] process should place obligations on QR to provide detailed information to stakeholders on capacity requirements, infrastructure expansion options and proposed capital expenditure. In return, the process should provide certainty to QR that capital expenditure undertaken in accordance with the plan and supported by stakeholders will be accepted as prudent and efficient by the Authority and not subsequently optimised out.*[64]

As an above-rail operator, QRN is not eligible to vote in the regulatory pre-approval process, nor does it obtain the formal certainty afforded to QR Network by the process. However, the endorsement of a Coal Rail Infrastructure Master Plan (CRIMP) by the user group facilitates coordinated investment across the supply chain by providing information about demand and end-user preferences. Consequently, the effectiveness and reliability of the CRIMP process is vital to above-rail operators' investment decisions and in managing the risk of coordination failure over a vertically separated supply chain. QRN has based its investment in electric locomotives on the information provided in the CRIMP process, and the subsequent customer support for further enhancement of electrical capacity in Blackwater.

In the Draft Decision, the QCA has questioned the effectiveness of the CRIMP and regulatory pre-approval process on the basis of expressions of dissatisfaction by stakeholders after the event. While QRN understands the position of its customers, it believes that the appropriate time for procedural complaints to be made was at the time that the vote was run – and if end-users lacked confidence in QR Network's proposals (or lacked sufficient information to make a decision) a negative vote should have been cast, as occurred in the 2010 CRIMP. In this respect, QRN supports the Draft Decision's recognition that ex-post dissatisfaction with QR Network's process should not be a reason to expropriate investments once they are sunk, particularly given its need to make complementary investments following a CRIMP process:

> *"… the Authority does not consider it appropriate to unnecessarily expose QR Network to asset stranding risks on the basis of expressions of dissatisfaction with the [voting] process after the event…*[65]

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62 For example, 2010 Access Undertaking, Schedule A, p. 154, s 1.4

63 QCA Draft Decision, s 3.3, p. 39, "*this process seeks to balance the interests of QR Network and of its customers. It is designed on the underlying premise that, if there is going to be a transfer of risk (in this case asset stranding risk) from QR Network to its customers, then those customers must have an ability to manage that risk.*"

64 QCA, Decision, QR's 2005 Draft Access Undertaking, December 2005, p. 42

65 Draft Decision, p.40

The alternative, namely, to allow ex post reassessment of the pre-approval process, would result in moral hazard that would discourage future supply chain investment. In those circumstances, neither QR Network nor above-rail operators would be able to rely on customer support for below-rail investment (and the associated, complementary above-rail commitments). Uncertainty about capital cost recovery would undermine future system growth and damage the commercial interests of all stakeholders, with significant negative implications for the development of the Queensland coal industry.

Further, it would also be reasonable to expect that, if the CRIMP process cannot be relied upon and that QR Network is therefore required to bear the risk of its infrastructure investments being bypassed and stranded, that QR Network would in turn seek higher returns, adding to supply chain costs for all stakeholders.

In any case, by accepting that the CRIMP process was followed, and the assets should not be stranded, the QCA has signalled that these costs will be recovered. Of most concern to QRN, as an operator, is that the QCA has not indicated how it proposes to allow this to occur, compounding market anxiety about regulatory risk and furthering uncertainty during a period in which negotiations are under way for a significant proportion of above rail contracts in the Blackwater system. As noted earlier, QRN's view is that it is incumbent on the QCA, having identified that the AT5 is giving rise to stranding concerns, to engage constructively with stakeholders on how it proposes to price electric access in the future.

It is also difficult to reconcile the QCA's stated intent with its observation that proposals to address asset stranding risk in the DAAU and previous QR Network applications should not be required in a period so soon after the approval for the investment was gained.[66] The implication is that the circumstances in which the investment was assessed as prudent should not have changed in such a short period. QRN considers this observation highlights the nature of a regulatory failure where the regulatory pre-approval process can determine that investments are prudent and efficient and that the same assets can subsequently be the subject of asset stranding concerns. Rather than questioning the prudency of the investment, which was supported by stakeholders, it seems logical to question the inefficient tariff arrangements and the behaviour of Pacific National, which have given rise to the risk.

Lastly, QRN opposes the QCA's suggestion in the Draft Decision that user pre-approval of capital expenditure should be removed from the next access undertaking and that QR Network should rely on ex-post prudency assessments of capital expenditure.[67] Such an approach would discourage future investment in below-rail expansion capacity, as QR Network would then be unable to protect itself from the risks associated with ex-post prudency assessments, and would make it difficult for above-rail operators to obtain appropriate signals for their own investments. In effect, such an approach would undermine the coordination of planning in a disaggregated supply-chain. Moreover, such an approach would give below-rail investments all the risk characteristics of normal commercial investment, on which QR Network would naturally expect a greater return to compensate it for stranding risk, thereby increasing costs to the supply-chain.

3.5 The QCA has not given sufficient weight to the interests of electric traction users

The Draft Decision does not give sufficient weight to the interests of both QRN and Blackwater users with existing and future commitments to electric traction. The current tariff arrangements are exposing all QRN's customers with electric commitments to an inefficiently escalating cost base. The QCA has not regarded this as a sufficient reason for acting on the DAAU for a number of reasons:

- first, that the DAAU would favour electric traction, to the detriment of substitution between traction modes on the Goonyella and Blackwater systems; and

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66 Draft Decision, p. 40, *"That said, it remains a curious aspect of both the DAAU and QR Network's AT5 tariff proposals contained in the 2008 DAU, that they seek to address, amongst other things, an asset stranding issue in a period when QR Network had sought and gained regulatory approval for, and subsequently undertook, significant investments in the electric infrastructure."*

67 Draft Decision, p. 40, "*Therefore it may be best to remove the current capital expenditure approval process from the next undertaking. QR Network would then have to rely on the more conventional ex-post assessments of prudency of capacity expenditure and the inherent risks associated with establishing the prudency of past expenditures."*

- second, that the consequences of the DAAU would be that Pacific National's diesel commitments in Blackwater would become uncompetitive, a factor that apparently outweighs the interests of QRN, and its electric customers, who ultimately bear the cost of the escalating AT5.

Each of these points is addressed below.

First, the Draft Decision says that the DAAU would reduce the degree of competition in Blackwater rail haulage by limiting the opportunities for rivalry in all dimensions of the price-product-service package. This conclusion is predicated on the QCA's view that, by making investment in electric traction more attractive, the DAAU would eliminate traction choice as one of the ways competitors in the above rail market can seek to differentiate themselves from their rivals in offering a competing service to end users. The QCA says that this lack of choice would be an indicator of lack of competition, and therefore refuses to approve a DAAU that would improve the prospects of electric traction relative to diesel traction.

This approach exaggerates the relevance of traction to value creation in the above-rail market, given that many other ways remain for above rail competitors to differentiate, such as service level, responsiveness, reliability, technological innovation and the like. Furthermore, it assumes traction choice as being necessary to preserve vigorous competition, in the absence of any principled discussion as to why traction choice and the level of competition are related. There is no reason to think that competition across traction choice is particularly essential to the promotion of competition. In Goonyella, where competition is particularly fierce,[68] all users operate electric locomotives. The QCA's position is equivalent to an argument that, for example, the choice of hybrid cars is essential to competition in the market for automobiles, when of course, competition occurs across a huge number of variables with the source of tractive energy being merely one consideration to a person wishing to purchase a car.

In any case, the extent to which the DAAU makes electric traction more attractive relative to diesel must be weighed against the alternative option of doing nothing to address the current coordination failure in the Blackwater system. If unchecked, the result of that coordination failure will be the progressive unravelling of the economies of scale that are necessary for electric to be a viable choice. In this eventuality, electric traction could be eliminated as a choice for competitors in the above rail market, which would effectively result (at very large cost) in what the QCA aims to avoid – namely, a reduction in the number of ways rivals have to differentiate themselves.

Second, the Draft Decision finds that the DAAU will reduce above-rail competition because it discriminates against Pacific National,[69] which has invested in diesel locomotives for Blackwater, and favours QRN as QR Network's related party above-rail operator, which has invested in electric locomotives. QRN rejects the QCA's characterisation of the DAAU as anti-competitively directed at Pacific National's costs, given that *any* diesel service would pay more, while *any* electric service would pay less than would otherwise have been the case without the DAAU. Moreover, this characterisation by the Draft Decision misses what QRN understands to be the purpose of the DAAU – which was not directed at Pacific National paying more – but was rather directed at all diesel users in Blackwater (including QRN) contributing to the cost of the infrastructure if they chose to bypass it, that is, the burden of paying infrastructure charges would equitably follow only from a discretionary decision to bypass the assets in the first place.

Further, the Draft Decision's theory of competitive harm to Pacific National appears to rely on a doubtful assumption that the traction mix in Blackwater is fixed, with QRN being irrevocably committed to electric and Pacific National to diesel. It is on this basis that the QCA assumes that incentivising greater use of electric would be equivalent to forcing Pacific National from the market. This approach, which confuses protecting Pacific National with protecting competition, fails to recognise that:

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[68] Both QRN and Pacific National operate electric services and recent media releases indicate BMA's intention to operate its own services, or at least, contract a third party to operate BMA owned rolling stock. See Siemens Media Release dated 12 July 2012, The BHP Billiton Mitsubishi Alliance (BMA) has awarded Siemens a contract to supply 13 narrow gauge 25kV heavy haul electric locomotives to assist BMA in commencing rail operations in Queensland… and provides BMA with the ability to transport coal efficiently from its Caval Ridge and Daunia mines to the Hay Point Coal Terminal in the Bowen Basin, available at http://www.siemens.com.au/news/Bowen_Basin_coal; Asciano, 14 September 2012, ASX Announcement – Train Services Contract Announced, p.1, *"This contract provides the support functions of maintenance and daily servicing for the four BMA train sets planned for use in the Goonyella coal system to the BMA owned Hay Point coal terminal.",* available at http://www.asciano.com.au/resources/newsres/140912020443_120914_new_train_services_contract_announced.pdf

[69] Draft Decision, p. 34, "*the Authority considers the DAAU is likely to discriminate against Pacific National and favour QR Network's related party operator, QR National…"*

- Pacific National would have anticipated electrification and the DAAU (noting its prior support for the measure), and has presumably negotiated appropriate risk-sharing mechanisms in its contracts, meaning that its competitiveness as regard existing contracts in Blackwater will be unaffected by the DAAU;[70]

- Moreover, it is simply incorrect to characterise Pacific National's competitive position in Blackwater as being permanently limited to diesel traction, particularly given its recent entry in that system and small market share.[71] As its market share grows, it will be able to purchase electrics if they are more attractive and re-deploy diesels to other markets (as, indeed, will QRN in relation to diesels it operates in Blackwater);

- The Draft Decision has given no regard to the competitive prospects of a new entrant, including that a new entrant has the option to choose either traction type.

QRN notes that Pacific National was aware of the timing of electric capacity upgrades to Blackwater and it seems unlikely that it will not be in a position to obtain electric locomotives for deployment. Further, given the opportunities for redeploying diesel locomotives to non-electrified growth corridors such as Newlands/GAP, Moura, SBR or Mt Isa, it is reasonable to assume Pacific National has recognised the opportunity to swap its Blackwater diesels for electric locomotives as electric capacity became available. Consequently, Pacific National would not be disadvantaged by the DAAU except to the extent that it placed itself in that position.

In this regard, QRN regards any attempt to characterise Pacific National as being 'surprised' by the DAAU, and therefore exposed to unanticipated regulatory risk, as mistaken, given that:

- The electrification of Blackwater proceeded after a public process, including a public endorsement of the project by the QCA in April 2009;[72]

- QR Network has made industry aware for several years about the inefficiency of AT5,[73] and in fact put forward in 2008/09 a proposal (which was similar to the DAAU) to amend its undertaking to address that inefficiency, together with explanatory material that was in similar terms to the DAAU;[74]

- Pacific National supported that proposal at the time, and in fact, made clear that its support for the socialisation of electric costs across Blackwater and Goonyella would extend to the Newlands system, assuming fleet inter-operability, as Pacific National seemed to be considering operating an electric fleet across all three systems once GAP was electrified; and[75]

- Throughout, as indicated in its submission on this DAAU, Pacific National was considering whether to operate electric trains in Blackwater, and was only prevented from doing so due to the temporary lack of capacity.[76]

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70 QR Network has repeatedly made industry aware of its willingness to consider transitional arrangements. QR Network, December 2011, Submission to QCA: Electric Access Draft Amending Access Undertaking, p.30, *"As noted earlier, Pacific National currently runs a significant electric fleet in the Goonyella system and has a low market share in the Blackwater system – as such, QR Network expects that Pacific National will similarly be able, by July 2012, to run at least 90% of feasible electric services (over both systems) with electric locomotives. If Pacific National can show that this will not be the case, QR Network is happy to consider additional transitional measures"*:: Attachment B presentation to Traction Working Group 10 May 2012, p.3 "*QR Network will work closely with each of our customers to ensure smooth transition to the proposed pricing structure."*

71 Asciano, 16 April 2012, Asciano Submission to the QCA on QR Network DAAU Relating to Electric Traction, p.9, *"Asciano entered the Queensland coal rail haulage market in 2009."*; Draft Decision, p.20, *"Asciano noted that QR National provided 80% of the haulage services in the Blackwater system."*

72 QCA, Regulatory Pre-approval for Coal Master Plan 2008 capacity expansion projects, letter to Mr Hockridge, 23 April 2009

73 QR Network, October 2009, 2009 Coal Rail Infrastructure Master Plan, Working Paper 4.5 Rationale for Power Systems Upgrade in the Blackwater System, p. 37, "*It is essential that a pricing model and risk allocation for electric traction infrastructure are developed to ensure that all wider system economic benefits can be realised and the stranding risks for both QR Network and rail operators are minimised."*

74 QR Network, December 2011, Submission to QCA: Electric Access Draft Amending Access Undertaking, p.20, "*QR Network is proposing to amend the 2010 AU to introduce a single whole of network AT5 charge… This network-wide approach to pricing of electric traction was proposed by QR Network in the development of the 2010 AU."*

75 Pacific National supported the socialisation of AT5 across Blackwater, Goonyella and an electrified Newlands, on the condition that AC locomotives were able to operate in Blackwater (as they now can). See Asciano, November 2008, Submission to the Queensland Competition Authority QR Network 2009 Draft Access Undertaking, p. 56

76 Asciano Submission, p.9, "*Prior to entering this market* [Queensland coal rail haulage market] *Asciano had to make a decision as to whether to operate diesel locomotives or AC electric locomotives. At this time… Asciano was informed… that the Blackwater system could not accommodate AC electric locomotives.";* Asciano, November 2008, Submission to the Queensland Competition Authority on QR Network's 2009 Draft Access Undertaking, p. 56, Asciano that "*QR Network is working towards resolving the technical issues that prevent the new generation locomotives using the Blackwater system... Asciano understands that remedial work is currently being scoped but at this time completion is not expected until around 2012."*

4 QR Network's TCO Model (Draft Decision, Section 2)

This section sets out QRN's view regarding the findings of the QCA's Draft Decision with respect to QR Network's Total Cost of Ownership (TCO) model and the overall efficiency of electric traction as the preferred long term supply chain solution. The section also clarifies specific attributes of electric traction in the Blackwater and Goonyella systems.

The change to the regulated tariffs proposed in the DAAU was justified by QR Network based on its assessment of the relative long term efficiency of electric over diesel traction. QR Network's analysis was conducted on a TCO basis *given the current configuration and capital value of the Blackwater and Goonyella systems*. Stakeholders, and the QCA, disputed the validity of QR Network's claims and argued that the relative efficiency of electric and diesel traction is best left to market forces. Much of that discussion seems to proceed on a misunderstanding of the model – the total cost of ownership question is not concerned with the most efficient traction choice for a hypothetical, greenfield railroad. Rather, the TCO model appears to examine the most efficient traction choice for the rail network users actually have available; namely, the current Blackwater below-rail assets, including the ongoing cost to service the investments that are already sunk.[77]

As noted earlier in this submission, QRN's view is that a rational and appropriate evaluation of economic efficiency requires an assessment of the whole supply chain. QRN is therefore supportive of the TCO concept, and its relevance in determining sustainable electric traction pricing for the Blackwater and Goonyella systems. As discussed in section 5.1.1 of this submission, QRN considers that such an assessment is consistent with s 69E of the QCA Act.

At the time of the publication of the Draft Decision, QR Network was actively working with industry, including with QRN, to address criticisms made by stakeholders on the underlying assumptions of the TCO analysis. The QCA was aware that QR Network had initiated this consultation process.[78] In the course of its engagement, QR Network issued an open invitation to all stakeholders, including the QCA, to review the TCO model (subject to appropriate confidentiality arrangements being entered into by the parties).[79] A similar invitation had been issued by QR Network in its explanatory submission supporting the DAAU.[80] QRN understands it was the only stakeholder to accept QR Network's offer, with neither the QCA nor any other industry participant choosing to review the TCO model or suggest an alternative process for review. In this respect, it is notable that the Draft Decision criticises a model that, to the best of QRN's knowledge, the QCA has not assessed.

Whilst QRN is not in favour of unnecessarily delaying QCA decision-making, given the importance of the TCO model (and the QCA's rejection of it) to the Draft Decision, QRN believes it would have been reasonable for the QCA to satisfy itself of the TCO's assumptions through a constructive engagement process. QRN notes that the QCA Act allows the QCA to convene working groups, or other informal processes for just such a purpose.[81] The approach that was taken by the QCA, namely, relying on stakeholder comment without undertaking any independent assessment or analysis, has given rise to a number of factual errors, and raises doubts about the integrity and due process of the QCA's decision-making.

4.1 Criticisms of QR Network's TCO model (2.1)

A number of the criticisms of the TCO analysis related specifically to key drivers of above rail efficiencies that impact cycle times. Indeed, Pacific National provided selected data to support its claims. The QCA accepted these criticisms, without, as noted, reviewing the TCO model, and found that:

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77 Following QRN's independent review of QR Network's TCO model.

78 Draft Decision, p.12 *"The Authority understands that QR Network has been engaging with a number of stakeholders with a view to settling the various contentions in the debate on the relative efficiency of diesel and electric traction."*

79 QRN notes that those confidentiality restrictions were required due to the use of QRN's commercially sensitive operating data by QR Network.

80 QR Network, December 2011, Submission to QCA: Electric Access Draft Amending Access Undertaking, p.11 "*QR Network will be happy for the QCA to subject the TCO analysis to detailed review and validation."*

81 See s 172 of *Queensland Competition Authority Act 1997*

- Sufficient doubt had been raised regarding the relative efficiency of electric traction versus diesel traction to warrant overturning what has been a long held view by the QCA that electric is more efficient than diesel traction;

- As a result of its mistaken perception that there is no convincing evidence to support electric traction over diesel, the QCA found that it is unlikely that there are negative externalities (i.e. congestion costs) associated with the operation of diesel locomotives in an electric system and, therefore, there is limited spill over benefits to Goonyella users of diesel trains being operation in Blackwater; and

- Whilst the QCA acknowledged that AT5 and the capacity multiplier may not be promoting efficient outcomes, the QCA did not indicate viable alternatives to correcting the prevailing inefficient tariff structure.

In the Draft Decision, the evaluation of the assumptions in QR Network's TCO model gave rise to discussion on cycle times, capacity and infrastructure costs, technology and traction choice decisions. Each of these will be discussed in turn based on QRN's assessment of the TCO model and its understanding of the market in which it operates.

QRN first notes however, that Pacific National has provided to the QCA selected and isolated data in preference to a holistic and calibrated capacity model, and has likewise failed to participate in reviewing and validating QR Network's TCO model. Of course, the extent of Pacific National's involvement in this process is a matter for it, but for the QCA to accept, without question, Pacific National's data is inappropriate. The QCA is an independent and impartial regulator, and, as such, is required to make an independent assessment of all relevant facts. Therefore, QRN does not see any basis for the QCA to find that the reliability of QR Network's model is doubtful, in circumstances where the QCA has not evaluated the model, but then accept at face value unsystematic and unaudited data provided by Pacific National.

4.1.1 Cycle Times

QR Network's evaluation of cycle times on the Blackwater system estimated electric trains at an average weighted cycle time of 26.4 hours and diesel trains at 28.3 hours.[82] Such an evaluation is based on the use of simulated data, the benefit of which is that below rail performance issues that impact all trains equally (e.g. possessions for the maintenance of the network and scheduling conflicts) do not skew or adversely impact the results.

In critiquing QR Network's cycle time assumptions, Pacific National provided information regarding the actual cycle time of their diesel locomotives in the Blackwater system, in support of its argument that diesel trains are at least as efficient as the 26.4 hour cycle time of electric trains.[83] As noted, Pacific National appears to have misunderstood the difference between the actual performance of individual consists (which is, of course, subject to significant variability) and the average weighted simulated system performance, which has the benefit of correcting for variability across both traction modes. It is clear the impact failing to make such an allowance can have from Pacific National's comment that it was able to achieve a 21 hour cycle time on a day when scheduling conflicts did not arise with other services.[84]

QRN does not have access to information to compare where the performance differentials are across the cycle for individual consists and, as noted by Downer, there are a significant number of variables, including: loading, unloading, passing loops and other bottlenecks in relation to any assessment of cycle time.[85] Indeed the comparison

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[82] QR National's review of the TCO model revealed that the cycle times quoted by QR Network are based on modeling the performance of each traction type for each mine-to-port haul combination, in both Blackwater and Goonyella systems, and taking the weighted average performance for each. Further, it is our understanding that these cycle times assuming current operating paradigms and do not include future (significant) benefits from optimizing system performance expected when transitioning to a fully electrified system.

[83] Asciano Submission, p.21, Asciano provided a summary of actual raw cycle data from 1 July 2011 to 14 February 2012. The summary stated that 65% of Pacific National diesel services achieved an equivalent or better cycle time than QR Network's benchmark cycle time for electric trains of 26.4 hours.

[84] Asciano, 16 April 2012, Asciano Submission to the QCA on QR Network DAAU Relating to Electric Traction, p.21, *"the best Asciano diesel cycle time was 21 hours on a day when no QR National services were operating and therefore had no constraining effect on Asciano train operations."*

[85] Downer EDI Rail Pty Ltd, 9 March 2012, Submission in relation to QR Network's 16 December 2011 Draft Amending Access Undertaking for Sustainable Electric Traction Pricing (1st Submission), p.2, *"We believe the significant number of variables, including loading, unloading, passing loops and other bottlenecks, make it difficult to definitively support a case that greater use of electric locomotives will improve cycle time."*

provided by Pacific National of the relative performance of diesel trains in the "section Bluff to Warren which is relatively hilly"[86] represents approximately 140km of track - providing the opportunity to "catch up" depending on the conditions at the time of running. A more relevant comparison is the 10km of track between Windah and Westwood, which has the steepest gradient on the Blackwater system, with a sectional run time of 20 minutes. In this respect, as noted, the QCA has accepted Pacific National's assertions at face value, and made no attempt to ascertain whether they are appropriate metrics for assessing the run time performance of diesel and electric trains.

Indeed, Pacific National attributed the relative performance of their diesel trains to better speed and control and the installation of ECP braking. QRN accepts that ECP braking has the potential to marginally improve below-rail transit time. However, ECP braking is not specific to diesel consists and can be enabled in any of the modern electric locomotives (that is, ECP braking can be installed on wagons hauled by both diesel and electric locomotives). Therefore, it is QRN's view that the relevant comparison is to either include the impact of ECP braking on both types of trains or to exclude the impact, as it understands QR Network has done in the TCO model. In this regard, QRN regards the comments in the Draft Decision in relation to ECP braking as irrelevant.[87]

Further, Pacific National stated that its diesel trains consistently matched or outperformed QR Network's estimated cycle time for electric trains and were not slower in climbing the ruling grades than electric locomotives.[88] In addition, Pacific National claims that their diesel trains have at least as good speed control as QRN's electric trains. QRN notes that there is typically only a small difference between diesel and electric trains when there is 'green light running', that is, there is no requirement to stop and then start again. Electric trains however, show better performance than diesel in the real-life circumstances where there is stop-start running, together with steep gradients, due to the increased amount of power available. This greater power allows electric locomotives to accelerate to maximum speed more quickly and to maintain that speed. Indeed, the power differential is simply demonstrated by noting that diesel consists on the Blackwater system have 75% of the power (kW) of electric consists.[89]

The relative performance of electric locomotives over diesel locomotives is supported by manufacturers including Siemens, Bombadier, Toshiba, CNR and CSR. In this respect, the results of QR Network's TCO model are consistent with the findings of comparable international studies and technical analysis.

For example, Bombadier (the largest global manufacturer of heavy haul electric locomotives) has conducted analysis which shows that electric traction has substantial advantages over diesel traction as shown in the figure below.[90] When comparing the performance of diesel trains (Traxx DE, DE-4400hp, DE-6000hp) over electric trains (TRAXX AC, TRAXX AC-H, IORE & WAG-9) on a gradient of 1:200, the diesel typically outperformed electric only in terms of the starting tractive effort. However, this was substantially offset by the electric trains hauling the train loads at significantly higher speeds, requiring a smaller number of locomotives, and sustaining their tractive energy over higher grades and loads. Furthermore, the lightest diesel train requires approximately 10% more power at the wheel in order to pull its own unproductive weight.

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86 Asciano Submission, p.22, Asciano observed 75 coal services (Asciano Diesel, QR National Diesel and QR National Electric) on the Blackwater system between Bluff and Warren and concluded that *"in relation to cycle times diesel trains are at least as efficient, if not more efficient, than electric trains on the Blackwater system."*

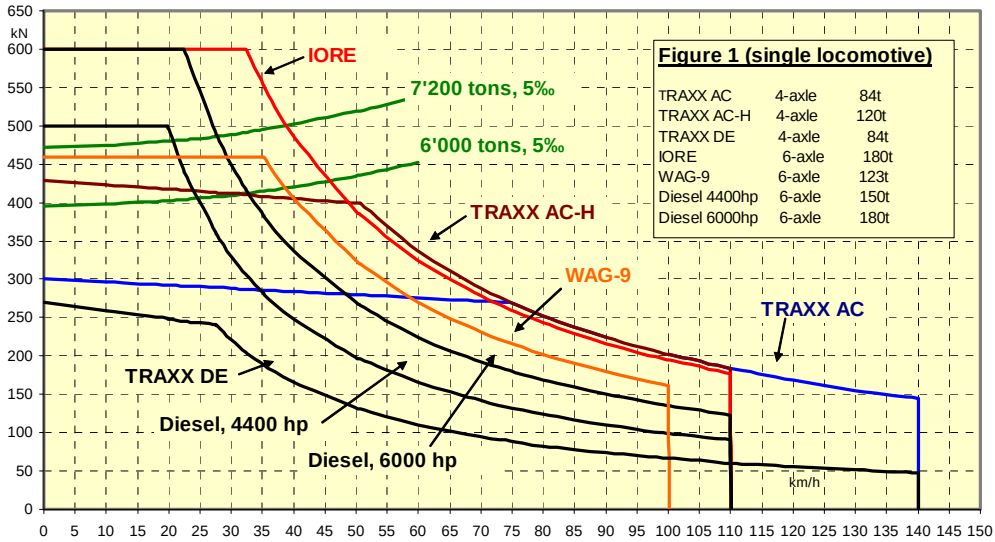
87 Draft Decision, p.8, *"Asciano said that, as Pacific National's trains had a more effective braking system [ECP braking], they could maintain a higher overall speed in any given section."*

88 Draft Decision, p.8, *"Asciano concluded that, in relation to cycle times, Pacific National's diesel trains were as efficient as QR National's electric trains in the Blackwater system, both overall and on sections where there were relatively steep and/ or numerous gradients. Asciano argued Pacific National's diesel trains performed better as they could maintain speed and had better speed control than electric trains."*

89 4 x QRN 4000/4100 class (Downer: EMD GT42Cu-AC/ EMD GT42Cu-ACe) Gross power 9696 kW/ Tractive power 9040kW. 3 x QRN 3800 class (Siemens E40AC) Gross power 13,500 kW/ Tractive power 12,000 kW

90 Attachment C Bombardier Transportation, January 2007, Electric locomotives for freight corridors, pp. 7- 10

Figure 1: Relative performance of Diesel versus Electric Traction with train resistance curves for loads of 6,000 and 7,200 tons[91]



Further, in their assessment of cycle time, stakeholders also raised concerns regarding the allowance made for the provisioning of diesel trains, particularly, that QR Network had included too high an allowance for the time it takes to refuel a diesel locomotive. For example, Downer Engineering, the main narrow gauge supplier of locomotives in Queensland,[92] said that diesel refuelling can be completed in just over four minutes and all other servicing including sand, toilets and cab amenities would be required for both diesel and electric locomotives.[93] QRN is not in a position to disagree with the technical accuracy of this statement, but notes that it is an oversimplification of the operational requirements to refuel a train and does not accurately reflect the real-world refuelling times in Blackwater.

Specifically, Downer Engineering's statement that it takes four minutes to refuel a diesel train does not appear to take into consideration parking the train, all activities involved in actually filling the locomotive and then pulling the consist forward to do the same for each locomotive in the consist. Further, what is also relevant to meeting the quoted fill rates is the availability of facilities and suitably qualified technicians to do the task. It is not clear from the Downer submission if the refuelling equipment required to meet the quoted fill rate is what is currently in service or if it takes into consideration the number of locomotives or consists being refuelled at the same time. This is particularly relevant given fill rates drop significantly if there is more than one locomotive or consist being refuelled at the same time. Further, as the scale of refuelling activity increased, the complexity and associated delays increase commensurately. In contrast to diesel, electric locomotive cycle times benefit from such increases in scale.

4.1.1.1 Capacity and Infrastructure Costs

Stakeholders raised concerns regarding the comparative cost of capacity improvements between diesel and electric systems. In this respect, for example, the Draft Decisions quotes the concern expressed by Rio Tinto that "headways on the Blackwater system [are] currently at 30 minutes [which is] based on the capacity of the overhead electric network".[94] QRN understands the concern, but notes that the current 30 minute headway on the Blackwater system is not related to the electric overhead capacity, but is rather a function of the sectional run time across single line sections of track on the Blackwater system together with the allowances for through-running trains on the North Coast Line. With the duplication of the Blackwater system, the constraint becomes the longest sectional run time on

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91 Attachment C Bombardier Transportation, January 2007, Electric locomotives for freight corridors, pp. 7

92 Noting only two major suppliers of diesel locomotive engines globally: General Electric and Electro-Motive Diesel

93 Downer EDI Rail Pty Ltd, 10 May 2012, Submission in relation to QR Network's 16 December 2011 Draft Amending Access Undertaking for Sustainable Electric Traction Pricing (2nd Submission), p.1, *"With a fill rate of 800l/min a locomotives could be refuelled in just over 4 minutes. All other servicing including sand, toilets and cab amenities would be required for both the diesel and electric locomotives."*

94 Draft Decision, p.9

the network, which is the assumed 20 minute run-time on the Windah to Westwood segment. That run-time is actually determined by the operational capability of the diesel consists, given it can be traversed by electric trains in 13 minutes.

Further, QRN notes the Draft Decision finds that diesel technologies have greater flexibility which results in an option value that is not reflected in the TCO analysis, again, a finding reached without the QCA having reviewed the model.[95] In particular, the QCA argued that, with diesel technologies, above-rail capacity can be increased in smaller steps and therefore could more flexibly match the future growth in coal volumes. In this respect, QRN considers the relative costs associated with the flexibility to scale capacity in line with demand are particularly relevant when assessing a greenfield investment. However, with the installation of substations supporting the last feeder station at Duaringa in September 2012, QRN understands that the Blackwater system will have sufficient feeder stations to allow future capacity increases to be managed through upgrades to existing feeder stations (rather than the development of new ones). Further, contrary to the assertions made in the Draft Decision, QRN understands that the estimated cost of the electric investment necessary to allow expanded system capacity[96] has already been included in the TCO analysis by QR Network in order to take account of the option value the QCA has referenced.

The Draft Decision also argues that, as network electrification has high up-front fixed costs and lower on-going operating costs, the relative efficiency of electric over diesel requires high utilisation and there is a resultant risk to supply-chain costs if electric capacity demand forecasts are not realised.[97] QRN does not dispute this assertion, given its understanding that the intent of the DAAU was to address and mitigate the realisation of this risk. That electric traction has strong economies of scale is not, in QRN's view, a disadvantage (nor is it clear why the QCA has chosen to treat economies of scale as an economic cost).

Lastly, QRN notes that stakeholders have also argued that, as the provisioning of diesel locomotives is undertaken off-network, it does not impact on below rail capacity or require more track investment. As additional capital and operating expenditure would be required off-network, stakeholders have expressed concerns about the appropriateness of these costs being evaluated by QR Network. QRN understands the views of its customers, considers that it is appropriate for QR Network to assess the efficiency of the supply-chain rather than limiting itself to costs incurred in the below rail service. It is therefore QRN's view that off-network capital or operating expenditure is plainly relevant in comparing the efficiency of electric and diesel traction. In this respect, it notes that the Queensland Resources Council has previously indicated to the QCA that:

> *…the regulatory environment must … ensure coal infrastructure assets maximise the efficiency of Queensland's rail-to-port coal supply chain and recognise the importance of aligning ownership interests and incentives across the supply [chain].*[98]

4.1.2 Technology

In relation to technological improvements, QRN understands that the TCO analysis assumes that the innovation curve is equivalent for both diesel and electric traction. This seems a reasonable position for QR Network to take; QR Network's assumption is actually supported by stakeholder comments on the DAAU which highlight how it is impossible to predict how technology will develop over the 30 year assessment period of the TCO.[99]

Some stakeholders have argued that technology improvements in diesel traction should be included in the TCO, as technology change is more likely to occur in the market for diesel locomotives than it is in the market for electric locomotives. The Draft Decision accepts that argument, and finds that innovation is likely to stall in the market for

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95 Draft Decision, p.12, *"Diesel technologies have greater flexibility which results in an option value that is not reflected in QR Network's TCO analysis."*

96 Goonyella to achieve 290 mtpa and Blackwater 156 mtpa

97 Draft Decision, p.12, *"The relative efficiency of electric over diesel requires relatively high utilisation of the installed capacity. There is, therefore, an inherent risk that these efficiencies will not be achieved if the demand forecasts are not realised."*

98 QRC, 12 February 2010, Submission in response to the QCA's draft determination on QR Network's 2009 Access Undertaking, p.3

99 Draft Decision, p.9, "*Asciano said it was impossible to predict how technology would develop, particularly over a period as long as thirty years."*

electric traction.[100] The QCA's finding in this respect has been premised on inaccurate information, namely that Siemens is a monopoly supplier of electric locomotives. In actual fact, there are many competing narrow gauge, heavy haul, electric traction locomotive suppliers. Further, the rate of technological development and competition in the market for electric traction is plainly not constrained by gauge[101] or geography, with the international market as or more competitive than the comparable diesel market (assuming separate markets for each traction type). Section 5.1.2.1 outlines the market for electric locomotive supply.

In QRN's view, to the extent the innovation curves for diesel traction and electric traction are asymmetric, there is a possibility that there will be greater innovation in electric locomotives than in diesel locomotives. This is in part due to the benefits of drawing power from the distributed energy system versus the simple fact that a diesel locomotive is constrained by the size of the engine. One of the significant technological innovation advantages of an electric traction system, which is not available on diesel locomotives, is the contribution regenerative braking can make to reducing operating costs. Regenerative braking allows the electric locomotive to capture braking energy and transmit the power back into the distributed power network in order to either power other locomotives or to transfer energy back into the grid. While QRN understands that this benefit has not been captured in the TCO analysis, international analysis shows significant energy efficiency benefits can be obtained:

- Energy savings by regeneration are typically in the range of between five to seven per cent in a flat country (Finland) and between 20 to 30 per cent in a mountainous country (Switzerland).[102]
- A detailed analysis made in 2000 of the Coal Link in South Africa (24 hour simulation of all trains) for the line Ermelo – Richards Bay showed a total potential of energy savings of >30%[103]
- Siemens have conducted a study in Central Queensland with the results included in Attachment E, where energy regeneration for one Goonyella system round trip (3 units E40AC + 124 wagons) resulted in:
    - a saving of 4500 kWh (~1000 litres of fuel);
    - a corresponding reduction in energy cost per ton kilometre; and
    - CO2 emissions reduced per year and train by 1,740 t.

Further, QRN notes that the potential for further advancement in the energy efficiency of electric traction is obtainable through access to developments in power generation and 'smart grid' technology, itself enabled by the scalable nature of the overhead power system.

4.1.3 Other issues with QR Network's TCO analysis

4.1.3.1 Environmental considerations

International studies have concluded that diesel engines are more carbon intensive and less energy efficient than electric, as depicted in the figure below, with the typical carbon dioxide (CO_2) emission from a diesel vehicle (2,100g) exceeding that of an electric vehicle [104] Further, international studies have also demonstrated that diesel freight trains

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100 Draft Decision, p.33, "*The Authority considers this* [the DAAU] *could reduce the competitive constraint faced by the narrow-gauge electric locomotive supplier form the narrow-gauge diesel locomotive suppliers. The Authority considers it could also hinder technological change in electric locomotives, which is usually an outcome of a competitive market."*

101 Locomotive manufactures typically compete across gauge types (both track and outline) by adopting adaptive engineering processes in response to operator tenders.

102 Bombardier, January 2007, Electric locomotives for Freight Corridors, p.3

103 Provided to QRN by Bombardier.

104 Network Rail, October 2009, Network RUS Electrification p.31, available at: http://www.networkrail.co.uk/networkrus_electrification.pdf, that references: Atkins, 2007, Rail Safety & Standards Board Research Programme Engineering T633: Study on further electrification of Britain's railway network Final Report, Rail Safety & Standards Board, available at: http://www.rssb.co.uk/SiteCollectionDocuments/pdf/reports/research/T633_rpt_final.pdf

will consume 3.0 times more energy than an electric freight train.[105] These studies highlight the energy efficiency potential of electric traction, particularly as the share of renewable energy increases.

Figure 2: Carbon emissions by transport mode[106]

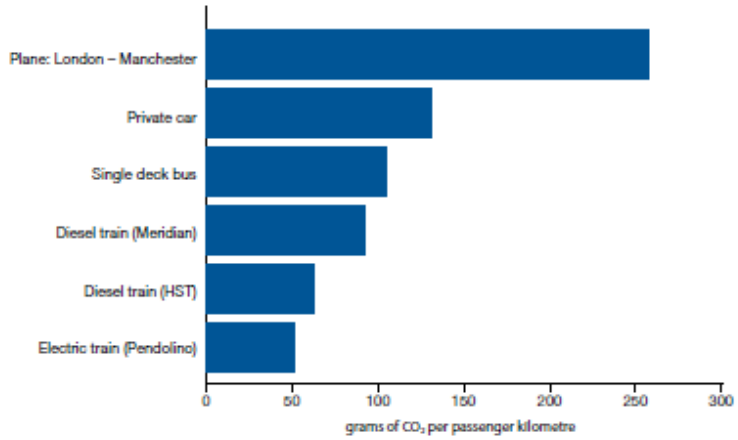

Table 1: Comparison between diesel and electric locomotive energy efficiency[107]

		Energy Consumption			CO2 Emission	
		BTU	kcal	kWh	(kg-CO2)	Electric/Diesel
Passenger	**Diesel**	170.20	43	0.050	0.010	1.00
	Electric	64.60	16	0.019	0.006	0.60
Freight	**Diesel**	255.50	64	0.075	0.015	1.00
	Electric	84.60	21	0.025	0.008	0.53

In addition to the advantages of greater CO_2 management associated with electric traction, international standards are increasingly requiring significant reductions in the emission of pollutants and particle matter from diesel engines. Adoption of these international standards in Australia may require the development of new and more expensive diesel engine technologies. In this respect, in comparing the relative environmental performance of diesel and electric locomotives, QRN notes that diesel locomotives carry at least two times the amount of mineral oil as electric locomotives and ten times the amount of cooling fluid, and that these pollutants require regular replacement in diesel locomotives but not in electrics.[108]

4.1.3.2 Comparative energy efficiency

Some stakeholders have indicated to the QCA that, if the consumption of coal at the point of generation is considered in a TCO analysis, modern diesel trains are more energy efficient than electric trains. QRN respectfully disagrees with these statements, and notes that international studies conducted by both Siemens and CNR suggest otherwise. CNR have found that, from the point of loss of electric transmission, electric locomotives are approximately 7% more energy efficient then diesel.[109] Further, Siemens, when comparing the energy efficiency of

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105 Attachment D Japan International Corporation Agency, 2007, The Feasibility Study on The Development of Dedicated Freight Corridor for Delhi-Mumbai and Ludhiana-Sonnagar in India, Final Report, Ministry of Railways Government of India, Volume 3, Chapter 5, p.33, *"A diesel freight train will consume 3.0 times more energy then an electric freight train."*

106 Interfleet Technology & Lancaster University, 2007, Rail Safety & Standards Board Research Programme Engineering T618 - Traction Energy Metrics, Rail Safety & Standards Board, p.51, available at http://www.rssb.co.uk/SiteCollectionDocuments/pdf/reports/Research/T618_traction-energy-metrics_final.pdf

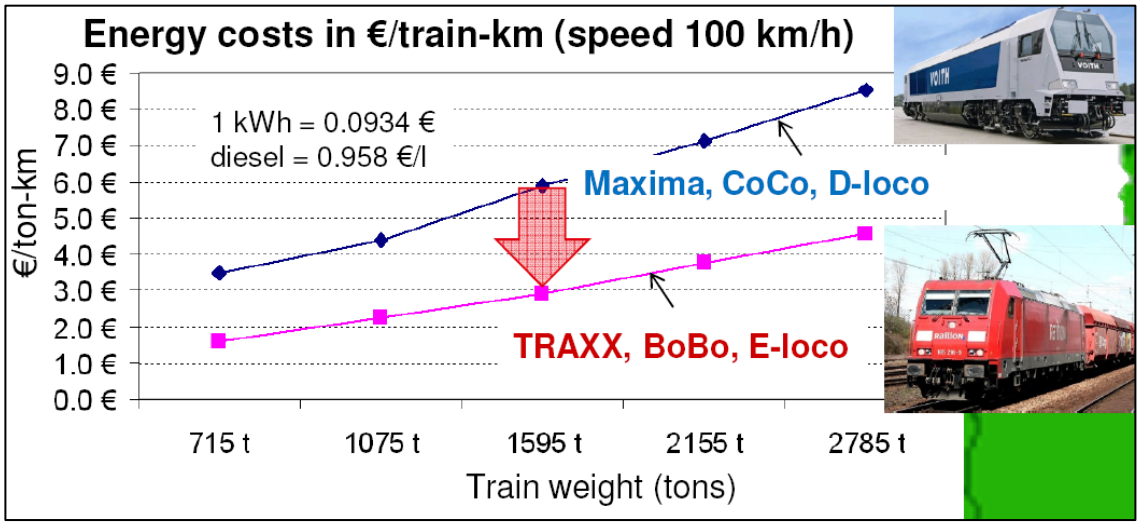
107 Attachment D Japan International Corporation Agency, 2007, The Feasibility Study on The Development of Dedicated Freight Corridor for Delhi-Mumbai and Ludhiana-Sonnagar in India, Final Report, Ministry of Railways Government of India, Volume 3, Chapter 5, p.33, See Table 5-24.

108 Attachment E, Siemens, Diesel versus Electric 2012, p.3

109 Attachment F, China CNR, Datong Electric Locomotive Co., Ltd, p.24, "*average thermal efficiency of diesel locomotive is only 26% and the electric locomotive is 28%".*

the whole energy supply chain, including processing and transport, have estimated that electric traction is 2.4 times more energy efficient than diesel.[110] Further, an international study by Bombadier shows that when comparing the energy efficiency of each traction type in Germany, long-haul diesel traction is not as competitive as long-haul electric traction, as the diesel energy costs are twice as high. Further, Bombadier notes that, at the same level of energy efficiency, electric locomotives haul up to three times the train weight as diesel.[111]

Figure 3: Relative Energy costs of Diesel v Electric in Germany



4.1.3.3 Above rail assumptions

The Draft Decision criticises QR Network's reliance on QRN's operating data, and notes that different operators would have different costs and performance statistics.[112]

QRN does not dispute that it is possible that competing operators would have different cost and efficiency profiles when doing the same task with the same traction type. However, QRN notes that Pacific National has in fact had the opportunity of working with QR Network on the TCO model in the Traction Working Group but has not elected to do so. In QRN's view, it is unreasonable for the QCA to criticise QR Network for not accessing comprehensive above-rail data in circumstances where QR Network is unable to obtain that data due to Pacific National not working constructively with industry to determine the most efficient traction option for Blackwater.

In any case, QRN believes that the appropriate response to concerns that the use of QRN (rather than Pacific National data) has been used by QR Network is independent verification of the model's assumptions. Such an option has previously been discussed in QR Network's Traction Working Group, and remains, in QRN's understanding, an option for stakeholders to consider. At the present time, QRN understands that the Blackwater user group does not regard such an exercise as necessary, but would support its customers in undertaking independent analysis if required.

4.1.3.4 Price sensitivities

Stakeholders have argued that electricity and diesel price forecasts are subject to widely varying sensitivities. QRN queried this issue with QR Network, and understands that the TCO analysis demonstrates that a 10% change in the electricity price impacts the full electric case by 4%. Comparatively, QRN understand that a 10% change in the diesel price has a 6% impact on the full diesel case. This appears to indicate that the diesel case is more sensitive to changes in the price of oil than the electric case is to the price of electricity. In any case, given the relative

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110 Attachment E, Siemens, Diesel versus Electric 2012, p.2, see section on Energy Efficiency that describes the average energy efficiency of diesel locomotives as 12% whereas electric locomotives as 29%.

111 Attachment G, Bombadier, *New Electric locomotives for the UK The 20th Annual Rail Freight Group Conference*, 29th May 2012, p.5

112 Draft Decision, p.11, Stakeholders questioned "*QR Network's ability to effectively undertake the TCO analysis without understanding the current and future costs and prices of the second above-rail operator and of all the access seekers.*"

insensitivity of the results to changes in energy price forecasts, QRN does not consider that this issue is a reasonable basis on which to discount the validity of Network's TCO assessment.

4.2 Buffer capacity and the utilisation of the electric network (2.3)

The QCA acknowledges QR Network's arguments in relation to buffer capacity spill-over benefits to Goonyella. It recognises that Goonyella may benefit from Blackwater operating a mixed system, for example, by accommodating efficient above rail fleet management with 100% utilisation of electric traction in Goonyella.

In addition however, the Draft Decision also speculates that there may be other reasons that diesel locomotives are operated in Blackwater. Further, it goes on to suggest that diesel locomotives were not used in the Goonyella system during QRN's electric locomotive refurbishment so as to avoid the congestion costs associated with QRN's lower performance, older diesel locomotives, rather than as a consequence of the superior performance of electrics in Goonyella.[113] Indeed, the QCA states that Pacific National, in the same set of circumstances as QRN during its refurbishment program, may "not have hesitated" in using diesel trains in the Goonyella system.[114] It is not clear what purpose or justification the QCA has for speculating on fleet allocation decisions made by QRN during its locomotive refurbishment program. In QRN's view, unfounded discussion in the Draft Decision on the efficiency of QRN's fleet management decisions is without basis.

Further, the Draft Decision notes that the QCA has requested documentary evidence from QR Network and QRN to support claims that diesel locomotives operating in Blackwater provide buffer capacity for Goonyella. It notes that neither QR Network, nor QRN, responded with such information.

QRN wrote to the QCA on 23 April 2012[115] indicating that it would respond with the information, once it had been compiled. However, QRN questions why an operator would be asked to provide information to demonstrate that diesel locomotives, which can be flexibly deployed across networks, provide buffer capacity across the fleet. It is self-evident that options to deploy fleet over multiple networks provide benefits to above rail operators and consequently to users in terms of the total costs they face for rail transportation services.

QRN notes that Pacific National has previously supported the concept of fleet management benefits between Blackwater and Goonyella,[116] and indeed, in the future in Newlands, by agreeing that it "is true that the older of QRN fleet of electric locomotives are interchangeable between the two systems" and that new generation electric locomotives being brought on stream by both QRN and Pacific National will be able to utilise the Blackwater electrical system once technical issues are resolved in 2012.[117] On that basis, Asciano has previously supported QR Network proposals to socialise AT5 across Blackwater and Goonyella, and eventually Newlands.

Nonetheless, the QCA has said it would require evidence of the size of the spill-over effects in order to assess whether QR Network's proposals in the DAAU were commensurate with the benefits provided. QRN understands the difficulty in quantifying the benefits, despite remaining convinced they exist. In any case, as noted in QRN's previous submission,[118] QRN has customers in both Goonyella and Blackwater and understands the difficulty in implementing a pricing arrangement that increases costs to Goonyella users. For that reason, QRN remains open to alternative proposals that resolve this issue, provided those proposals address the underlying commercial problem and resolve the prevailing pricing inefficiency.

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113 Draft Decision, p.18, "*It is quite possible that QR National's decision not to shift its diesel locomotives to the Goonyella system was based on an assessment of the performance capabilities of its diesel consists."*

114 Draft Decision, p.18, *"Asciano evidently believes that Pacific National's diesel locomotives have performance levels that are the equal of QR National's electric locomotives. In the same set of circumstances, Pacific National may not have hesitated in shifting diesel locomotives from the Blackwater system to the Goonyella system."*

115 Letter from P Scurrah to J Hall, 23 April 2012

116 Asciano, November 2008, Submission to the Queensland Competition Authority QR Network 2009 Draft Access Undertaking, p. 56

117 Asciano, November 2008, Submission to the Queensland Competition Authority QR Network 2009 Draft Access Undertaking, p. 56

118 QR National, 16 April 2012, QR Network's Electric Access Draft Amending Access Undertaking (DAAU), p. 5

5 Statutory decision-making criteria (Draft Decision, Section 3)

In determining whether or not to approve a DAAU, the QCA is required to have regard to the decision-making criteria in s 138(2) of the Act. In particular, it is required to consider:

(a) the object of Part V;

(b) the legitimate business interests of the owner or operator of the service;

(c) if the owner and operator of the service are different entities—the legitimate business interests of the operator of the service are protected;

(d) the public interest, including the public interest in having competition in markets (whether or not in Australia);

(e) the interests of persons who may seek access to the service, including whether adequate provision has been made for compensation if the rights of users of the service are adversely affected;

(f) the effect of excluding existing assets for pricing purposes;

(g) the pricing principles mentioned in section 168A;

(h) any other issues the QCA considers relevant.

The QCA's consideration of these issues is set out in Chapter 3 of the Draft Decision, and responded to in detail across the following subsections.

5.1 Object of Part V of the Act (3.2)

The QCA is required to exercise its statutory powers having regard to the object of Part V of the QCA Act, namely, the need to "promote the economically efficient operation of, use of, and investment in, significant infrastructure by which services are provided, with the effect of promoting effective competition in upstream and downstream markets".[119] The Draft Decision approaches this issue as follows:

- first, the Draft Decision argues that the DAAU fails to promote the efficient operation of, use of, or investment in the below-rail assets, as it would promote a traction mode that requires higher below-rail costs than diesel,[120] and thus fails to promote economic efficiencies in significant infrastructure;
- second, it argues that the DAAU would adversely affect competition in the above-rail haulage market, by reducing the 'traction choice' available to end-users, and disadvantaging Pacific National;[121]
- third, it argues that the DAAU will adversely affect competition in the market for the supply of locomotives, based on an incorrect factual finding that Siemens is a monopoly supplier.[122]

QRN disagrees with each of these points for the reasons given in the following subsections. In responding to these issues, QRN notes that the QCA has based its conclusions on the information available from QR Network and

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119 *Queensland Competition Authority Act 1997*, s 69E

120 Draft Decision, p.27, *"the objects clause refers to below-rail infrastructure and not above- and below-rail as suggested by QR Network. There is no convincing evidence to show that maximising the use of electric traction will result in lower below-rail costs. In particular, QR Network has not demonstrated that modern diesel trains have longer cycle times, and therefore require more below-rail capacity than electric trains. Indeed, QR Network said the below-rail expenditure for a fully electric system was higher than that for a fully diesel system."*

121 Draft Decision, p.34, *"The Authority considers the DAAU is likely to discriminate against Pacific National"* and "*The Authority considers that this* [strong incentives for the use of electric traction over diesel] *is likely to eliminate traction choice as one of the ways competitors in the above rail market can seek to differentiate themselves form their rivals"*

122 BMA provided an addendum to their 16 April 2012 submission correcting a factual error in their previous submission by saying that "*Siemens is not the sole supplier of such locomotives* [narrow gauge electric Locomotives] *in the world*." BMA letter to John Hall, 3 September 2012, available at http://www.qca.org.au/files/R-BHPBillitonMitsubishiAllianceBHPMitsuiCoalAddendum-Submission-QRNetworkETSDAAU-0512.pdf

stakeholders.[123] However, the QCA does not appear to have investigated assertions before relying on them, leading to factual inaccuracies that have distorted its analysis and contributed to erroneous conclusions in the Draft Decision. For example, the QCA has failed to identify alternative suppliers of electric locomotives, in circumstances where research would have identified Toshiba and other suppliers.[124]

5.1.1 Promotion of supply-chain efficiency and the TCO model

The Draft Decision sets out the QCA's view that the specific reference to 'significant infrastructure' in s 69E has the effect of limiting the object of the QCA Act to the promotion of efficiency in a single functional layer of the coal supply-chain, rather than overall efficiency as measured by economic surplus. As a consequence of that interpretation, the Draft Decision finds that the proposed DAAU does not promote efficient use of, or investment in, significant infrastructure, and thus, finds that the object of the QCA Act is not promoted (s 69E).[125]

QRN contends that this interpretation is overly narrow, economically unsound, and inconsistent with the QCA's previous approach to s 69E. It is also a backward step for the continued promotion of efficient operations across the Queensland coal supply-chain, and appears to misunderstand how economic efficiency is broadly understood in a network industry and a supply-chain, namely, that efficiency is a concept that requires a multi-factored assessment of economic action in different functional layers.

Section 69E provides, relevantly, that the object of the QCA Act is the promotion of efficient operation, use of, and investment in, the significant infrastructure by which services are provided. This language was developed by the Productivity Commission in its *Review of the National Access Regime* (2001), and incorporated into state and federal legislation through the adoption of the Competition and Infrastructure Reform Agreement (CIRA). As a statutory formulation, it has been widely adopted, not only in contexts where the CIRA has directly required adoption (e.g. s 44AA of the *Competition and Consumer Act* 2010 and s 69E of the QCA Act), but also as a substantive test for regulatory intervention (e.g. as a component of the 'long term interests of end users' test in Part XIC of the CCA).

The objects clause leaves undefined what is meant by 'efficient operation of, use of and investment in', and from which perspective the concept of efficiency ought to be assessed. It is well accepted however, that the statute contemplates efficiency as a multi-factored concept, plainly encompassing what the Australian Competition Tribunal has referred to as the "traditional categories" of economic efficiency: that is, efficiencies of production, the allocation of resources, the allowance of transactional efficiency, and the promotion of dynamic efficiency and innovation.[126] The desired end result, as described by the Tribunal in relation to the objects clause in Part IIIA, is the "enhancement of local wealth",[127] or how the "efficient outcome … as assessed from the position of end-users" is attained.[128]

Although the terms 'use' and 'operation' are undefined by the statute, it is plain that a 'use' or 'operation' of infrastructure that had the effect of imposing costs on downstream or upstream markets that were not offset elsewhere, and thus decreased overall surplus, could not be described as an 'efficient use' or 'efficient operations'. On no reasonable view could this be said to be an "enhancement of local wealth", as, in fact, wealth would be reduced because social costs would be, on an overall view, higher than they would otherwise be. This would equally be true where the use of infrastructure reduced costs for the infrastructure owner (and was thus, on a narrow and artificial view, productively efficient), but imposed much higher costs or inefficiencies on upstream or downstream markets. It would be nonsensical to suggest that this could be described as 'economically efficient', given that society is net worse off from such an outcome.

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123 Draft Decision, p.4, "*In reaching this draft decision, the Authority considered QR Network's proposal, and all the submissions from stakeholders. The Authority has assessed QR Network's factual assertions based on the material provided by QR Network and stakeholders."*

124 Draft Decision, p. 33, "*Siemens is the sole supplier…"* and "*The Authority considers this could reduce the competitive constraint faced by the narrow gauge electric locomotive suppler*…"

125 Draft Decision, p.26, *"The Authority does not agree with QR Network that the relevant focus of the objects clause is on promoting economic efficiency of the whole of the rail haulage service. The objects clause specifically refers to promoting efficient investment and use of significant infrastructure; that is, the declared service."*

126 *Re Fortescue Metals Group* ([2010] ACompT 2 at [798]-[803].

127 *Re Fortescue Metals Group* ([2010] ACompT 2 at [798]-[803].

128 *Re Seven Network Limited (No 4)* [2004] ACompT 11 at [96].

Likewise, an investment in below-rail infrastructure that actually decreased consumer surplus could hardly be described as an efficient investment, even where it may have had the apparent effect of 'improving' the asset (i.e. by promoting short-run productive efficiency). An investment in infrastructure may very well reduce costs in a static sense, but may so fundamentally undermine transactional or dynamic efficiency (which naturally require assessment across functional layers) so as to no longer be considered on any measure as being 'economically efficient'.

Given this, it is submitted that any assessment of efficiency must necessarily take into account the impact of transactional, productive, dynamic and allocative efficiencies across multiple functional layers – rather than be artificially limited to a consideration of efficiency in a single functional layer. In the context of the CQCN, this mode of analysis has, at least until the Draft Decision, been comparatively uncontroversial. Indeed, as noted earlier in this submission, the QCA itself amended QR Network's voluntary undertaking, in circumstances where QR Network had failed to include a supply-chain consideration in its original DAU, to provide that the intent of the document was the promotion of supply-chain efficiency.[129]

This has been reaffirmed on numerous occasions by the QCA, and indeed, is a central feature of the regulatory arrangements. It is difficult to reconcile the very extensive consideration by the QCA of supply-chain issues when it approved UT3,[130] with newfound firmness that the objective of the regulatory regime is the promotion of below-rail efficiency. The notion that overall efficiency (or supply-chain efficiency) is extraneous to the objects of the regulatory regime, and is merely one of many factors to weigh up as relevant to the public interest, is a substantial shift in the QCA's approach to administering the QCA Act.

For example, in its UT3 Final Decision, the only mention by the QCA of the objects clause was actually in relation to the need to promote supply-chain efficiency:

> *In considering QR Network's proposed new supply chain principles, the Authority has had regard for the need to promote the economically efficient operation of, use of and investment in, the infrastructure by which services are provided, with the effect of promoting effective competition in upstream and downstream markets. The Authority was also mindful that a balance must be struck between optimising supply chain efficiency and the legitimate business interests of the service provider …*
>
> *… the Authority maintains its view .. that, where possible, the undertaking should facilitate the coordination of the coal chain where participants have reached agreement on implementation (and achieve a level of consistency with regulatory arrangements applying to other infrastructure providers within such coal chains).*
>
> *Nevertheless, the Authority believes that the QR Network undertaking could include stronger commitments to coordinating the operation and development of the coal supply chains …*[131]

If the object of the regulatory regime was not the enhancement of local wealth, it would be difficult to understand a number of core design features of QR Network's undertaking. It is recognised that a mode of capacity allocation that promoted below-rail allocative or productive efficiency when considered in isolation, might on a broader view, be found to reduce supply-chain efficiency. This, for example, timetabled train operations, while being productively efficient from a below-rail perspective, are so allocatively inefficient from a coal supply-chain perspective as to make that operating mode unsuitable for the CQCN. By way of further example, the QCA has previously required QR Network to coordinate its maintenance activities with other participants in the coal supply chains. The effect of that requirement, which reflected historic practice, has been for QR Network to continue to incur a higher level of maintenance costs that might otherwise occur were QR Network to disregard supply-chain efficiency.[132] Further, it is recognised that QR Network should be allowed to depart from its approved pricing principles to reward above-rail investments that are more efficient than below-rail investments which provide a similar supply chain outcome. In accepting that proposition during the development of UT3, the QCA accepted "that there may be instances where it

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129 QR Network, 2010 Access Undertaking, cl 2.3(e); see also, cl 2.3(f)(iv)

130 QRN notes that the need to support supply-chain coordination and efficiency was the principal lens through which the QCA initially evaluated QR Network's 2008/09 DAU. See, for example, the Foreword to QCA, October 2008, *Issues Paper: QR Network 2009 Draft Access Undertaking*.

131 QCA, September 2010, Final Decision, QR Network 2010 Draft Access Undertaking, p.185

132 Minimising track possessions necessarily requires QR Network to run a more ad hoc maintenance program, and thus incur higher crew and equipment costs.

is appropriate for QR Network to breach the pricing principles, if doing so will provide an *overall net benefit* to coal supply chain participants" (emphasis added).[133]

By contrast, the Draft Decision essentially makes a distinction between regulatory proposals that:

- promote efficiency across the supply-chain but are 'inefficient' from a below-rail perspective; and
- promote below-rail efficiency but fail to promote overall efficiency.

In the circumstances of the first bullet point, such a regulatory proposal would fail what the QCA describes as the first 'limb' of the objects clause, namely, that it failed to promote efficient investment in the below-rail asset (despite promoting overall efficiency, as measured by an increase in consumer surplus). In the circumstances of the second bullet point however, the regulatory proposal would in fact meet the objects clause, as below-rail efficiency would be promoted, despite an overall reduction in consumer surplus.

In this respect, the Draft Decision demonstrates an apparently limited understanding of 'efficient investment', in that the term is apparently used to mean, exclusively, investment that is productively efficient from a below-rail perspective. For example, the QCA appears to have interpreted QR Network's acknowledgement that below-rail expenditure is higher for a fully electric system than for a fully diesel system, to be an indication that electric traction is productively inefficient (in that greater *below-rail* resources are consumed than is necessary to deliver the same network capacity). As a general matter, this is equivalent to the QCA regarding QR Network has behaving 'efficiently' by reason only of transferring costs to above-rail operators.

More specifically, it fails to recognise that there are plainly two substitutable asset classes against which efficiency should be assessed – namely, embedded generation (diesel) and remote generation and distribution (electric). That one is regarded as an 'above rail' cost and one a 'below rail' cost is not the result of market forces, but the operation of s 250 of the QCA Act. In an economic sense however, they are plainly substitutes – with the relevant economic question being which of the two (or what combination of the two) is more likely to enhance social welfare (produce the greatest economic surplus over the long run). The QCA's approach is to regard the occurrence of a cost in the below-rail element of the supply chain as inefficient, without considering the efficiency of incurring costs in the above-rail element of the same supply chain. These two elements of the rail transportation service cannot be separated as each is only useful to users in combination with the other. Consequently, they must be considered together. The QCA's approach to considering each separately will lead to a reduction in economic surplus and will also promote a market and cost structure that cannot benefit from any element of market forces.

Finally, QRN notes that the QCA's preparedness to consider supply-chain efficiency as a public interest consideration does not, in a practical sense, offset the approach the QCA has taken to s 69E. First, the public interest criterion requires a 'weighing' exercise between costs and benefits, and it is unclear whether the statute contemplates supply-chain efficiency being weighed against social or public costs. Second, more importantly, public interest is only one consideration amongst many equally-weighted considerations in s 138(2), whereas the objects clause informs the way in which s 138(2) analysis is conducted. In this sense, to consider the supply-chain as a matter of public-interest is to demote its centrality to the regulatory framework.

5.1.2 Promotion of competition in the above-rail haulage market

The Draft Decision finds that the DAAU would result in a reduction in competition in the above-rail haulage market because it would result in:

- reduced competition between traction types, because the DAAU encourages electric and discourages diesel traction and creates barriers to entry; and

[133] QCA, December 2009, Draft Decision, QR Network 2009 Draft Access Undertaking, p.148

- reduced competition between Pacific National and QRN which are characterised as proxies for diesel and electric traction respectively.

5.1.2.1 Reduction in 'traction-based' competition in Blackwater

The QCA finds that the DAAU is likely to cause a reduction in the number of diesel consists in Blackwater, and that it would therefore bring about a reduction in the diversity of the 'price-product-service' package offered to customers with adverse consequences for competition.[134] Further, the Draft Decision assumes that competition between diesel and electric traction can be characterised as competition between QRN and Pacific National because QRN intends to replace a substantial number of diesel locomotives with electric locomotives once the new electric feeder stations are commissioned, but Pacific National has not signalled any intentions as regards future traction choice in Blackwater.[135] The Draft Decision also says that by providing strong incentives for the use of electric traction and discouraging the use of diesel traction, the DAAU is likely to eliminate traction choice as one of the ways competing above-rail operators differentiate themselves, implying that the DAAU would result in both above-rail operators choosing to operate electric locomotives. The Draft Decision concludes that this reduction in traction choice would indicate a reduction in competition.

QRN notes that the QCA's promotion of traction choice in a market where overall efficiency requires, in the QCA's own view, coordination between invested infrastructure and technology choice is incongruous. In suggesting that traction choice is even an issue relevant to efficiency and competition, the QCA appears to be disregarding significant experience with regulating supply-chains, particularly, the need to ensure that choice is coordinated and that economies of scale are realised.

Further, QRN disagrees with the substance of the QCA's analysis for reasons outlined below.

First, the Draft Decision assumes that Pacific National will not invest in electric locomotives for Blackwater and that QRN will not choose to operate any diesel locomotives in Blackwater. This is unlikely to accurately characterise the future traction mix in Blackwater. It is more likely that both above-rail operators will operate at least some of each traction type, and that opportunities to diversify fleet-mix will continue to exist particularly over the medium to longer-term period over which competition occurs. In particular:

- Pacific National has indicated that it was considering operating electric traction in Blackwater, but was ultimately not able to due to electric capacity constraints at the time.[136] Given the anticipated increases in electric capacity with the commissioning of the feeder stations and the options for redeployment of its diesel locomotives to other growth corridors, it could be assumed that Pacific National's future traction choices will include electric traction. It is therefore incorrect to characterise Pacific National's competitive position in Blackwater as being permanently limited to diesel traction, particularly given its recent entry in that system and small market share.[137] As Pacific National grows its share in Blackwater, it will be necessary for it to purchase additional locomotives – with there being no reason to think that Pacific National would be unable to purchase electrics;

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134 Draft Decision, p.33, "*This is likely to reduce the option for operators to use diesel locomotives, with the result that diesel locomotives may no longer be an effective substitute for electric locomotives…"* and *"the Authority has formed the view that the DAAU will not promote effective competition…"* and "*…could result in a higher cost for electric locomotives into the future than would otherwise be the case."*

135 Draft Decision, p. 34, "*Pacific National offers only diesel services and QR National currently offers both electric and diesel services. QR Network said that, upon commissioning of the new feeder stations in the Blackwater system (which it expected would be in the second half of 2012), QR National intended to replace a substantial number of its diesel locomotives with electric locomotives. Therefore, competition between QR National and Pacific National in Blackwater would effectively reflect competition between the two traction types."*

136 Asciano Submission, p.9, "*Prior to entering this market* [Queensland coal rail haulage market] *Asciano had to make a decision as to whether to operate diesel locomotives or AC electric locomotives. At the time this decision was made in 2007 Asciano was informed… that the Blackwater system could not accommodate AC electric locomotives."* In addition in their November 2008 Submission to the Queensland Competition Authority on QR Network's 2009 Draft Access Undertaking, p. 56, Asciano supported the socialisation of the AT5 tariff "*conditional on being able to use electric locomotives interchangeably between the systems".* Pacific National also noted here that "*QR Network is working towards resolving the technical issues that prevent the new generation locomotives using the Blackwater system... Asciano understands that remedial work is currently being scoped but at this time completion is not expected until around 2012."* QRN has inferred from this a preparedness by Pacific National to operate electric locomotives in the Blackwater system at the time of the investment and at a point in the future.

137 Asciano, 16 April 2012, Asciano Submission to the QCA on QR Network DAAU Relating to Electric Traction, p.9, *"Asciano entered the Queensland coal rail haulage market in 2009."*; QRN understands Pacific National's current market share in Blackwater is less than 10%.

- QRN is likely to continue to operate some diesel locomotives in Blackwater, irrespective of the DAAU. This is because of the buffer fleet management issues highlighted in the DAAU, which depend on at least some level of diesel traction in Blackwater, the requirement for some non-electrified hauls in Blackwater to remain diesel, and individual customer requirements; and

- the traction choices of a hypothetical new entrant are relevant to the analysis, including that a new entrant has the option to choose either traction type.

Secondly, QRN disagrees with the finding that a reduction of traction choice generally would be harmful to competition, which the QCA has described as being "characterised by rivalrous market behaviour in all dimensions of the price-product-service packages offered to end customers".[138] There is no reason to think that a relative increase in the competitiveness of electric traction, and a relative decrease in the competitiveness of diesel traction, would harm competition, given the ability of both QRN and Pacific National and any other operator to operate either traction type. The fact that diesel and electric traction are effectively substitutes retains a traction-based competitive constraint, whether or not diesel traction is actually operated in Blackwater. Moreover, competition is as vigorous in single-traction systems as the hybrid Blackwater, if not more so. This is demonstrated in both the Goonyella system, which currently enjoys the benefits of dynamic above-rail competition, as evidenced by Pacific National's increasing market share and the recent entry of BMA with electric consists, and the Newlands system, with diesel only traction.

In this respect, the QCA's assessment of effective competition appears to place unwarranted emphasis on service differentiation and non-price competition, and insufficient emphasis on barriers to entry and the existence or otherwise of undue market power. In doing so, the QCA is adopting a mode of analysis that not only puts in place a threshold for intervention that is too low, but also one which misses the key economic consideration, namely, the existence or otherwise of structural market power. Moreover, in QRN's view, it is inappropriate for the regulator to consider whether or not the service offerings of above-rail firms are sufficiently differentiated – which would essentially require the regulator to assess the relative merits of alternate business models. Rather, what matters is whether there are structural impediments to competition, and in this respect, QRN does not see any basis for finding that the DAAU would raise a structural impediment to rivalry between it and Pacific National.

Of course, QRN agrees that non-price competition is otherwise desirable, and that the regulatory arrangements ought to anticipate the needs of individual operators and provide sufficient flexibility to allow value-creation. However, in any network industry, there is a balance between non-price competition between downstream rivals and the efficient use of the network. The common inputs and constraints that arise from a shared network necessarily mean that absolute freedom to differentiate a downstream service is likely to result in sub-optimal outcomes from an economic efficiency perspective. The role of the regulator is to define a field of rivalry in which competition is effective and efficient, and in some circumstances, this means that the regulator must tend towards price rather than non-price competition. In particular, where there is an inverse correlation between service differentiation downstream, and the costs and risks to the upstream firm, such as where the choice of traction by the downstream above-rail operator affects the costs and risk to the upstream network provider, the regulator must exercise judgment as to the extent to which it requires the network provider to be responsive to downstream requests.

In this regard, QRN does not agree with the assumption in the Draft Decision that preserving traction choice is more important than other efficiency considerations, such as preventing coordination failure or the recovery of sunk costs in order to encourage (or not discourage) investment.

Further, QRN notes that traction choice is only one way in which above-rail operators differentiate their offerings to individual customers, with numerous other points of differentiation being, arguably much more important (i.e. price, service level, responsiveness, reliability, technological innovation, and the allocation of risk). QRN considers there is no evidence that differentiation based on traction choice will lead to materially better competitive outcomes, in terms of price reductions, than in markets where only one type of traction predominates. In any case, if the coordination failure becoming evident in the Blackwater system is not addressed in a timely and effective way, the unravelling of

[138] Draft Decision, p.32

electric economies of scale in Blackwater will mean that electric traction ceases to be a viable alternative traction choice, and this would, by the logic of the Draft Decision, reduce traction-based competition.

The Draft Decision states that stakeholders identified electric capacity constraints in Blackwater as a significant barrier to entry into the electric traction market. While it is evident that electric capacity constraints may have resulted in Pacific National investing in diesel locomotives for its entry into the Blackwater system, it is well understood that additional electric capacity is becoming available as the new electric feeder stations are commissioned. As the DAAU aims to support the viability of electric traction in Blackwater by ensuring the electric assets are efficiently utilised, it cannot create such a barrier.

The Draft Decision noted that stakeholders also identified a potential barrier to entry for small scale, 'second tier' new entrants into the haulage market which sought to compete on the basis of low capital costs using older, more depreciated diesel rolling stock.[139] Assuming such an operator could demonstrate similar or superior cycle and transit times to electric locomotives, for example by using an additional locomotive, they said the DAAU would effectively impose a premium on that low cost operator, acting to prevent market entry. QRN does not consider that calibrating the regulatory arrangements to try and incentivise entry by operators running old, depreciated rolling-stock would promote efficiency, nor that such an operator would be likely to exceed the performance envelope of the first-class, new electric locomotives that are currently deployed in Blackwater. Moreover, there is very little prospect of entry in a high-performance, narrow-gauge market by such an entrant. QRN considers the greater risk of not addressing the coordination failure in Blackwater far outweighs the supposed benefits and likelihood of encouraging inefficient entry.

For the reasons set out above, QRN does not agree with the Draft Decision that the DAAU would adversely affect the state of actual rivalry, or indeed any future rivalry between operators in the Blackwater haulage market, or that it would be likely to discourage future entry. QRN again reiterates the point that undermining supply-chain coordination for no purpose other than to facilitate traction choice is likely to lead to inefficient outcomes, thereby imposing greater costs on industry than if traction choice was coordinated to select the lowest cost solution.

5.1.2.2 Anticompetitive discrimination against Pacific National in Blackwater

The Draft Decision finds that the DAAU would likely discriminate against Pacific National and thereby remove a competitive constraint on QRN, which is a related party operator to QR Network. This is because the effect of the DAAU would be to increase the access charges for diesel traction and consequently for Pacific National (assumed to be a proxy for all diesel services in Blackwater) and to decrease access charges for QRN (assumed to be a proxy for all electric traction in Blackwater).

The QCA strongly suggests that the DAAU is an attempt by QR Network to favour its related party operator. Indeed, this is explicitly stated where the QCA has said that 'unless evidence is provided to the contrary, there is an assumption that QR Network has the economic incentive to advantage its own related party operator (QRN)'.[140]

QRN rejects the argument that the DAAU is likely to discriminate against Pacific National. This is particularly because:

- first, the DAAU is designed to address the coordination failure in the electric traction market in Blackwater and is intended to ensure diesel and electric traction remain substitutes in the above rail market;
- second, the DAAU would affect prices for all electric traction users, current and future, not just QRN, and all diesel traction users, current and future, not just those for QRN and Pacific National;
- third, the DAAU should be assessed based on its efficiency properties, not the unproven assumption of discriminatory, anti-competitive behaviour by QR Network; and

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[139] Draft Decision, p. 30, "*Rio Tinto and Vale were concerned that the DAAU could constrain future competition as it could impact on the opportunity for a new rail operator to be able to effectively enter the market on a small scale.*"; "*Also, Rio Tinto said moving Blackwater to a largely electric system would act as a barrier to entry to 'second' tier haulage operators which typically used re-engineered diesel trains and avoided high capital expenditure.*"

[140] Draft Decision, p. 49

- fourth, this argument assumes the inadequacy of the ring fencing and non-discrimination provisions in the TIA Act,[141] the QCA Act[142] and the 2010 Access Undertaking[143] which the QCA has approved.

More broadly, the Draft Decision fails to distinguish between protecting a competitor and protecting competition. The Draft Decision says that the DAAU would affect the pricing terms on which Pacific National's diesel services compete with QRN's electric services, although it is QRN's understanding of the DAAU that *any* diesel service would pay more while *any* electric service would pay less than would otherwise have been the case without the DAAU. That is, where the effect of the DAAU is to increase the costs of operating a diesel locomotive in Blackwater and to decrease the costs of operating an electric locomotive, this applies to all above-rail operators equally. In any event, a negative commercial impact on one above rail operator is not equivalent to a reduction in competition. This is particularly the case where the Draft Decision fails to establish that that Pacific National would be commercially harmed, let alone the competitive process damaged.

Pacific National was aware of the timing of electric capacity upgrades to Blackwater and has presumably been in a position to obtain electric locomotives for deployment in Blackwater. Consequently, Pacific National would not be disadvantaged by the DAAU, and will presumably have sufficient fleet flexibility to respond appropriately to below-rail tariff changes. Indeed, the December 2007 Coal Rail Infrastructure Master Plan (CRIMP) released to industry by QR Network for comment, outlined a range of considerations in deciding whether or not industry would support further electrification of the Blackwater system. QR Network highlighted the interdependency of operator fleet acquisitions and the potential impact timing of these decisions would have on the opportunity to capitalise on the advantages of electrification.[144] Subsequently, in April 2009 the QCA approved the customer vote for a range of projects including the Blackwater power system upgrade outlined in the 2009 CRIMP.[145] It would have been clear to Pacific National at that time that QR Network and users intended that upgrades to electrification of Blackwater would be progressed.

Pacific National said that it entered the Blackwater market in 2009 with diesel locomotives because it was unable to obtain electric capacity owing to electric capacity constraints in Blackwater at that time.[146] It is therefore evident that Pacific National was aware of the benefits of electrification but invested in diesel for reasons other than that diesel traction is more efficient. Given the opportunities for redeploying diesel locomotives to non-electrified growth corridors such as Newlands/GAP, Moura/SBR or Mt Isa, it is reasonable to assume Pacific National recognised the opportunity to swap the diesel for electric locomotives once electric capacity became available.

5.1.2.3 Ex post rule changes

The Draft Decision finds that the DAAU would change the rules after Pacific National has joined the market and that this could take away much of its anticipated profit. Therefore it would chill future competition in the above-rail haulage market, as potential entrants will not want to risk their capital in a market which is prone to regulatory changes.[147] QRN responds to this from an economic risk perspective in Section 5.3.2 of this submission.

QRN disputes that promptly amending the regulatory framework to correct for regulatory error would chill future competition. The correction of regulatory error promotes, rather than discourages, investment. Where it becomes evident that there is a risk to coordination, market participants need to be certain that the regulator will act. In this respect, the failure by the QCA to solve this issue and maintain the integrity of the regulatory pre-approval process, is likely to have implications for the incentive to invest not only in rail assets, but other regulated assets as well.

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141 *Transport Infrastructure Act 1994*, Chapter 13, Part 5, s438G and s438H

142 *Queensland Competition Act 1997*, s 100 (2)

143 QR Network, 2010 Access Undertaking, Part 3, pp.12 - 26

144 QR Network Access, December 2007, Coal Rail Infrastructure Master Plan – 2nd Edition, Industry Consultation Draft, pp.88-90

145 QCA letter to QR Network, 23 April 2009, Regulatory pre-approval for Coal Master Plan 2008 capacity expansion projects, published on the QCA website

146 Asciano Submission, p.9, "*Prior to entering this market* [Queensland coal rail haulage market] *Asciano had to make a decision as to whether to operate diesel locomotives or AC electric locomotives. At the time this decision was made in 2007 Asciano was informed… that the Blackwater system could not accommodate AC electric locomotives."*

147 Draft Decision, p. 35, "*The DAAU proposes to 'change the rules' after a new entrant (Pacific National) has joined, in a way which could take away much of its anticipated profit. Therefore it would chill future competition in the above-rail haulage market, as potential entrants will not want to risk their capital in a market which is prone to such changes.*"

QRN notes that at the time Pacific National entered the market its anticipated profit would have been based on an assumption that both diesel and electric traction would be operated in Blackwater. Pacific National has stated that it wanted to enter the Blackwater market with electric locomotives but was unable to. Therefore, returning the 'rules' to those that support electric traction is restoring the situation facing Pacific National at the time it entered the market and providing security that the regulatory environment will be reasonable and will address unanticipated market and/or regulatory failures. The alternative, namely to preserve the status quo simply to protect the apparent interests of Pacific National, in circumstances where it is not even clear that those interests will be damaged, is to expose all supply-chain participants to the risk that regulatory errors will not be corrected.

Moreover, the Draft Decision does not appreciate that QRN is itself exposed to an ex post rule change if the QCA fails to maintain the integrity of the planning and capex pre-approval process. QRN, having invested in the expectation that the pre-approval process will be supported by the QCA, would be exposed to an unanticipated regulatory risk were the QCA to put complementary investments at risk by failing to protect the investment certainty provided by the undertaking's investment framework.

QRN believes that in providing regulatory certainty, problems such as coordination failure and potential asset stranding risks will be addressed, and new entrants will be encouraged to invest on the basis of sound economics, rather than in the hope of capitalising on a regulatory error that the regulator will then be forced to maintain.

5.1.2.4 Effect on above-rail competition in Goonyella

The Draft Decision states that the DAAU would not affect *current* competition in Goonyella, because both existing operators currently operate electric locomotives.[148] Recent media statements show that the newest entrant, BMA, also intends to operate electric traction in Goonyella[149]. QRN notes that, despite the QCA's apparent resolve that traction choice in Blackwater is essential to competition, it does not appear to consider that the apparent lack of choice in Goonyella is an indicator of a lack of competition.

Noting the above, the QCA considers that the DAAU could affect *future* competition in the above-rail haulage market in Goonyella. It says that measures to transfer electric infrastructure costs from Blackwater to Goonyella will increase the cost of entry into the above-rail haulage market with electric traction and that the measures requiring diesel services to pay the electric tariffs will increase the costs of entry with diesel traction. It is unclear on what economic basis a tariff that applies equally to all users, both prospective and current, would discourage entry by an above rail operator.

In any case, QRN regards these comments as unwelcome and giving rise to a regulatory risk, given that the Draft Decision does not appear to recognise that increased use of diesel traction will introduce a new threat to the economies of scale for electric infrastructure in Goonyella. Goonyella users, including new entrants, have selected electric traction over diesel, even without the DAAU, which itself would further enhance the attractiveness of electric traction over diesel. In addition, the Goonyella system, operating as a fully electrified system, is not currently facing the same issues as Blackwater and electric traction users are benefiting from the efficiencies available from operating electric traction. In those circumstances, for the QCA to now indicate that it does not consider protecting the Goonyella user group against the unravelling of economies of scale is concerning.

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148 Draft Decision, p.35, "*Therefore, the Authority has formed the view that the DAAU might not affect the current state of actual rivalry between operators in the Goonyella haulage market, but that it would discourage future entry.*"

149 Siemens Media Release dated 12 July 2012, The BHP Billiton Mitsubishi Alliance (BMA) has awarded Siemens a contract to supply 13 narrow gauge 25kV heavy haul electric locomotives to assist BMA in commencing rail operations in Queensland… and provides BMA with the ability to transport coal efficiently from its Caval Ridge and Daunia mines to the Hay Point Coal Terminal in the Bowen Basin, available at http://www.siemens.com.au/news/Bowen_Basin_coal; Asciano, 14 September 2012, ASX Announcement – Train Services Contract Announced, p.1, *"This contract provides the support functions of maintenance and daily servicing for the four BMA train sets planned for use in the Goonyella coal system to the BMA owned Hay Point coal terminal.",* available at http://www.asciano.com.au/resources/newsres/140912020443_120914_new_train_services_contract_announced.pdf

5.1.3 Promotion of competition in locomotive supplies market

The Draft Decision finds that the DAAU is likely to have the effect of influencing operator decisions about the purchase of locomotives, making the decision in favour of electric locomotives more attractive.[150] It also states that the Goonyella and Blackwater systems are the only narrow-gauge heavy haul networks in the world that utilise electric traction,[151] and that Siemens is the only supplier of narrow-gauge electric locomotives for use on those systems.[152] As a consequence, the Draft Decision finds that the DAAU, by increasing the incentive for operators to purchase electric locomotives, would increase the exposure of above-rail operators to a monopoly supplier.[153] The Draft Decision therefore argues that the DAAU would reduce the competitive constraint imposed on Siemens by diesel operators, with a consequent reduction in competition, and the stalling of technological innovation.[154]

This argument as it is based on factually incorrect information. The DAAU would not reduce competition in the locomotive supplies market, as is evidenced in the following sections.

5.1.3.1 The Draft Decision is based on factual errors

The QCA's competition analysis of the locomotive supplies market rests on factual errors that could have been avoided had the QCA conducted adequate fact-checking and research to check the accuracy of information in stakeholder submissions. While QRN understands that the QCA must necessarily be able to rely on material it is given, particularly where it is not possible to independently verify it, it also believes that the QCA, having declared an investigation in relation to QR Network's DAAU,[155] ought to make reasonable efforts to check the accuracy of core facts underpinning its decision.

In this respect, the Draft Decision finds that:

- technological innovation in diesel traction is more likely than in electric traction;[156]
- the DAAU would raise barriers to entry, as a new entrant would need to bargain with a monopoly supplier of locomotives; and[157]
- exposing the Queensland coal industry to a monopoly supplier of locomotives is not in the public interest.[158]

Each of these findings are based on the QCA's repetition of incorrect claims that Siemens is a monopoly supplier,[159] with no assessment made by the QCA as to whether or not these claims are accurate.

As noted in a letter from BMA to the QCA on 3 September 2012, Siemens is not the sole supplier of narrow gauge electric locomotives. For example, Toshiba has also been engaged in the development and manufacture of electric

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150 Draft Decision, p.33, "*The DAAU provides strong incentives for the use of electric traction and discourages the use of diesel traction in the electrified networks of Goonyella and Blackwater.*"

151 Draft Decision, p.32, "*In addition, the electrified networks of Blackwater and Goonyella are the only known narrow-gauge heavy-haul networks in the world that feature a voltage of 25kV AC traction, and require electric locomotives that can run on this voltage.*"

152 Draft Decision, p.33 "*Siemens is the sole supplier of narrow-gauge heavy-haul electric locomotives for the electrified networks of Goonyella and Blackwater…*"

153 Draft Decision, p. 33, "*This is likely to reduce the option for operators to use diesel locomotives, with the result that diesel locomotives may no longer be an effective substitute for electric locomotives in the electrified networks of Goonyella and Blackwater*"

154 Draft Decision, p.33, "*The Authority considers this could reduce the competitive constraint faced by the narrow gauge electric locomotive supplier from the narrow-gauge diesel locomotive supplier. The Authority considers it could also hinder technological change in electric locomotives, which is usually an outcome of a competitive market*"

155 Letter dated 21 December 2011 from QCA to Mr Michael Carter notifying of The Authority's intention to conduct an investigation to decide whether to approve, or refuse to approve, QR Network's Electric Traction Services DAAU. Available at http://www.qca.org.au/files/R-QCA-Letter-NoticeOfInvestigation-ETS-1211.pdf.

156 Draft Decision, p.11, "*…the rivalrous behaviour between the competing suppliers is likely to result in greater technological improvements in diesel technology in comparison to electric locomotives where there is only one supplier.*"

157 Draft Decision, p.35, "*The DAAU may actually increase the cost of entering the market with electric services… because… a new entrant contemplating entry with electric traction would be in a relatively weak bargaining position when negotiating with the sole locomotive supplier.*"

158 Draft Decision, p.55, "*Asciano said that there was only a single supplier in the upstream market for electric locomotives used by above rail coal haulage operators in Queensland. It argued it was not in the public interest to support an approach which locked in a single type of technology supplied by a single supplier.*" The QCA agreed stating at p.56 of the Draft Decision that "*It* [the DAAU] *is also likely to prevent the emergence of the lowest cost coal supply chain.*"

159 The Draft Decision refers to Siemens as the sole supplier of narrow gauge at pp.10, 17, 20, 31 and 33.

locomotives in both domestic and overseas markets. Further to the letter from BMA, QRN notes that there are in fact multiple heavy haul, narrow-gauge, electric locomotive suppliers globally and the market is highly competitive.

5.1.3.2 The supply of electric locomotives

The international market for electric traction locomotives is at least as competitive as that for diesel (including freight, passenger and heavy haul), with heavy haul networks dominated by electric traction in India, China, Russia, Europe, Africa and South Africa[160], in addition to the electric traction in the CQCN.

There are at least eight major suppliers of electric heavy haul locomotives that QRN has been able to identify through discussions with its suppliers. Some of these firms are currently active in the CQCN, others have expressed an interest in entering, have previously been active in, or retain the option of entering, the Australian market. The firms that have been identified are set out in the Table below.

Table 2: Producers of heavy haul electric locomotives

Producer	Headquartered	Active in Australia
Siemens[161]	Germany	Yes
China South Locomotive & Rolling Stock (CSR)[162]	China	Yes
China CNR Corporation[163]	China	Yes
JSC Transmash[164]	Russia	No
URAL Locomotives (49% Siemens JV)	Russia	No
Bombadier Locomotives[165]	Germany	Yes
Alstom[166]	France	Yes
Toshiba[167]	Japan	Yes

QRN understands that while some electric locomotive suppliers active in international markets are not traditional suppliers of narrow-gauge locomotives, manufacturers of locomotives (both diesel and electric) have adaptive engineering processes that allow them to cater to a variety of gauges, with the one-time fixed cost of adapting a design usually offset by the size of any given tender. Consequently, gauge differences between an 'off the shelf' locomotive and the network on which it will operate can often be overcome by suppliers. For example, Siemens has advised QRN that in a current South African narrow gauge, electric tender, a number of companies have submitted tenders on the basis of their ability to adaptively engineer their bogies to account for the South African gauge.

QRN notes that the outline gauge (external dimensions) of a locomotive can also require adaptive engineering. In this respect, in prior rolling stock procurement programs, for example, in Western Australia, locomotive suppliers have adapted outline gauges in response to QRN requirements.

Siemens is currently the only supplier of electric heavy haul locomotives to the CQCN, though as noted above, a number of firms actively market their locomotives in the Australian market. In QRN's view, the relatively small size of the Australian market and the infrequency of major locomotive procurement programs, contribute to the situation

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160 Transnet operate the Richards Bay Coal Export line and the Sishen – Saldanha Iron Ore Export lines in South Africa. Both lines are electrified narrow gauge lines and indeed the Richard Bay Coal Export line has 25kV AC traction. See Attachment H: Transnet, 2011, Heavy Haul Operations in South Africa, Presentation to IHHA Calgary Canada, p. 8, downloaded from http://www.ihha.net/IHA/uploads/files/heavy%20haul%20operations%20in%20south%20africa%20wc%20kuys%20110616_f.pdf

161 http://www.mobility.siemens.com/mobility/global/en/pages/siemens-mobility.aspx

162 http://www.csrgc.com.cn/ens/

163 http://www.chinacnr.com/

164 http://www.transmash.com/

165 http://www.bombardier.com/en/transportation/products-services?docID=0901260d80010347

166 http://www.alstom.com/australia/

167 http://www.toshiba.co.jp/sis/en/menu/train.htm

where there is currently only one electric locomotive supplier to the CQCN. Competition has typically occurred 'for the market', in that electric locomotive suppliers compete to meet all market demand in a tender, rather than 'in the market'. In any case, Siemens' market position is not fixed, with it being exposed to the competitive threat of an alternative supplier taking the market for supplying some or all of the CQCN, particularly given that there are now three current purchasers of electric locomotives across the electrified network.

The diesel heavy-haul locomotive market is currently shared between EDI Downer and UGL, each with approximately 50% market share in the heavy-haul Australian market. Both EDI and UGL have local diesel manufacturing facilities.

QRN also notes the following:

- All heavy-haul electric locomotives are currently manufactured overseas, but there is no reason to think that Siemens has asymmetrically lower importation or regulatory costs than any other foreign manufacturer;
- There are no particular international restrictions on the trade of locomotives and the transport costs are not insurmountable;
- There is no evidence that the technological curve (innovation) for electric locomotives is inferior to that for diesel, contrary to the Draft Decision's finding.[168] Many technologies are common to both diesel and electric locomotives. For example, although the Draft Decision suggests that ECP braking applied to diesel locomotives enhances performance against electric locomotives[169], ECP braking can be applied to either traction type. Given the equivalent market structures and number of suppliers for each traction type, (and several common suppliers of both diesel and electrics), there is unlikely to be a material difference in the respective innovation curves; and,
- To the extent there was a material asymmetry in the innovation curves, it may be superior for electric, given the greater scope for electric traction to take advantage of the absence of size constraints associated with on board power generation and the innovation in energy efficiency (e.g. greater use of renewable sources, or regenerative braking technologies).

5.2 Interests of the Owner (3.3)

The DAAU identified underutilisation of the electric assets in Blackwater as the reason for circumstances that may result in electric traction becoming uncompetitive with diesel traction and the stranding of the electric assets. The QCA indicates in the Draft Decision that it will not strand QR Network's electric assets. The Draft Decision states:

> *It is evident that QR Network did follow the process in the undertaking and the Authority has already approved the scope of the electric network upgrades and some of the projects have already been included in the regulated asset base[170] … Given this, the Authority does not consider it appropriate to unnecessarily expose QR Network to asset stranding risks on the basis of expressions of dissatisfaction with the [voting] process after the event…*[171]

QRN supports this finding in the Draft Decision. The disinclination of the user base to support the 2010 CRIMP (which occurred subsequently to the 2008 vote on Blackwater electrification), and which is referenced by the QCA in the Draft Decision,[172] demonstrates that the pre-approval process is not a rubber-stamp, and that the user base can and does exercise an informed discretion as to the scope of QR Network's capital spend. In this regard, as noted

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168 Draft Decision, p.11, "*…the rivalrous behaviour between the competing suppliers is likely to result in greater technological improvements in diesel technology in comparison to electric locomotives where there is only one supplier."*

169 Draft Decision, p.8, *"Asciano said that, as Pacific National's trains had a more effective braking system [ECP braking], they could maintain a higher overall speed in any given section."*

170 Draft Decision, p.39

171 Draft Decision, p.40

172 Draft Decision, p.39, "*Despite this, the Authority notes that there is an opportunity for stakeholders to object to an investment proposal on the basis of insufficient information at the time of the customer vote process (sch A, cl.3.2.2(d)).*"

earlier, QRN also regarded the CRIMP as providing the certainty it required to progress its own complementary capital investments in rollingstock.

As an above-rail operator, QRN's principal concern with the QCA's analysis of QR Network's interests, is that, while identifying that QR Network is entitled to recover electrification costs, the QCA provides no indication on how it proposes that those costs be recovered. QRN must necessarily therefore assume that, if users opt for diesel contracts, the costs of QR Network's investments will be increasingly socialised across all of its customers in the Blackwater system (both diesel and electric), given the inability of a declining electric user base to economically support the entire asset. It is critical for QRN, as it seeks to structure its above-rail contracts, to understand how the QCA would approach such an eventuality, and in this respect, as noted earlier, the Draft Decision provides no guidance.

5.3 Interests of Access Seekers (3.4)

In assessing a DAAU, the QCA is required to have regard to the interests of persons who seek access to the below-rail service. This includes above-rail operators and end users. In this respect, while the impact on QRN (and its electric customers) of the current tariff arrangements might be material, the Draft Decision fails to give any to the real-world commercial impacts of the DAAU on electric users. Instead, the Draft Decision applies a flawed definition of 'regulatory certainty' to justify its failure to consider how the interests of electric customers in the Blackwater system are best protected. The QCA seems concerned solely with ensuring that Pacific National's tariff arrangements are not altered, even while other users of the system suffer commercial disadvantage.

5.3.1 The Draft Decision mischaracterises the commercial arrangements in Blackwater

5.3.1.1 Above-rail operators

QRN has made significant investments in electric locomotives for Blackwater on the basis of industry commitments to investments in below rail electric infrastructure. QRN understands that Pacific National also sought to invest in electric locomotives for Blackwater, but was unable to do so because sufficient electric capacity was not available at that time. Consequently, Pacific National invested in a limited number of diesel locomotives in order to supply customers in Blackwater. QRN has limited alternatives to redeploy electric locomotives given Goonyella is currently the only other electrified network. However, as noted, the risk that Pacific National diesel locomotives would be 'locked-in' to operating in Blackwater would have been mitigated by the option to redeploy the diesel locomotives to other non-electrified growth corridors such as Newlands and Moura.

The DAAU necessarily seeks to support QR Network's ability to recover its investment costs by changing the underlying *method* of cost recovery for prudently incurred investment in below rail infrastructure. It does not propose to change the underlying service offering. That is, Pacific National and QRN will both still be free to operate diesel locomotives in Blackwater, albeit at a cost that reflects an election to bypass the electric infrastructure.

Further, the impact of the DAAU will only impact above-rail operators during the negotiation of *new* rail haulage contracts, where the relative access charges for electric or diesel traction will affect the attractiveness of an above-rail operators offering electric versus diesel traction. In this respect, QRN expects that given Pacific National's currently relatively small market share in Blackwater, new contracts would involve a further investment in rolling stock. Consequently, a change to the 'regulatory rules' at this stage would not significantly affect its ability to compete one way or the other.

5.3.1.2 End users

Both QRN and Pacific National's customers in Blackwater would have participated in the CRIMP and regulatory pre-approval process, for the proposal to upgrade electric capacity in Blackwater. Customers would likely have been aware that in supporting investment in electric infrastructure, they were underpinning the costs of providing access to those assets. Indeed, as much is inherent in the regulatory arrangements themselves: users obtain the benefit of capital charges that are limited to the cost of capital because QR Network is insulated from volume, patronage and stranding risk.

QRN's primary concern for end users is that those of its customers which have opted for electric traction should not be exposed to increasing tariffs merely because other users have elected not to use assets approved during a CRIMP process. In those circumstances, QR National's customers, the interests of which the QCA is required to consider, but has not done so, will be exposed to increasing costs. In this respect, QRN understands that the DAAU is intended to promote equity amongst users, and that QR Network's willingness to consider transitional arrangements may account for any unanticipated disadvantage.[173] In particular:

- all future haulage contracts that specify diesel traction in Blackwater will necessarily reflect the costs of bypassing the electric network, but as all operators and end users will be in the same situation, equity is achieved; and

- the cost of existing diesel hauls (both QRN's and Pacific National's) may change to reflect the cost of bypassing the asset, but this would be equitable in that affected parties will presumably have anticipated that risk in electing to bypass infrastructure that had been approved through the CRIMP and accounted for it in their commercial arrangements, or otherwise will have the benefit of QR Network's transitional arrangements facilitate commercial work-outs.

With respect to the interests of its Goonyella customers, as noted in our earlier submission,[174] QRN supports efforts aimed at finding a pricing mechanism that is acceptable to users of both systems. In this regard, as flagged in its original submission, QRN is open to regulatory proposals that would remove cross-system socialisation, provided that they otherwise meet its commercial objectives and eliminate inefficient pricing. In this respect, QRN considers that any tariff arrangement approved by the QCA must not only solve the current coordination failure in Blackwater, but must also insulate and promote the efficiencies that are currently being realised in Goonyella.

5.3.2 The Draft Decision's approach to ex post and ex ante regulatory risk

Rather than considering a real-world commercial matrix set out above, the QCA regards the interests of QRN, other, future electric operators, and those users with exposure to AT5 via the pass through of below-rail tariffs, in having the inefficient tariff arrangements corrected, as being outweighed by Pacific National's interest in maintaining its ex ante below-rail tariff expectations.

It is QRN's view that the QCA must administer the regulatory arrangements to make clear that problems such as coordination failure and potential asset stranding risks will be addressed. Failure to do so would send a significant negative signal to investors in regulated sectors. The Draft Decision appears to suggest that the QCA will not correct regulatory failure in circumstances where users have ex ante tariff expectations that would be undermined by ex post regulatory intervention. For this to be reasonable, users would need to be able to more readily self-insure against the indefinite perpetuation of regulatory failure, rather than the prospect of their below-rail tariffs changing.

In essence, the Draft Decision discounts the need for certainty that where market failure has been compounded by a regulatory failure, such as coordination failure, the regulator will act to restore the competitive conditions to those that can achieve an efficient outcome. While the specific measures proposed in the DAAU may not have been fully anticipated, albeit noting though their similarity with the 2008/09 proposal, QRN considers that it would have been evident to all stakeholders that QR Network intended to invest in increased electric capacity in Blackwater. QRN therefore considers that stakeholders, including the QCA, would not have been surprised by QR Network's

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[173] QR Network, December 2011, Submission to QCA: Electric Access Draft Amending Access Undertaking, p.30, *"As noted earlier, Pacific National currently runs a significant electric fleet in the Goonyella system and has a low market share in the Blackwater system – as such, QR Network expects that Pacific National will similarly be able, by July 2012, to run at least 90% of feasible electric services (over both systems) with electric locomotives. If Pacific National can show that this will not be the case, QR Network is happy to consider additional transitional measures"*:: Attachment B, presentation to Traction Working Group 10 May 2012, p.3 "*QR Network will work closely with each of our customers to ensure smooth transition to the proposed pricing structure."*

[174] QR National, 16 April 2012, QR Network's Electric Access Draft Amending Access Undertaking (DAAU), p. 5, *"QR National has customers in both Goonyella and Blackwater and understands the difficulties of introducing this change. On this basis, we are actively supportive of continuing discussions aimed at finding a pricing mechanism that is appropriate to the objective and acceptable to users of both systems."*

application to amend the 2010 Access Undertaking. This particularly so given that a previous attempt to achieve just such a result had occurred in 2008 with the support of Pacific National.[175]

As noted in section 3 of this submission, QRN does not understand how the Draft Decision could accept that Pacific National did not anticipate the DAAU. As noted earlier, Pacific National has previously supported regulatory proposals that would support plans to operate an interoperable electric fleet across Blackwater, Goonyella and eventually Newlands once it is electrified.[176]

QRN considers that the principal purpose of the regulatory framework is to provide certainty to stakeholders about future services and costs, including that QR Network will only be allowed to recover costs on those services that can be offered by prudent investment and at efficient prices. In markets which are not subject to regulation, such certainty is secured though commercially negotiated contracts supporting investments and providing assurances to customers about the services they will be provided. Such contracts include levels of risk, which parties are able to manage through commercial terms and conditions. Where commercially negotiated outcomes are replaced with regulation, the risks are managed through the regulatory processes, which include that customers (access seekers) cannot be denied access to the regulated service and that only efficient costs can be recovered by the supplier.

QRN expects that Pacific National would have invested in diesel locomotives for Blackwater hauls on the basis of commercially negotiated contracts, which should include terms and conditions appropriate to the risks it faced. Given its interest in electric traction,[177] it could be assumed that Pacific National was aware that there were risks associated with locking in contracts for diesel traction. Presumably it considered such risks were manageable (for example through the ability to redeploy diesel locomotives to other systems).

5.4 Pricing Principles (3.5)

The Draft Decision considers that the DAAU is inconsistent with the pricing principles in s 168A of the QCA Act for a two primary reasons:

- First, the QCA is not satisfied that the proposed amendments to the pricing arrangements would aid efficiency,[178] though it is equally unconvinced that the status quo is efficient.[179]

- Second, the QCA notes that the pricing principles prevent pricing practices that discriminate in favour of a downstream operator or a related body corporate, except if they are related to cost differences. In this regard, the Draft Decision finds that the DAAU's proposed changes both fail to reflect cost differences, and would discriminate in favour of QRN because it would result in higher costs for diesel trains and lower costs for electric trains than would otherwise be the case in Blackwater.[180] In this respect, the QCA seems prepared to tolerate inefficient pricing arrangements that embed a partiality toward diesel to the benefit of Pacific National, but is not willing to accept pricing arrangements that would coordinate the efficient use of sunk infrastructure investment.

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175 QR Network, September 2008, Access Undertaking 2009, Volume 1 – Regulatory Framework, p.107, *"QR Network has therefore proposed combining the asset bases for the two systems* [Goonyella and Blackwater] *and calculating a single tariff that applies on both systems."*

176 Asciano, November 2008, Submission to the Queensland Competition Authority on QR Network's 2009 Draft Access Undertaking, p. 56, Asciano supported the socialisation of the AT5 tariff "*conditional on being able to use electric locomotives interchangeably between the systems".*

177 Asciano Submission, p.9, "*Prior to entering this market* [Queensland coal rail haulage market] *Asciano had to make a decision as to whether to operate diesel locomotives or AC electric locomotives. At the time this decision was made in 2007 Asciano was informed… that the Blackwater system could not accommodate AC electric locomotives."* In addition in their November 2008 Submission to the Queensland Competition Authority on QR Network's 2009 Draft Access Undertaking, p. 56, Asciano supported the socialisation of the AT5 tariff "*conditional on being able to use electric locomotives interchangeably between the systems".* Pacific National also noted here that "*QR Network is working towards resolving the technical issues that prevent the new generation locomotives using the Blackwater system... Asciano understands that remedial work is currently being scoped but at this time completion is not expected until around 2012."* QRN has inferred from this a preparedness by Pacific National to operate electric locomotives in the Blackwater system at the time of the investment and at a point in the future.

178 Draft Decision, p.53, "*The Authority is therefore not satisfied that the proposed amendments to the pricing arrangements contained in the DAAU will aid efficiency."*

179 Draft Decision, p.5, "*The Authority acknowledges QR Network's argument that AT5 is an average cost price and therefore may send inappropriate signals for the efficient utilisation of the overhead electric network."*

180 Draft Decision, p.34, "*Thus, as a result of the proposed DAAU… users of Pacific National's diesel haulage services would pay more than they would have paid without the DAAU, and those of QR National's electric haulage services would pay less than they would have paid without the DAAU."*

Before turning to the substance of the Draft Decision, QRN notes that, while the QCA may not agree that the pricing proposals in the DAAU are those it considers optimal, it has not recommended any ways in which the DAAU could be amended to better aid efficiency. This is despite the QCA recognising that the existing tariff arrangements are problematic.[181] As indicated earlier, QRN's view is that, having recognised a problem, the onus is on the QCA to provide guidance to industry on the mechanism by which that problem will be addressed. QRN urges the QCA to address the necessity for alternative pricing arrangements, given the current arrangements do not aid efficiency.

5.4.1 The efficient pricing of substitutable services

As noted in the introductory remarks of this submission, the QCA's approach to multi-part tariffs has been to structure the pricing for the declared service to allow users the option of two, substitutable traction services – diesel and electric traction – each of which are priced separately, but must necessarily reflect cost relativities in order to, in the QCA's own view, maintain competitive tension between them and prevent inefficient over-selection of one or the other. In this, the QCA seems to be echoing a regulatory model explored by, amongst others, Cave (2006),[182] namely, that the regulator should set a series of perfectly calibrated access prices to enable access seekers to efficiently consume (and efficiently switch between) substitutable, upstream monopoly services. The purpose of this regulatory model is to allow market preferences to determine the optimal allocation of resources in the downstream market, rather than regulatory pre-selection of a particular allocation.

The difficulty with this approach has proved to be regulatory error in price-setting, and the invariable inefficient over-selection of a particular option by access seekers. The model assumes that it is possible to set access prices that are perfectly adjusted to reflect the costs of consuming each substitutable service, such that access seeker decisions to consume a particular 'option' reflect efficient market preferences, firm risk appetite, and investment strategies. In practice however, this assumption rarely holds, as the regulator lacks the information or ability to set price signals to allocate resources efficiently across multiple, substitutable services. The result therefore tends to be market distortions, where access seekers 'over-preference' a particular service, to the inefficient exclusion of the other, substitutable services. In essence, the model's reliance on the regulator's ability to maintain optimal pricing for allocative and dynamic efficiency, tends to fail when exposed to real-world commercial and practical constraints, particularly in circumstances where coordination failure is a possibility.

In QRN's view, it is precisely this outcome that is currently occurring in Blackwater. By endorsing the continuation of average cost pricing, which behaves in the opposite way to efficient marginal cost pricing, the QCA is in effect sending an inefficiently high price signal for access to the electric infrastructure. This, in addition to the other elements of coordination failure that were set out earlier in this submission, is resulting in inefficient selection of diesel traction in circumstances where greater resource allocation to electric would be much more efficient. The QCA acknowledges as much, namely, that the existing tariff arrangements are not efficient.[183] Consequently, existing tariffs cannot be said to meet the requirements of s 168A(a).

A further, particular difficulty that arises by reason of the QCA's approach is that it requires the tariff structure to be adapted to account for both regulated and unregulated costs. Tractive energy for electric locomotives is supplied by the below-rail service through QR Network's electric overhead assets, while the tractive energy for diesel trains is supplied by the above-rail service on-train, using a diesel generator. The supply of remotely generated energy by QR Network is regulated, while the locally generated on-train energy supply is not. By maintaining two substitutable services, one of which is regulated and one of which is only partly regulated (below rail access for diesel traction is limited to the track only, rather than energy as well) a comparison of the below-rail costs of providing access to the declared service is not straightforward. This is particularly so given the QCA has limited it's assessment of 'efficiency'

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[181] Draft Decision, p.5, "*The Authority acknowledges QR Network's argument that AT5 is an average cost price and therefore may send inappropriate signals for the efficient utilisation of the overhead electric network.*"

[182] M Cave & I Voglesang, 'How access pricing and entry interact', Telecommunications Policy, 27, 2003, pp. 717-727; and M Cave, 'Encouraging infrastructure competition via the ladder of investment', Telecommunications Policy, 30, 2006, pp. 223-237

[183] Draft Decision, p.5, "*The Authority acknowledges QR Network's argument that AT5 is an average cost price and therefore may send inappropriate signals for the efficient utilisation of the overhead electric network.*"

to the below-rail service, without including the above-rail service except to the extent that the efficiency or otherwise of the below rail service promotes or fails to promote competition in upstream or downstream markets.[184]

5.4.2 Stakeholder concerns and optimal pricing arrangements

The Blackwater and Goonyella user groups have expressed significant concern about QR Network's proposed changes to the tariff arrangements. In particular, users have expressed anxieties that the DAAU:

- could result in QR Network over-recovering AT5 revenue where diesel services pay for electric assets they did not use;
- would force users to select electric traction, even though diesel traction is just as efficient;
- discriminates against Pacific National in favour of QRN and reduces competition between them;
- could establish a precedent to apply a 'quick fix' in developing tariffs that may be applied to GAPE and anywhere that there had been poor and inefficient below-rail investment;
- treats electric infrastructure as sunk and consequently seeks to set prices to best utilise those sunk investments, which would send an inappropriate dynamic efficiency signal;
- could provide an incentive for ongoing inefficient over-investment in electric assets by forcing operators to pay for sunk electric infrastructure that was not being used; and
- should instead apply a price signal that addressed the economic consequences of diesel traction as this would incentivise reduced costs and improved productivity in the selection of traction mix.

QRN understands these concerns, however it should be noted that:

- the existing revenue cap form of regulation prevents QR Network from over-recovering AT5 revenue;
- users would not be forced under the DAAU to use electric traction, but may end up paying infrastructure costs regardless of their traction choice as a consequences of an election to bypass regulated assets, given that cost of capital regulation is intended to insulate QR Network from patronage risk;
- the proposals in the DAAU apply equally to all users of diesel traction and it does not discriminate in favour of QRN, which also operates diesel traction, nor does it reduce competition between QRN and Pacific National, which has the opportunity to invest in electric traction for future or indeed, current volumes;
- the proposals in the DAAU seek to recover the costs of electric infrastructure, which the QCA has assessed as prudent and therefore it does not seek to recover costs from inefficient electric below-rail investment; and
- the proposed pricing does not send inappropriate pricing signals for dynamic efficiency because a) the assets are sunk, and b) future investment decisions will be made based on the relative costs of alternative investment options available at the time of the investment decision.

As the QCA has acknowledged in the Draft Decision, QR Network is not compensated for asset stranding risk,[185] and has an entitlement to recover prudently incurred costs.[186] Given this, the relevant issue for the QCA to determine appears to be from QRN's perspective, how those costs might be recovered in the least distorting way.

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[184] Draft Decision, p. 26, "*Accordingly if the DAAU: (a) does not promote economic efficiencies in the below-rail infrastructure; or (b) promotes economic efficiencies in the below-rail infrastructure but does **not** as a consequence promote effective competition in upstream and downstream markets, the DAAU will not be consistent with the objects of Part 5 of the QCA Act.*

[185] QCA, June 2010, Draft Decision, QR Network's 2010 DAU – Tariffs and Schedule F, p.48, *"The Authority agrees with QR Network and Synergies that the CAPM does not compensate the firm for asymmetric risk"*

5.4.3 Specific issues with the Draft Decision

The Draft Decision states that the QCA may be prepared to accept the necessity for alternative pricing arrangements if it could be shown that this aided efficiency.[187] It has also stated that the current AT5, AT2 and capacity multiplier may not be efficiently functioning,[188] and that the revenue adequacy principle requires a departure from the efficient marginal costs pricing rule, but that the pricing principles limit the implementation of such departures.

There are a number of methodological or logical shortcomings in this approach. In this respect, it is noted that:

- First, in relation to 'efficient prices', it is evident from the Draft Decision that the QCA agrees that the current AT2, the AT2 multiplier and AT5 tariffs require review in order to ensure they accurately reflect the cost to QR Network of providing access to the below-rail infrastructure. Consequently, the current pricing arrangements are likely to be discriminating in favour of diesel or electric traction operators one way or another, either because AT2 and/or the AT2 multiplier is too low or because AT5 is not structured to send appropriate pricing signals to promote efficiency. In recognising that current pricing is not efficient, and yet not suggesting ways in which the DAAU could be amended, the QCA is worsening a regulatory failure, which in itself is limiting efficiency.

- Second, the QCA has stated that it does not intend to strand QR Network's electric assets. Although these costs are sunk they are real costs, and given they were supported by users and were assessed as prudent and efficient, they must be recovered if future investment in network capacity is not to be discouraged. Discouraging future investment will inhibit dynamic efficiency and limit the future efficiency of the declared service, contrary to the pricing principles. Moreover, the QCA accepts there is a risk of QR Network failing to generate expected revenue exists (per s 168A(a)), yet does nothing to address this concern, with further significant adverse consequences for efficiency (s 168A(b)) and the incentive to invest in productivity improvements (s 168A(d)). In this respect, the QCA's failure to act sends a signal to investors in other industries, not just the rail sector, about the capacity of the QCA to sustain investment in regulated sectors.

- Third, in assessing whether the proposed access pricing discriminates between above-rail operators, the focus should be on their *future* competitive position, not the current competitive positions. Moreover, that a tariff change might have a transitory or temporary effect on a single operator is not to say that it is 'discriminatory' – in QRN's view, s 168A(c) must necessarily be assessed over a sufficiently long term to distinguish regulatory measures that promote efficiency from ones that do not.

- Fourth, the QCA not recognised that, in assessing the impact of access charges on the future competitive positions of QRN, Pacific National and future market entrants, only QRN, as the incumbent with a larger fleet is likely to have sufficient rolling stock to meet the requirements of new haulage contracts in Blackwater. Pacific National and potential new entrants will need to acquire new rolling stock for any new haulage contracts they win. Consequently, in making future fleet acquisition decisions they will include an assessment of the access pricing arrangements. Unless the QCA addresses the inefficiencies it has acknowledged in the access pricing arrangements, these decisions could be distorted by confusing below rail pricing signals.

- Fifth, the QCA has equated competition between electric and diesel traction in Blackwater with competition between QRN and Pacific National[189] and considers that QR Network has "not demonstrated that there is a cost differential in providing below-rail services to the two above-rail operators".[190] While this simplifies the

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186 QCA, September 2010, Final Decision QR Network's 2010 DAU, p.176, "*The Authority believes that, provided that QR Network has acted prudently… it should expect that its efficient costs should be recognised and included in the regulatory asset base."*

187 Draft Decision, p. 52, "*The Authority might be prepared to accept that it was necessary to adopt alternative pricing arrangements if it could be shown that this aided efficiency."*

188 Draft Decision, p.21, "*That is, when utilisation is low, the price is high and when utilisation is high, the price is low. A price that exhibited economic efficiency principles would actually do the opposite."*

189 Draft Decision, p. 34, "*Pacific National offers only diesel services and QR National currently offers both electric and diesel services. QR Network said that, upon commissioning of the new feeder stations in the Blackwater system (which it expected would be in the second half of 2012), QR National intended to replace a substantial number of its diesel locomotives with electric locomotives. Therefore, competition between QR National and Pacific National in Blackwater would effectively reflect competition between the two traction types."*

190 Draft Decision, p. 53

analysis, it results in an inadequate assessment of the competitive effects of the DAAU. Rather than considering whether there is a cost differential between the provision of below-rail access for electric and diesel traction services, the QCA has considered whether there is a cost differential between the provision of below rail services to QRN and Pacific National. For the reasons given earlier, this assumption is doubtful – and seems to rely on the idea that both QRN and Pacific National have permanently and irrevocably committed to electric and diesel traction respectively.

5.5 Public Interest (3.7)

The Draft Decision finds that the DAAU would not be in the public interest because in the QCA's view that it:[191]

- will not promote, but will adversely effective competition in the above-rail market;
- will not promote, but will adversely effect economically efficient outcomes;
- is likely to prevent the emergence of the lowest-cost coal supply chain;
- will discriminate in favour of QRN as a related party to QR Network, thereby undermining future mining activity;
- will significantly change the regulatory principles which have been the basis on which coal industry participants have entered into commercial arrangements;
- introduce significant commercial and regulatory uncertainty that could undermine current as well as future mining activity;
- is likely to over-signal the benefits of investments in electric traction, having an adverse effect on development of coal industry in Queensland;
- could divert capital into electric infrastructure investment in circumstances where diesel traction would be a more efficient, increasing transport costs and adversely affecting development of the coal industry in the event of competition overseas and/or a downturn in coal prices; and
- will not evidently result in environmental benefits.

The Draft Decision provides very little in the way of a structured assessment as to the meaning of 'public interest', or how it should be properly applied in the context of s 138(2) of the QCA Act. The QCA appears to have had regard only to a policy document released by the ACCC in regards to Part IIIA arbitrations in formulating its approach to the public interest criterion.[192] It is unclear why the QCA regards that source, amongst many others, as relevant.[193] In any case, the QCA's assessment of s 138(2)(d) is limited to a short and unstructured series of conclusions on the interests of the Queensland coal industry.

QRN has largely addressed each of the findings that underpin the QCA's assessment of the public interest in previous sections. It is worth noting however, the limited factual or substantive discussion in the QCA's assessment, the QCA's failure to conduct any sort of qualitative or quantitative weighing process, and that reasons demonstrating that the QCA has given appropriate weight to positive aspects of the DAAU were not included in the Draft Decision.

It is worth noting that the QCA not considered the implications of the Draft Decision itself on coal industry development. While the QCA is unconvinced that the DAAU would promote development, it does not appreciate that failure to promote certainty will itself have negative implications for capital investment in the coal supply chain. As

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191 Draft Decision, pp.56-57

192 Draft Decision, p.56, *"The term 'public interest' is not defined in the QCA Act… The ACCC provided guidance on the interpretation of public interest..."*

193 It is unclear why the QCA regards the ACCC's interpretation of public interest in the context of Part IIIA arbitrations as relevant, as against other circumstances where a public interest/benefit criterion is applied by the ACCC (i.e. in authorisations), or the NCC (i.e. in Part IIIA declaration), or as against the multiple Tribunal cases that have regard to it (i.e. *Fortescue Metals*, *Virgin Blue, SACL*).

noted earlier, the Draft Decision does not take any steps to ensure the integrity of the regulatory pre-approval of capital expenditure, and does not consider the commercial implications not acting to protect users and operators with electric traction commitments from regulatory failure. On both counts, the QCA's approach, if not adjusted prior to the release of a Final Decision, will itself introduce significant commercial and regulatory uncertainty that could undermine current as well as future development of the Queensland coal industry.

5.5.1 The QCA has applied the wrong test

The meaning of 'public interest', and more particularly, the correct methodological approach to assessing it in the context of access regulation, has been extensively considered by the Australian Competition Tribunal. Most relevantly, in *Fortescue Metals Group*, the Tribunal accepted that what is ultimately in question is the welfare, particularly the economic welfare, of the general community.[194] The Tribunal went on to largely accept the analytical approach that had been adopted by Professor Allan Fels in that case, namely, that the relevant analytical matrix when assessing the public interest is simply whether the benefits of the proposal outweigh the costs, bearing in mind that the objective is a better outcome rather than a state of perfection.[195]

The Draft Decision states, and QRN agrees, that the public interest may include a 'wide variety of matters', and that 'relevant matters can vary' as between one regulatory process and another.[196] However, the Draft Decision then goes on to apply an unstructured exercise in speculating on the apparently limited assistance the DAAU will provide the coal industry, as distinct from the benefit of the DAAU to the *public* interest. In this respect, the QCA's analysis does not seem to account for the difference between the private interests of the Queensland coal industry and the public interest. By framing its analysis in terms of whether the DAAU would promote coal industry development, rather than treating the development of the coal industry as a potential public benefit that should be assessed against likely public costs, the QCA has fallen into error.

5.5.2 The QCA has not exercised its discretion transparently

The QCA has not conducted a reasoned weighing exercise of costs and benefits. It is clear that an assessment of the public interest necessarily involves significant qualitative, as well as quantitative, aspects.[197] The Draft Decision however, fails to engage in either, instead being limited to the QCA expressing its dissatisfaction with respect to a limited sub-set of claimed benefits of the DAAU. The QCA does not provide any evidence that it has conducted a reasonable and transparent weighing exercise, to adjudge the benefits of the DAAU against the costs.

5.6 Any other issues (3.8)

The QCA has identified the proposal to socialise AT5 across the Blackwater and Goonyella systems as a key concern of stakeholders. As noted in our earlier submission,[198] QRN has customers in both Goonyella and Blackwater and understands the difficulties of introducing this change. Consequently, QRN supports efforts aimed at finding a pricing mechanism that is appropriate to the objective and acceptable to users of both systems. In this regard, as flagged in its original submission, QRN is open to regulatory proposals that would remove cross-system socialisation, provided that they otherwise meet its commercial objectives.

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194 *In the matter of Fortescue Metals Group Ltd* [2010] ACompT 2 at [1161].

195 *In the matter of Fortescue Metals Group Ltd* [2010] ACompT 2 at [1161].

196 Draft Decision, p.56, "*The Authority considers that public interest may include a wide variety of matters, and the relevant matters can vary from one DAAU to another.*"

197 *In the matter of Fortescue Metals Group Ltd* [2010] ACompT 2 at [1169].

198 QR National, 16 April 2012, QR Network's Electric Access Draft Amending Access Undertaking (DAAU), p. 5, *"QR National has customers in both Goonyella and Blackwater and understands the difficulties of introducing this change. On this basis, we are actively supportive of continuing discussions aimed at finding a pricing mechanism that is appropriate to the objective and acceptable to users of both systems."*

Economic Aspects of Electric Traction Charges

Paper prepared for QR National

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I Introduction and overview

1. This paper has been prepared for QR National, which is a competitive above-rail train operator of electric and diesel locomotives in the Central Queensland Coal Network (CQCN).

2. On 16 December 2011, QR Network (an independent subsidiary of QR National) submitted to the Queensland Competition Authority (QCA) a Draft Amending Access Undertaking (DAAU) proposing that a single AT5 tariff be charged to above-rail operators across the whole Goonyella-Blackwater system, rather than the present situation of a separate tariff for each system. The DAAU also proposed that some diesel trains pay a contribution to the cost of the electric overhead. QR Network proposed that these changes to the tariff arrangements would allow it to recoup its investment in electric infrastructure assets more efficiently and with significantly less risk of asset stranding, particularly in the Blackwater system.

3. The subsequent July 2012 Draft Decision by the QCA proposed not to approve QR Network's AT5 DAAU.

4. In its Draft Decision, the QCA recognises the potential inefficiencies related to the current average cost charging arrangements for the electric infrastructure assets. However, it rejects QR Network's contention that charging arrangements based on average cost pricing could result in a situation where a high cost traction technology prevailed. Instead, the QCA contends that setting a "price that reflects the efficient costs of providing access to electric infrastructure", will lead to the above-rail market determining the least-cost technology and ensuring the efficiency of supply-chain outcomes. The Draft Decision does not provide guidance on the methodology by which the QCA intends on calculating such an efficient price.

5. QR National has requested that we assess whether or not the QCA's reliance on the decentralised decision-making of above-rail operators will lead to efficient outcomes.

6. In this respect, the first section of this paper shows, that contrary to the QCA's suggestion, decentralised choice can indeed result in inefficient technology choice, and that the likelihood of that occurring is greater where there are a small number of downstream competitors. In those situations – in addition to the 'tipping' concerns that arise by reason of average cost pricing, which the QCA, in our opinion, tends to overlook – the interdependence between downstream competitors can create incentives for one competitor to inflict costs on its rival through the strategic selection of diesel traction, with the ultimate effect of increasing total cost for the supply-chain. A simple model is used to highlight these factors at work.

7. These issues arising from decentralised choice are merely one element of a broader issue, namely, the management of vertically separated supply chains. In such supply chains, complementarities between investment decisions at the various layers give rise to external effects that need to be managed. Those effects, for reasons explained in the text, are rarely amenable to efficient management through decentralised choice (as would occur, for instance, in a market-based price system). As a result, processes are needed that emulate the decisions that would be taken within a vertically integrated firm. Those processes must provide for the efficient provision to the supply chain as a whole of quasi-public goods (such as shared

capacity with high fixed costs and low variable costs), and allow each participant in the supply chain to take its decisions on the basis of reasonable expectations as to the complementary investments that will be undertaken.

8. The second section of this paper therefore discusses the economic theory that underpins the design of mechanisms of this kind, and applies that theory to the specific mechanisms approved by QCA for coordinating investment decisions in the CQCN. It shows that these mechanisms play an important role in promoting efficient investment decisions and in allowing above-rail competitors to frame their strategy on the basis of what – until now – have been regarded as credible commitments by the QCA as to the future operating environment.

9. We further note the suggestion in the QCA's Draft Decision that it is considering moving away from its commitment to those mechanisms, and relying on ex post regulatory judgment to determine whether or not investments in the below-rail assets are prudent. The paper discusses whether such a move should be made retroactively, concluding that to do so would be contrary both to economic efficiency and to competitive neutrality. On that basis, a final section of the paper draws together some conclusions.

10. An attachment to the paper provides the background to the QCA's Draft Decision and should serve as a reference for the chronology and the main issues.

II Decentralised choice of traction

11. In its DAAU, QR Network argued that the current AT5 tariff arrangements distort above-rail operators' incentives in selecting a traction technology. It further argued that as a result of those distortions, above-rail operators might select a traction type with higher costs than they would have selected were their choices coordinated or were price signals fully efficient.

12. In contrast, in its Draft Decision, the QCA suggests decentralised choice will result in an efficient choice of traction technology. We note that this appears to downplay the consequences of the price distortions associated with average cost pricing (which the QCA otherwise recognises). In coming to the view that those distortions would not result in incorrect technology choice, the QCA seems to have been influenced by an argument put on behalf of Pacific National (PN) that, were there efficiency gains from the use of electric traction, QR Network could – despite average cost pricing – somehow internalise those gains and induce PN to adopt electric traction. The small number of access seekers, it is claimed, should make resolving any 'coordination failure' all the easier.

13. This argument is incorrect. To begin with, no mechanism is proposed by which this result could be achieved while respecting the aggregate cost recovery constraint and operating under-average cost pricing. Moreover, far from facilitating resolution of any 'coordination failure', the small number of access seekers makes it more likely that – left to their own devices – the problems will be intractable and the resulting outcomes inefficient.[1] This occurs because the small numbers case is vulnerable to strategic behaviour; moreover, an average cost pricing rule, where the charge for recovery of the joint and common cost falls only on electric traction users, makes the returns to such strategic behaviour all the greater.

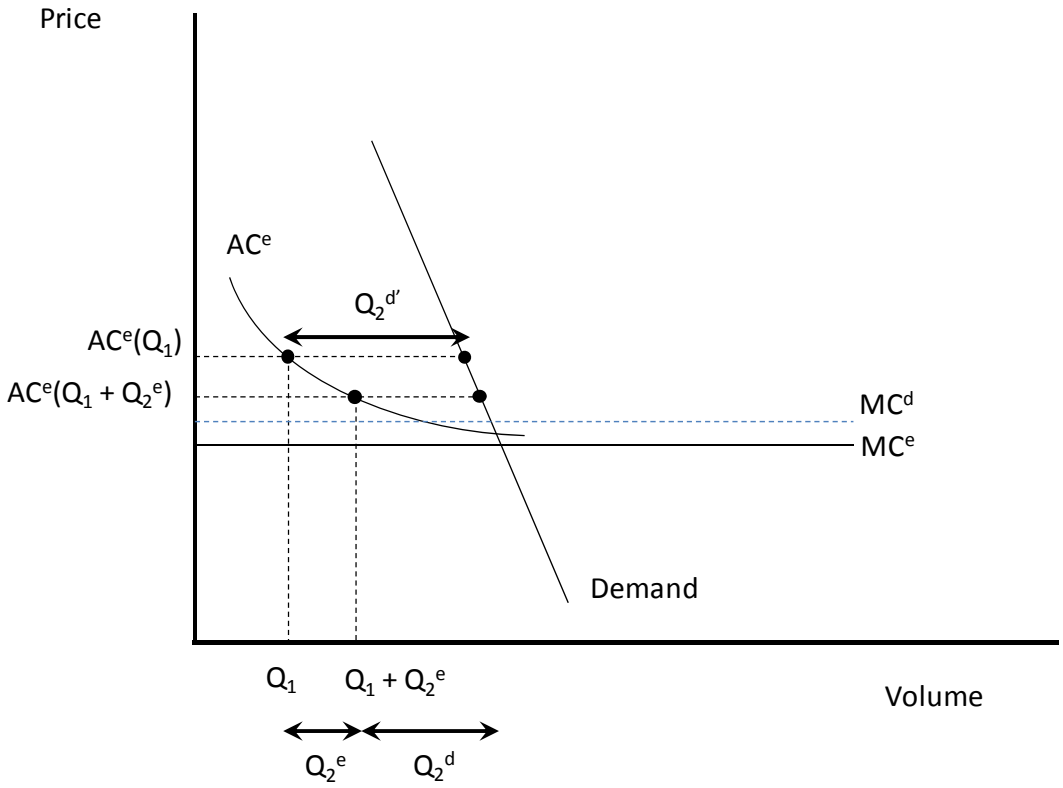
[1] See also James Buchanan ([1967], 1999) *The Demand and Supply of Public Goods*, The Collected Works of James M. Buchanan, volume 5, Liberty Fund, page 79 and follows.

14. The issue of strategic choice of variables such as operating technology has been extensively explored in 'raising rivals costs' models.[2] The economic essence of these models is that a player's behaviour can impose a negative externality on its rival. So long as the harmful consequences of that externality to the rival exceed the cost it imposes on the player, choosing the action that generates that externality is profitable.

15. To illustrate the mechanism at work, consider the following stylised model, which is illustrated in the figure below. Suppose that there are two firms, 1 and 2. Firm 1 supplies Q_1 units using electric traction, whilst firm 2 supplies Q_2^e using electric traction, whilst supplying Q_2^d using diesel, with $Q_2 = Q_2^e + Q_2^d$.

    Total quantity is:

$$Q = Q_1 + Q_2 = Q_1 + Q_2^e + Q_2^d$$



16. Let the average costs of electric be $AC^e(Q_1+Q_2^e)$. We assume that these are declining due to the presence of fixed costs. Marginal costs of electric are constant and assumed to be equal to MC^e. In the figure, it is assumed that the marginal costs of diesel, denoted by MC^d, exceed MC^e. This assumption is made deliberately, in order to show that it is not necessary to have $MC^d<MC^e$ for the argument to hold. Of course, the arguments below still go through if $MC^d<MC^e$.

[2] See S. Salop and D. Scheffman(1983), 'Raising Rivals' Cost,' *American Economic Review*, 73,pp. 267–271.

17. The price of electric is regulated, and is set equal to average cost. At this price, total residual demand is supplied by firm 2 using diesel (this requires that the costs of diesel not be too high). We assume that the price of diesel is fixed at some price $P^d > MC^d$.

18. In the initial situation, firm 2 therefore supplies Q_2^e units using electric traction, and Q_2^d using diesel. The regulated price of electric is $AC^e(Q_1+Q_2^e)$. Firm 1 makes zero profits. Firm 2 will make zero profits on Q_2^e, but positive profits on Q_2^d, as long as the price of diesel is less than the average cost of electric at this point.

19. Now consider the following thought experiment: suppose that firm 2 decides not to use electric traction at all, and assume that firm 1 continues to supply Q_1. As a result of this section, electric volumes decrease. The regulated price rises to $AC^e(Q_1)$, due to the assumption of declining average costs.

20. Firm 1 is indifferent to this, continuing to earn zero profits. Overall demand for the service falls (and so the volume supplied by firm 2 falls), but firm 2 increases its supply using diesel, to $Q_2^{d'}$. Firm 2 was earning zero profits from its electric volumes before the change, and so does not miss out on any profits in that section of its business by making the switch. The figure above clearly indicates that the profitability of this change for firm 2 will depend, inter alia, on the relative slopes of the average cost and demand curves, as well as on the relationship between costs in each market.

21. We can formalise this by examining the incentive of firm 2 to make marginal changes in electric supply. A marginal decrease in electric by firm 2 will be profitable as long as:

$$\frac{d\pi_2}{dQ_2^e} = \left(P^d - MC^d\right)\frac{dQ_2^d}{dQ_2^e} < 0$$

The term in brackets is additional profit per unit of the change in diesel. The second term is the induced change in diesel that is brought about when there is a reduction in electric by firm 2. In general, we will have $\frac{dQ_2^d}{dQ_2^e} \neq -1$ because the reduction in electric by firm 2 induces a reduction in overall electric volumes by lifting electric prices.

22. We can express this in a slightly different form. First, note that since we assume that $dQ_1 = 0$, we have:

$$dQ = dQ_2^e + dQ_2^d$$

so that:

$$dQ_2^d = dQ - dQ_2^e = -\left(dQ_2^e - dQ\right) < -dQ_2^e$$

hence:

$$dQ_2^d = -\left(dQ_2^e - \frac{dQ}{dP}dP^e\right) = -\left(dQ_2^e + \varepsilon\frac{Q}{P^e}dP^e\right)$$
$$= -\left(dQ_2^e + \varepsilon\frac{Q}{AC^e}dAC^e\right)$$

where $\varepsilon > 0$ is the (absolute value of the) elasticity of demand.

23. Next, let $\sigma > 0$ be the (absolute value of the) elasticity of average costs of electric with respect to changes in quantity of electric (in other words, the normalised slope of the average cost curve). We therefore have:

$$\frac{dAC^e}{AC^e} = -\sigma \frac{dQ^e}{Q^e} = -\sigma \frac{dQ_2^e}{Q^e}$$

and so:

$$dQ_2^d = -\left(dQ_2^e + \varepsilon \frac{Q}{AC^e} dAC^e \right) = -dQ_2^e \left(1 - \varepsilon\sigma \frac{Q}{Q^e} \right)$$
$$= -dQ_2^e \left(1 - \frac{\varepsilon\sigma}{1-s} \right)$$

where 0<s<1 is the share of diesel in total demand. Hence it will be profitable for firm 2 to supply additional quantities of diesel as long as:

$$1 - \frac{\varepsilon\sigma}{1-s} > 0$$

or as long as the share of diesel is sufficiently small:

$$s < 1 - \varepsilon\sigma$$

24. Intuitively, the larger the share of diesel, the further we move up the average cost curve, and the more likely it is that the absolute value of the elasticity of overall demand exceeds the absolute value of the elasticity of the average cost curve for electric, so that an increase in price brought about by a shift out of electric by firm 2 actually reduces the quantity of diesel that they can supply at the regulated price.

25. In short, the QCA errs in suggesting decentralised choice under average cost pricing will result in efficient technology choice. Rather, average cost pricing is not only likely to give rise to the usual choice distortion (in which equilibrium may occur at either a low-cost or a high-cost outcome) but will also create strategic incentives that distort choice further. With a small number of participants in the downstream market, those distortions are more likely.

26. In particular, it emerges from the model that the mere fact that the marginal costs of electric are lower than those of diesel need not result in the choice of electric. Rather, so long as the effect of the choice of diesel is to sufficiently increase costs for the firm committed to electric, its uncommitted rival may choose diesel even if that increases costs overall. That requires that the quantum of the uncommitted rival's volume is sufficient to materially shift the average cost of electric, to the point where the resulting price increase more than offsets the rise in the uncommitted firm's costs. Of course, whether such strategies are viable in any given situation is an empirical question; what makes such strategies particularly plausible in this context is the combination of an average cost pricing rule with the scope for at least one firm to engage in what amounts to partial by-pass of the regulated assets.

27. There is obviously the further question of whether such an outcome would be sustained. That would depend on whether the firm using electric was genuinely 'locked in' to electric traction.

If it was not, then it too might shift to diesel, nullifying the benefit of diesel use to its rival. However, there is no reason to assume that such a shift would ultimately lead to the optimal technology choice and associated level of costs.

III The management of integrated supply chains and the choice of complementary technologies

28. We turn now to a second crucial issue, which is the nature of the coal/rail supply chain and of the mechanisms involved in its efficient management. It will be shown that, from an economic perspective, those mechanisms serve precisely to avoid inefficiencies that can arise from decentralised choice.

29. By way of background, the significant expansion in below-rail electric assets in the Blackwater system has been undertaken by QR Network with the support of the coal mining companies, the above-rail operators and the QCA – a full analysis of the relevant developments is set out in Attachment 1. We note that although, as an above-rail operator, QRN is not eligible to vote in the Coal Rail Infrastructure Master Plan (CRIMP) process, the endorsement of the CRIMP facilitates coordinated investment by providing information about demand and end-user preferences.

30. As a result, the effectiveness and reliability of the CRIMP process is not only vital to the below-rail entity, but is also important to above-rail operators' investment decisions (and indeed, other supply chain entities, including ports), and in managing the risk of coordination failure over a vertically separated supply chain. The CRIMP process, in other words, serves to emulate the decision-making that would be undertaken within a fully vertically integrated supply-chain. It thus provides a framework within which the above-rail operators can then compete, with clarity as to the investments that will be made and the cost consequences of those investments. Specifically, rollingstock acquisitions that QRN has made in recent years are complementary to the approval of below-rail electric infrastructure in the CRIMP, because above-rail operators have a reasonable expectation that the CRIMP will be enforced.

31. From an economic perspective, this role of the CRIMP process reflects two crucial features of the supply chain within which QR National competes.

32. First, it is a defining feature of vertical supply chains that there are significant vertical complementarities, in which supply decisions at one layer create (or remove) options at others.[3] Properly managed, these vertical complementarities create "a whole is greater than the sum of its parts" effect, however, if they are not properly managed, each vertical layer will have incentives to shift costs on to other vertical layers, including the costs (and risks) of financing capacity expansion. In other words, if vertical externalities remain 'uninternalised', it will be difficult for the system as a whole to undertake investment in a coordinated manner along the least cost capacity expansion path.[4] Last but not least, for reasons explained in Box

[3] In other words, they make it possible for individual market participants to then efficiently design their own 'modules' within a framework that secures vertical complementarities: Carliss Y. Baldwin and Kim B. Clark (2000) *Design Rules, Volume 1: The Power of Modularity*, The MIT Press, pages 246 and follows.

[4] John Roberts (2004), *The Modern Firm: Organizational Design for Performance and Growth*, Oxford University Press, pages 41 and follows.

1, it is rarely possible to design a decentralised, price-based, mechanism that can properly internalise these choices, so that some administrative mechanism is essential to do so.

Box 1: Why it is difficult to rely solely on the price system to coordinate vertical complementarities in open-access supply chains

Where demand and cost structures have particular characteristics, it can prove impossible to define a resource allocation process that is both decentralised and efficient:

(a) decentralised, in the sense of requiring only:

I. That each firm have information about its own production possibilities, as against also knowing the production possibilities open to other firms, and

II. That each firm's message at any step should concern its own proposed actions at that step, as against also concerning the proposed actions of other firms at that step, and

(b) efficient in the use of the resources being allocated. (See: Geoffrey M. Heal (1973), The Theory of Economic Planning, Advanced Texts in Economics, North-Holland, pages 142 and follows).

Thus, it is well known that where production systems involve chains of processes, with each link in the chain being 'lumpy', in the sense that investments involve minimum increments of fixed, often large, size, efficient investment and use decisions may not be made without some degree of coordination, above and beyond that provided by price signals.

This is because decisions taken under those circumstances depart from two crucial assumptions conventionally made in economic models of decentralised choice of output and investment:

- That the set of alternatives is convex, which means that if two choices are available, any combination of those choices (i.e. any intermediate point) is also available, and
- That the objective function (that is, the function that measures how outcomes, such as profits, vary depending on the decision taken) is concave, which means that if two choices lead to the same outcome, then a combination of these choices would lead to a higher outcome (so that the objective function looks like a smooth climb to, and descent from, a single peak).

When both these assumptions hold, there is a single optimum. Moreover, that optimum can be found by exploring small variations around the current point, as a simple rule can be followed: change any dimension of performance, and if that change improves performance overall, continue to change it in the same direction until the improvements become smaller than the costs. As a result, it is easy to decentralise decision-making through the price system, allowing each unit to explore the options and assess the impact on its performance, without losing overall efficiency.

However, where investment decisions are indivisible (one cannot continuously vary the number of tracks, mines or ports), the set of alternatives is non-convex. For the same reason (and because of increasing returns to scale associated with redundancy in capacity), the objective function is non-concave. Put in practical terms, this has two implications.

The first is that there may be multiple outcomes that are 'local' equilibria, in the sense that small variations around those outcomes will result in worse performance. As a result, any decentralised process that involves individual decision-makers 'exploring' whether performance would improve by making slight changes around an initial position will not be able to identify the global, i.e. overall, optimum – that is, the configuration of assets that maximises the value of the system as a whole.

Second, changes in any one dimension of the system at a time may not suffice to indicate whether that dimension should in fact be varied; rather, finding the optimal configuration requires changing (or at least modelling changes in) all aspects of the chain at once.

This can create a need for some non-price-based mechanism that coordinates investment, production and use along each of the links in the chain. It is this that administrative coordination through vertical integration within the firm provides, albeit with costs of its own (not least the shielding of the now internalised decisions and operations from direct market processes). In vertically separated systems, such as the central Queensland coal chain, those coordination functions need to be undertaken as between firms. each with its own incentives.

33. Second, some aspects of investment choice in the supply chain – in this case, the below-rail electric assets – are what economists refer to as a quasi-public good to the supply chain as a whole. The fixed nature of the costs involved in their supply means they involve substantial scale economies, however, they are subject to some degree of rivalry in use in the sense of being capable of suffering congestion and, at that point, requiring expansion. Moreover, while like pure public goods, they are equally available to all users (up to the point where congestion occurs), actual consumption of the goods can differ among users (while with pure public goods, all users consume the same quantity of the good).

34. In his classic text on the subject, Nobel Laureate James Buchanan refers to these goods which involve a substantial degree of jointness in supply but do not provide an equal quantity of homogenous consumption units to all users as 'impure' public goods and shows that the basic Samuelsonian conditions for efficiency (involving vertical summation of demands) apply.[5] Efficiency, in other words, requires that the component of the good that is subject to joint supply should be provided up to the point where the summed marginal social benefit of the last unit of services provided (which is captured by the increase in consumer marginal benefits and producer profits) equals the marginal social cost of supplying the service.[6]

35. Achieving efficient levels of supply requires eliciting from users information on their valuations of the good. It requires, in other words, some process for simulating the outcome that would occur were the users bargaining over supply in an environment with no transaction costs. Where the relevant valuations are private information (i.e. they are known to each user, but not to others), no perfect revelation mechanism can exist. However, approximating a correct solution is the objective of schemes which rely on weighted voting by users over possible levels of provision of the quasi-public goods. These schemes are inspired by Wicksell's original

[5] Buchanan op. cit, at pages 48 and follows. Obviously, for supply to be efficient, as well as the marginal condition, the 'total' condition must also be met, which requires that the total benefits from supply are no less than the total costs of that supply.

[6] See also E J Mishan (1969) "The Relationship between Joint Products, Collective Goods, and External Effects", *Journal of Political Economy*, 77:3, 329-48.

solution to the public good problem, which involved unanimous voting by beneficiaries; recognising the issues the unanimity requirement created, Wicksell himself recommended a super-majority approach.[7]

36. The intention of the super-majority requirement is both to make it more likely that only Pareto-improvements will be approved and to raise the likelihood each voter will be pivotal, increasing the incentives for truthful revelation. It is clear, however, that the threshold will not induce truthful revelation if approving supply does not entail any requirement to contribute to the cost of supplying the public good. Rather, as in an assurance game, the incentive structure is defined by the combined fact that absent approval by the required majority, supply will not occur; and that if supply occurs, each user will be required to bear a share of costs.[8]In theory, supply voting will be most efficient where the share of costs each user bears (if supply occurs) is set equal to the Lindahl price for that user, however, where valuations are private information, it is common for some rule of thumb to be used instead, such as one which simply pro-rates the cost among voters. While obviously not first best, such rules of thumb can provide an approximation to the efficient solution when applied consistently.[9]

37. Voting schemes for regulated quasi-public goods have been applied in contexts going from airports to electricity transmission networks.[10] They serve the twofold purposes of reducing the costs of regulatory error (as it is end-users who decide on the level of supply, avoiding the need for the regulator to estimate end-user valuations) and of providing the access provider with a reasonable level of certainty about major investment decisions. For those purposes to be achieved, the regulator's commitment to enforce the scheme must be credible – in other words, once the procedural requirements have been met, (1) the regulated entity must supply the assets and (2) end-users must bear the costs of the assets, in a manner consistent with achieving full cost recovery.

IV Changes to the end-user approval process

38. In its draft decision, the QCA implies it is moving away from the CRIMP process of end-user voting for capital investment. That is, of course, a matter whose implications go beyond these proceedings. For the reasons set out above, such a change risks removing a mechanism that has an important role to play in efficiently coordinating decisions in a vertically interdependent, but vertically separated, supply chain.

39. However, even putting that broader question aside, what is relevant in this context is whether any such change should be made retrospectively – i.e. in a way that nullifies decisions already made in the end-user voting process as it has operated to date. Where the consequences of a rule change depend on past decisions that would have been made differently had the rule

7 Buchanan, op. cit., page 88 and follows.

8 Assurance games are discussed in Brian Skyrms (2004) *The Stag Hunt and the Evolution of Social Structure*, Cambridge University Press.

9 Buchanan, op. cit., page 154 and follows.

10 See José A. Gómez-Ibáñez (2003) *Regulating Infrastructure: Monopoly, Contracts, and Discretion*, Harvard University Press, pages 312 and follows.

change been correctly predicted, the rule change is commonly described as retroactive.[11] Such rule changes tax those economic agents whose assets are reduced in value as a result of the change, while providing benefits to those whose assets appreciate in value. They therefore have consequences both for efficiency (i.e. the change in the aggregate value of society's resources) and for income distribution.

40. Broadly, where retrospective rule changes depreciate the value of assets, the relevant issue is whether the party adversely affected could have insured itself against those changes.[12] If that insurance is unavailable, then risk costs are usually minimised by either explicitly compensating that party or 'grandfathering' the relevant decision. In this case, QR Network, having gone through the CRIMP process, was entitled to rely on the process' consequences being respected by the QCA. Further, decisions about investment in above-rail electric traction assets by QR National, and decisions to compete on the basis of electric traction, were made in the light of an administrative mechanism centred on end-user choice. Moreover, associated with that mechanism, are commitments by the QCA to ensure full cost recovery for prudent expenditure, ultimately from end-users, of the investment costs those mechanisms endorse. Finally, there was no reason for either QR Network or QR National to doubt the sincerity of the QCA's commitment to achieving such full cost recovery in a manner consistent with economic efficiency and competitive neutrality between above-rail operators, nor were there any means by which QR National could efficiently insure itself against the risk that it would not.

41. As a result, should the QCA retroactively amend the CRIMP process, it would impose uncompensated losses the value of QR National's above-rail assets, including its relationships with its customers. A decision by the QCA to impose such uncompensated losses would amount to time-inconsistency.[13]

42. Where investors expect a likelihood of time-inconsistent regulation, they will take steps to avoid it. For instance, unless suitably compensated, they will avoid projects that involve large amounts of sunk capital, even if those projects are expected to be profitable in the absence of time-inconsistency. Similarly, they will avoid projects that are very risky even if – absent time-inconsistency – those projects are expected to earn returns more than sufficient to justify the risk involved. And they will also likely delay risky investment until major uncertainty is resolved, thereby avoiding the time-inconsistency problem. Finally, investors will avoid projects where high returns are required later in the asset's life to compensate for low returns earlier on, as such projects are particularly susceptible to time-inconsistency. Combined, all of these responses harm end-users, who end up with fewer and poorer quality services and/or who will in future have to pay more to obtain the same level of investment and service.

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[11] For the definition cited here and an overview of the economics of retroactive rule changes, see Daniel Shaviro (2000) *When Rules Change: The Economics of Retroactivity*, Chicago Studies in Law and Economics, University of Chicago Press, 2000, page 26 and follows.

[12] Blume, L., D. Rubinfeld, and P. Shapiro (1984), 'The Taking of Law: When Should Compensation be Paid?' *Quarterly Journal of Economics* 99: 71-92.

[13] Time-inconsistency arises when a policy that is optimal (from the point of view of the regulator) ex ante turns out not to be the optimal policy ex post. If the policymaker cannot commit to a policy, it may then find itself wanting to change its policy ex post (say, after a firm has made its investment decision), regardless of what it said ex ante. Such an approach to policy is said to be time-inconsistent.

43. The solution to the problem of time-inconsistency is for the regulator to take steps to either reduce its own discretion, or to reduce its incentive (ex post) to make use of its discretion in a time-inconsistent way. Obviously, if the regulator has not done so – and even more so if the regulator has acted in ways that can reasonably be interpreted as involving time-inconsistency – then efficient investments will be foregone.

44. To date, the CRIMP process has provided an assurance against time-inconsistent behaviour in respect of assets approved under the procedures it sets down. It has thereby provided a credible framework for above-rail operators to take their own asset management decisions, knowing the broader investment context in which competition will occur. Retroactive overriding of previous CRIMP outcomes, and its associated asset stranding, would produce "demoralisation costs" that would merely increase the required risk premium in future periods; it is readily shown that the resulting social welfare losses can be large, especially where future demand for services is likely to grow.[14]

45. In its draft decision, the QCA discusses the issue of thus stranding parts of the existing regulated asset base (RAB) as if the relevant consequences were entirely distributional. This is incorrect, as it would impose real efficiency costs: first, as it would necessarily undermine the effectiveness of the CRIMP process in future, requiring its replacement by the likely less efficient process in which it is the regulator that determines the desirability of investment; and second, because it would increase the risk premium on future investment, causing costs to rise. However, even seen purely through the lens of distribution, the QCA's presumption that it is preferable to protect PN's position is questionable.

46. In effect, PN entered the market in full knowledge of the relevant rules, including those aimed at ensuring efficient coordination in the supply chain. As a result, PN must be every bit as bound by those decisions as any other intermediary – to do otherwise would breach competitive neutrality.[15] Moreover, given its knowledge of the rules then in place, PN was in a position to insure against regulatory changes that adversely affected its position, both by deciding on the level and structure of its investment and by building whatever risk premium it felt was required into its charges. It is therefore appropriate for PN to bear the risk associated with its investment choices, all the more so as those choices were taken in the light of well-documented and clearly set out rules.

47. In short, the QCA should either retain the existing rules in place or – if it intends to amend them – do so prospectively rather than retroactively.

V Conclusions

48. The assets at issue in this decision were entered into the RAB through careful decision-making, including through the CRIMP process. Such processes have a well-established pedigree in the

[14] Levine, P., J. Stern and F. Trillas 2005, 'Utility Price Regulation and Time Inconsistency: Comparisons with Monetary Policy', *Oxford Economic Papers*, 57(3), pp. 447–478.

[15] Of course, from a theoretical perspective, competitive neutrality is not a goal in itself, but one aspect of the wider pursuit of efficiency, to be pursued to the extent to which it is consistent with that wider objective. However, since the efficient industry structure is not known or knowable a priori, avoiding distortions to the allocation of output as between competing sources of supply is generally a sensible objective of policy. And in this case, efficiency and competitive neutrality coincide.

economics: they serve to coordinate vertically separate supply chains and serve as a 'real world' mechanism for making efficient supply decisions in the case of quasi-public goods. As well as reducing the risks of regulatory error as to the desired level of supply, they also provide a safeguard against time-inconsistent regulation, thus reducing the required risk premium.

49. There is no efficiency case for over-riding these mechanisms, and a clear efficiency case for not doing so. Retroactive changes are likely to be especially costly, as the uninsurable costs they inflict must damage end-users in the long run, as the required risk premium rises. In this specific instance, QR National was presumably entitled to take above-rail investment decisions in reliance on the QCA's commitment to those mechanisms and indeed did so. As a result, were the QCA to decide it intended to change the CRIMP process, it should only do so prospectively.

50. Instead, a retroactive decision would inflict losses on QR National while conferring a windfall on PN. This would reward investment in trying to upset the established rules merely so as to redistribute income towards oneself. That kind of investment is a pure social loss, and additionally, inflicts efficiency losses by increasing uncertainty.

51. Finally, it is incorrect to think merely decentralising the traction decision will lead to efficient outcomes. To begin with, average cost pricing in the presence of decreasing average costs makes it likely the cost curve cuts the demand curve at two points, one with high and one with low unit costs. Even with fully symmetric consumers, there is nothing that ensures the efficient outcome will prevail. In the small numbers case, the risks are compounded by the incentives for strategic behaviour. Simply put, PN has an incentive to both avoid costs itself and increase the costs borne by QR National; that incentive can lead it to select a technology that has higher unit costs, so long as the adverse impact on its rival (through the average cost pricing mechanism) outweighs the cost increase it incurs. That PN enjoys the option of shifting to electric traction should avoidable costs of diesel traction rise relative to those of electric traction only strengthens that incentive.

52. In terms of dealing with these risks of inefficiency, the standard economic approach would require that all end-users share in the joint and common costs of the assets whose commissioning they approved. Any other allocation of those costs is inconsistent both with the conventional theory of collective decision-making about public and quasi-public goods and with models of cost sharing in cooperative game theory.[16] It is also inconsistent with competitive neutrality. Moreover, departing from that approach will undermine the incentives for users to truthfully reveal their preferences in mechanisms such as CRIMP. In other words, for any such process to operate efficiently, users should face a cost imputation that fully reflects the cost consequences of their collective decision.

53. Of course, users of electric traction should bear the avoidable costs that use involves. As a result, any charge specifically related to use of electric traction should cover the entirety of those avoidable costs. However, the joint and common costs should fall on all users involved in

[16] The standard approach would be to compute a Shapley value; with symmetric users, this will impute the costs equally – see Hervé Moulin (2004) Fair Division and Collective Welfare, The MIT Press, pages 139-209.

the decision-making process, and by doing so, will help ensure competitive neutrality and that both the marginal and total test for efficient capacity expansion are met.[17]

[17] Of course, as Wicksell noted, any requirement short of unanimity in a collective voting process may lead to decisions that are inefficient. Equally, if cost shares do not reflect Lindhal prices, some inefficiency is inevitable. But that is the unavoidable consequence of information asymmetries, and as Buchanan notes, collective choice mechanisms (which he refers to as 'fiscal constitutions') are still likely to do better over time than decision by fiat – Buchanan, op. cit,. page 142 and follows.

Attachment 1: The background and issues

(b) Some history – Initial electrification of Goonyella and Blackwater systems

The first rail line into the Bowen Basin was built from Bowen to Collinsville in the early 1920s soon after the first geological survey of the area. By the 1940s several coal mines were in operation at Collinsville, Callide and Clermont. In this period, nearly half of total Queensland coal production was used as fuel for steam locomotives. From the 1950s, Queensland Rail (QR) switched from steam to diesel locomotives. In 1968, a heavy-haul rail line opened connecting the Moura mine to Gladstone. And in 1971, another heavy-haul line was built from the port at Hay Point (Mackay) to the coalfields atGoonyella. Several more new branch lines were opened through the 1970s and early 1980s as new mines were developed.

The initial electrification of the Goonyella and Blackwater coal rail systems occurred in the mid-1980s, primarily in response to the oil shocks of the 1970s, which raised the cost of diesel fuel, and then the coal boom of the early 1980s, which raised export demand and necessitated increased haulage volumes. The newer electric locomotives had higher haulage capacity, which allowed for heavier trains and improved transit times per tonne.At the time, Queensland Rail was a wholly state government-owned, vertically integrated monopoly. Hence, the capital cost of the initial electrification of the Goonyella-Blackwater system was publicly funded.

In 1993, the Hilmer Report into a National Competition Policy was released and within four years the QCA was established (in 1997) to bring to life the Hilmer recommendations in Queensland. In 1999, Queensland Rail submitted its first Draft Access Undertaking, which was subsequently not approved by the QCA.

Meanwhile, through the 1990s and the 2000s, the intended full electrification of the Blackwater system was never completed. Today, by usage, the Blackwater system operates as a mixed diesel (55%)/electric (45%) system, although 82 per cent of the track is electrified (807km of the 985km)[18]. This mixed locomotive arrangement somewhat constrains capacity utilisation on the Blackwater system due to the different operating characteristics of diesel and electric locomotives.For instance, the need to re-fuel diesel locomotives increases congestion on the network, thus delaying electric locomotives.

(c) 2001 Access Undertaking

The economic regulation of rail operator access to the central Queensland coal rail network began with the 2001 Access Undertaking, which had been subject to negotiation with the QCA since the initial QR draft in 1999. This first access undertaking came into effect on 20 December 2001 and applied to the QR coal rail network until the 2006 Access Undertaking came into effect on 30 June 2006.

[18] *Working Paper 4.5 Rationale for Power Systems Upgrade in the Blackwater System,*A Coal Rail Infrastructure Master Plan Working Paper, QR Network, March 2009. Diesel/Electric shares are calculated based on the number of Train Consists; see table on p.11 of Working Paper.

The terms of the 2001 Undertaking established the pricing principles that QR (and, later, QR Network) would operate within. The key constraints on QR/QRN's pricing arrangements were as follows:

- QR/QRNwould be entitled to earn revenue sufficient to achieve full recovery of efficient costs, including an adequate rate of return on the value of assets.
- QR/QRNwould not be able to differentiate Access Charges between Access Seekers or between Access Seekers and Access Holders for the purpose of adversely affecting competition within a relevant market (including for the purpose of preventing or hindering Access).
- Price limits would apply in respect to Access Charges to be established for each individual Train Service. In particular, the relevant Access Charge:

  (i) *will not fall below the level that will recover the expected Incremental Cost of providing Access for the Individual Train Service* (broadly, the SRMC); and

  (ii) *will not exceed the level that will recover the expected Stand Alone Cost of providing Access for the Individual Train Service*(which has been interpreted as the LRMC or unitised Average Cost, which will be the same *at ideal scale*).

(d) 2006 Access Undertaking – Customer vote on electrification expansion in Blackwater

QR's 2006Access Undertaking provided for the Authority to pre-approve the scope of its future capital expenditure in the central Queensland coal region if the nature of the works wasdetailed in QR's Coal Rail Infrastructure Master Plan (CRIMP) and if at least 60 per cent of affected customers did not oppose the scope of the works.

The QCA pre-approved the scope of 20 major capacity expansion projects, totalling $583 million over the period 2006-07 to 2008-09, that were submitted to it by QR on 14 November 2006. Of this total, $203 million related to duplications (with electrification) in the Blackwater system (see table below).

Table 1 Pre-approved Blackwater projects, 2006 Access Undertaking CRIMP

Pre-Approved Blackwater Project	Estimated Cost ($m)
Bluff – Blackwater duplication	59
Blackwater – Burngrove duplication	43
Aroona – Duaringa duplication	35
Westwood – Wycarbah duplication	34
Power System Strengthening (Raglan Substation)	16
Yan-Yan Passing Loop	13
Power System Strengthening at Rangal	3
Total Pre-Approved Projects	203

(e) 2008 Access Undertaking – Customer Vote on electrification expansion in Blackwater

As part of the 2008 Access Undertaking, the QCA pre-approved the scope of 17 capacity expansion projects in the central Queensland coal region submitted by QR Network to customers for a vote.

The Blackwater system electrification project accounted for $260 million in approvals, including $140 million in mainline duplications (including electrification) and $120 million for power system upgrades (see table below).

Following a successful customer voting process (whereby at least 60 per cent of customers did not oppose the scope of works), in December 2008 QR Network sought pre-approval from the Authority for the scope of $707 million of capital expenditure projects expected to be commissioned by 2012. The QCA approved QR Network's application on 23 April 2009 on the basis that QR Network had complied with the relevant requirements of its access undertaking.

The approval of this expenditure means that this capital is subsequently rolled into Blackwater's RAB, and QR Network can recoup this investment from customers according to the well-established pricing principles set out in the 2001 Access Undertaking and in subsequent undertakings.

Table 2 Pre-approved Blackwater projects, 2008 Access Undertaking CRIMP

Pre-Approved Blackwater Project	Estimated Cost ($m)
Blackwater Mainline Duplication:	220
- Kabra-Gracemere	
- Stanwell-Kabra	
- Dingo-Umolo	
- Walton-Parnabel-Omolo	
- Rocklands-Gracemere	
- Walton-Bluff	
Blackwater Power System Upgrade	120
Total Pre-Approved Projects	340

(f) 2010 Access Undertaking – WICET expansion

QR Network's 2010 Access Undertaking came into effect on 1 October 2010 and is due to expire in 2013. Under the 2010 Undertaking, on 19 May 2011 the QCA pre-approved the scope of nine customer-supported projects worth $350 million (included in QR Network's 2010 master plan for the Central Queensland Coal Region). The customer voting process on the 2010 Master Plan was completed in February 2011. Of the $350 million in pre-approved projects, none were related to the Blackwater system (almost all by number and value were related to the Goonyella system). However, an initial $24 million was allocated to commence work on a pre-feasibility study and a new feeder station to support the Wiggins Island Coal Export Terminal (WICET).

This decision gives some urgency to the questions dealt with in these proceedings, as operators and end customers are about to make decisions about whether to invest in diesel or electric locomotives for running services into Wiggins Island Coal Export Terminal (WICET).

(g) Impact of current pricing principles and tariffs on traction choice

The current pricing model for electric traction provides for the Blackwater and Goonyella systems being treated as separate systems, with the electric traction assets (poles and wires) priced

separately from the track asset, and only charged to actual electric locomotive hauled trains under the AT5 tariff structure for each system.

The AT5 tariff is an average cost measure that includes the total fixed and maintenance costs of electrification assets (separately) in the Blackwater and Goonyella systems and is derived from an *ex ante* estimate of total tonnes of coal hauled by electric locomotives. Because the AT5 tariff is an average cost (that is, it is based on unitised total costs), if electric locomotive use falls (rises), the AT5 tariff rises (falls).

In addition, there is an EC charge that covers the actual power consumption and the costs that QR Network incurs in buying power from the state grid (from Powerlink). This EC charge forms part of the avoidable costs of operating electric locomotives.

Under current conditions, it has been more efficient for above-rail operators to run all train services in the Goonyella system using electric locomotives. This is due to two factors in addition to the fact that Goonyella can be, potentially, 100 per cent electric. First, using only electric locomotives avoids introducing congestion into the Goonyella system resulting from electric and diesel locomotives having different performance characteristics (e.g. diesel locomotives need to stop and refuel). Second, the operating cost differential between diesel and electric is considerably wider in Goonyella, mainly because the AT5 electric access charge (for the use of electric capital) is significantly lower in the Goonyella system ($1.95 per egtk) than in the Blackwater system ($4.53 per egtk) as a result of higher electric utilisation in the Goonyella system and a more depreciated asset base.

In the event that buffer capacity is required for Goonyella, electric locomotives can be diverted from Blackwater, allowing the maintenance of the 100 per cent electric traction on Goonyella. Any shortfall in capacity on Blackwater resulting from this switching is managed through reserve diesel traction on that system (which can be managed jointly with the adjoining diesel-only Moura system). Consequently, backup capacity for Goonyella is effectively held in the form of diesel capacity on the Blackwater/Moura systems.

(h) The issue

The result of the current tariff structure is that, in the Blackwater system, track operators are choosing to use the cheaper diesel locomotives, which is driving average electric costs ever higher. This means that it is unlikely that QR Network will be able to recover its electrification capital costs in the Blackwater system, despite this capital expenditure being voted for in the access undertaking process.

Starting with the essential pricing principle that prudent and efficient capital expenditure has to be recovered and this should be done in the least distorting way, it is a given that the electrification capital costs in the Blackwater system (and Goonyella for that matter) are prudent as they were pre-approved by the QCA following a vote of the users in 2006 and 2008 (discussed above).

But a problem remains and that is that within the declared (hence, by definition monopoly) service there are two substitute services - diesel and electric traction, priced separately and competing such that the electric infrastructure is at risk of bypass and, as a result, asset stranding.

The traction energy for electric trains is supplied by the below rail service (QR Network) while the traction energy for diesel trains is supplied by an on-train diesel generator that forms part of the above rail service. Hence, one source of energy is regulated, while the other is not. By declaring two substitute services, but only regulating part of one (diesel regulation is limited to the track only, not the energy supply infrastructure), there is an intrinsic tension set up when assessing the efficiency of pricing on the basis of below rail efficiency only (as the QCA's Draft Decision does).

QR Network highlighted this problem to the QCA in its 2009 Draft Access Undertaking. In its September 2008 submission supporting the 2009 DAU, QR Network argued that the new electric infrastructure investment in Blackwater would increase the total RAB by 200 per cent but demand for electric services (in egtk) was only forecast to increase by 42 per cent. At the time, QR Network said the resulting increase in the AT5 electric infrastructure tariff for Blackwater was inequitable, and the pricing structure for electric infrastructure was inefficient.

(i) Pacific National

Pacific National entered the above-rail haulage market for Central Queensland coal in competition to QR National in early 2009 (announced in late 2008). Pacific National decided, in mid-2010, to order a significant number of diesel locomotives additional to its fleet at the time, many of which have been or are intended to be used for its Blackwater customers' hauls. The unexpected decision by Pacific National not to use electric traction for its Blackwater customers came after the 2009 pre-approval of the Blackwater power system upgrades and QR Network's consequent commitment to this investment.

(j) AT5 Tariff

As a result of these developments the AT5 + EC tariff in the Blackwater system is equivalent to, or exceeds, the cost to operators of running diesel locomotives (that is, the tariff is above the stand-alone cost of running diesel). This has created a cost recovery issue for QR Network's recent investments in the Blackwater system electric infrastructure. AT5 is currently the only available tariff element with which to recover this capital cost. Diesel train operators are not liable to pay AT5 because they do not use electric infrastructure.

Therefore, the asset stranding risks are significant for both the rail manager (if operators choose to use diesel) and the rail operators (if contracts using electric locomotives are subsequently lost and there is limited ability to deploy electric locomotives elsewhere).

As has been previously argued by QR Network, based on an overall economic assessment, electrification is viable once a critical traffic volume is achieved and sustained; but that key issues of locomotive fleet deployment, implementation lead-times, and having appropriate pricing arrangements that address stranding risks (for both the rail infrastructure owner and the train operator), are critical considerations that need to be adequately addressed.

(k) 2012 DAAU – a combined Goonyella-Blackwater AT5 tariff

In its 2012 DAAU, QR Network proposed a single AT5 tariff be applied across the whole Goonyella-Blackwater network and that users be charged the electric traction tariff even if they used a diesel locomotive where it was feasible to use an electric locomotive (at 90% of the time). A related

proposed change was to cap the increase in the AT5 charge at 5% per year to provide long-term price certainty to users. Under this approach, the network would presumably respond to the pricing structure by moving towards electric locomotives, whilst keeping some diesel capacity (mainly as a buffer) to maintain total network efficiency.

This network-wide approach to pricing of electric traction was initially proposed by QR Network in the development of the 2010 Access Undertaking. The proposal was not accepted by the QCA at that time on the basis that:

- the QCA considered it was incongruous that the investment could be efficient and required, yet at the same time need to be combined with the Goonyella system asset base in order to reduce the price effect of the investment;
- the QCA did not accept the assertion that combining tariffs for the two systems was necessary for QR Network to invest in electric infrastructure in Blackwater; and
- the QCA accepted that heavier utilisation of Goonyella electric assets tends to result in lower prices relative to Blackwater. However, it noted that this was also true for track infrastructure, yet there was no proposal from QR Network to amalgamate those non-electric assets.

(I) The QCA Draft Decision on the DAAU

This paper comments on aspects of the Queensland Competition Authority's Draft Decision in respect of the DAAU submitted by QR Network in December 2011. That DAAU proposed to amend the pricing arrangements for electric traction services (the AT5 tariff) in the approved 2010 access undertaking.

The QCA decision criteria are described in the Box below.

The QCA is required to consider QR Networks DAAU in accordance with section 142 of the QCA Act, and either approve, or refuse to approve, it.

Section 143(2) of the QCA Act provides that the Authority may approve a DAAU only if it considers it appropriate to do so having regard to the matters mentioned in section 138(2).

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

a) the object of Part 5 of the QCA Act, which is: to promote the economically efficient operation of, use of and investment in, significant infrastructure by which services are provided, with the effect of promoting effective competition in upstream and downstream markets (s. 69E).

b) the legitimate business interests of the owner or operator of the service;

c) if the owner and operator are different entities, the legitimate business interests of the operator of the service;

d) the public interest, including the public interest in having competition in markets (whether or not in Australia);

e) the interests of persons who may seek access to the service;

f) the effect of excluding existing assets for pricing purposes;

g) the pricing principles in s. 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 commensurate with the regulatory and commercial risks involved;

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

(iii) not allow a related access provider to set terms and conditions that discriminate in favour of the downstream operations of the access provider, except to the extent the cost of providing access to other operators is higher; and

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

h) any other issues the Authority considers relevant.

Section 138(3) of the QCA Act provides, among other things, that the Authority may approve the DAAU only if it is satisfied the proposed undertaking:

a) is consistent with any access code for the service; and

b) is not inconsistent with a ruling relating to the service that is in effect under division 7A of Part 5 of the QCA Act.

Based on its interpretation of the requirements under the Act, the QCA rejected QR Network's DAAU arguments, as follows:

The Authority shares many of the above concerns expressed by the stakeholders. The Authority is not convinced the DAAU is consistent with the objects clause of the access regime set out in Part 5 of the QCA Act. The Authority is not convinced that electric traction is more efficient than diesel traction and considers that QR Network has not made a compelling case that there are buffer fleet spill-over effects. The Authority considers the DAAU would over-signal the benefits of investment in electric traction. The Authority also considers the DAAU could reduce rivalrous behaviour between competing train operators and could discourage future entry in the above-rail market. It is therefore not evident on the information provided to the Authority that QR Network's proposal would promote the economically efficient operation of, use of and investment in the below-rail infrastructure in central Queensland and effective competition in upstream and downstream markets.

The Authority also shares stakeholders' concerns that the DAAU seeks to change regulatory principles that would undermine current as well as future mining activity and, by adversely affecting competition in the above-rail market, could add to rail transport costs and adversely affect efficiency and service delivery into the future.

For the reasons set out in more detail in this chapter, the Authority does not consider that the DAAU is consistent with the interests of access seekers and holders or the public, or with the pricing principles in the QCA Act.

The Authority, therefore, proposes not to approve the AT5 DAAU.

Traction Working Group (TWG)

Meeting 3

10 May 2012

QR NATIONAL NETWORK

Agenda

1. Safety share	Cissy	5 mins
2. Confirm draft minutes from last meeting	Cissy	5 mins
3. Executive summary	Colin	5 mins
4. TCO model review and validation	Matt	15 mins
5. ‘Mutual Commitment’ discussion	Colin/All	50 mins
6. Agree actions and next steps	All	10 mins

Appendix - Historic & future drivers of AT5 in Blackwater

The objective of this TWG is to agree validation of TCO analysis and further discuss 'Mutual Commitment' option

- The QCA received significant number of comments from industry on the DAAU on 16 April, and is minded to allow the TWG process to continue
- QR Network proposes to work with the QCA and industry in validating the structure and assumptions underpinning the TCO analysis
- Individual TCO model sessions are proposed and will be conducted as soon as possible in order to assist our customers in validating our analysis
- The proposed 'Mutual Commitment' alternative to the DAAU will not adversely impact either Goonyella or Blackwater customers
- QR Network will work closely with each of our customers to ensure smooth transition to the proposed pricing structure
- QR Network has modelled a broad range of hypothetical and actual mines to determine economically viable investments in electric infrastructure

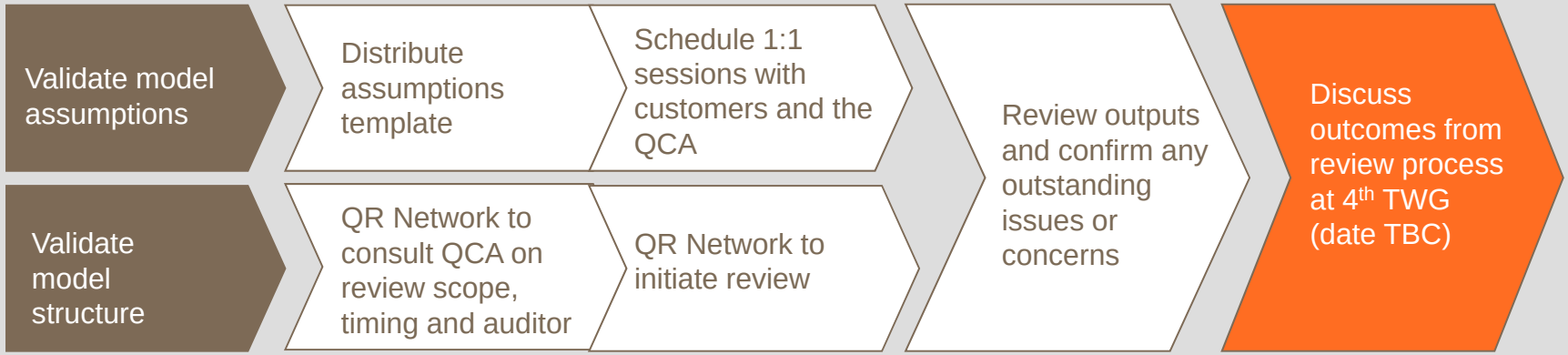
QR Network proposes to work with QCA and industry in validating structure and assumptions for TCO analysis

- The QCA will be consulted on an independent audit of the TCO model, including terms of reference and auditor
- QR Network and the QCA have agreed to run through the detail of the TCO model and assumptions in the near future
- QR Network would like to schedule 1:1 sessions with each of our customers to jointly validate:
  - Model structure
  - Above rail assumptions
  - Below rail assumptions
- QR Network will share the results of the independent audit and customer sessions at the next TWG

Individual TCO sessions are proposed to occur as soon as possible to assist our customers in validating our analysis

- QR Network will make the TCO model available to Industry under confidence and on-site within QR Network, with all commercially sensitive information for other hauls redacted
  - *Due to the material risk that commercially sensitive information pertaining to above rail operators could be breached, participants in the 1:1 sessions will be asked to sign an appropriate confidentiality agreement*
- A blank template listing all of the relevant above rail assumption inputs will be distributed to customers prior to the 1:1 sessions
- QR Network will provide an overview of the model architecture and methodology and run the customer specific assumptions through the TCO model

TCO model validation process flow[1]



1. Engagement streams have been shown as running concurrently for simplicity, noting that timing dependant on the QCA and customers' availability

QR NATIONAL

Proposed ‘Mutual Commitment’ alternative will not adversely impact either Goonyella or Blackwater customers

Regulatory option[1]	1 Cross-system socialisation	2 Diesel rebate above minimum electric utilisation	3 5% cap on volatility of AT5 pricing	Transitional arrangements
Original DAAU	Yes	Combined Goonyella and Blackwater electric utilisation of 90%	Yes	Mentioned but not detailed
Mutual Commitment	No	Customer commitment to utilisation of electric paths on an independent system basis: • Goonyella 100% • Blackwater 90%	No: 5% cap replaced with QR Network commitment to an AT5 + EC price cap	Actively considering with detail to be agreed on a customer by customer basis[2]

1. *All regulatory options are subject to approval by the QCA*
2. *Most relevant to commitments entered into prior to the submission of the DAAU in Dec-11. Any transitional arrangements will be designed so as not to adversely impact other system users.*

QR NATIONAL

QR Network will work with each customer to ensure smooth transition to proposed pricing structure

System	Impact for **existing electric** users on **electrified** spurs	Impact for **existing diesel** users on **non-electrified** spurs	Impact for **new diesel** users on **electrified** mainlines, with commitments to diesel traction made:	
			Pre-DAAU	***Post-DAAU***
Goonyella	• No change to AT5 pricing regime • Commitment to 100% electric utilisation • AT5 + EC price cap	• Not applicable – 100% electric system	• Not applicable – 100% electric system	• Customers liable to pay AT5 on 100% of diesel GTK
Blackwater	• No change to AT5 pricing regime • Commitment to 90% electric utilisation • AT5 + EC price cap	• Existing non-electrified spurs considered feasible to electrify if system AT5 is reduced for all Blackwater customers after electrification	• Where transitional arrangements are considered, there will be no adverse pricing impact for other customers	• Customers liable to pay AT5 on diesel GTK over 10% threshold

Users of diesel traction on feasible electric paths will pay AT5 tariff above allowable threshold - Blackwater

Pricing impact for Access Holders operating on electrified spurs under:

- User commitment to 90% utlisation of feasible electric paths in **Blackwater**
- QR Network commitment to AT5+EC cap

Scenario A: Access Holder rails diesel
100% diesel traction (4x4100 DEL + 98 wagons = 2,747 MGTK)

- Diesel GTK = 2,747 MGTK (100% of 5mtpa)
- If FY14 AT5 = $2.90 / ‘000GTK and the Access Holder rails 100% diesel, they will be charged ~$7.97M per annum
- Allowable diesel GTK = 10% x 2,747 MGTK
- The Access Holder will be rebated 274.7 MGTK x $2.90 / ‘000GTK = $0.797M
- The net impact is an additional $7.17M in diesel haulage rates for this haul

Note: if transitional arrangements are negotiated with the Access Holder, it is proposed that the Access Holder will have the remaining 90% of AT5 deducted from their AT3 or AT4 rate.

Scenario B: Access Holder rails electric
100% electric traction (3x3800 EL + 98 wagons = 2,712 MGTK)

- Electric GTK = 2,712 MGTK (100% of 5mtpa)
- If FY14 AT5 = $2.90 / ‘000GTK, the Access Holder will be charged $7.87M per annum
- The Access Holder can rail up to 10% of allowable GTKs using diesel traction per annum
- The Access Holder will be rebated the AT5 charge up to the 10% threshold for diesel GTKs

.

Note: if transitional arrangements are negotiated with the Access Holder, QR Network will ensure that any recovery of the deferred AT5 revenue will not adversely impact other Blackwater customers

QR NATIONAL

Users of diesel traction on feasible electric paths pay AT5 tariff above allowable threshold - Goonyella

Pricing impact for Access Holders operating on electrified spurs under:

- User commitment to 100% utlisation of feasible electric paths in **Goonyella**
- QR Network commitment to AT5+EC cap

Scenario A: Access Holder rails diesel
100% diesel traction (4x4100 DEL + 120 wagons = 3,444 MGTK)

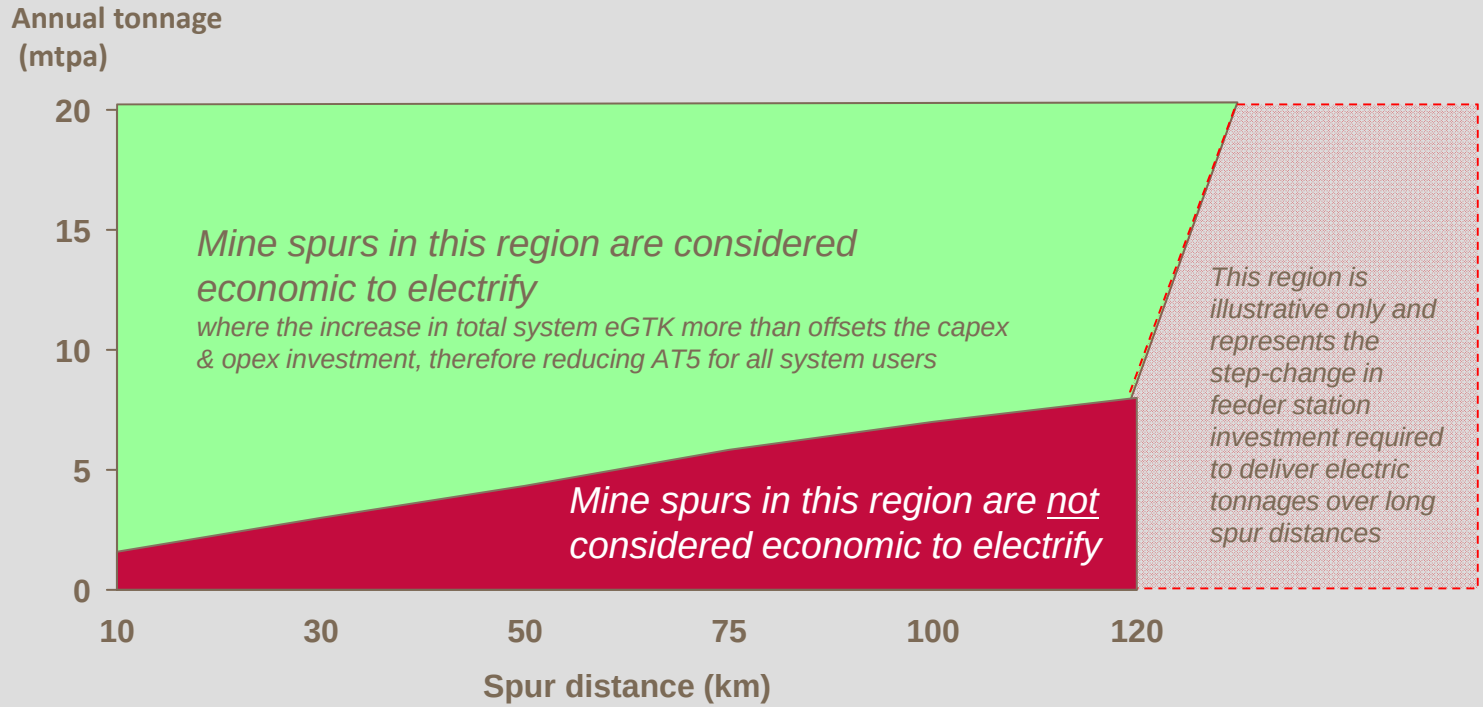
- Diesel GTK = 3,444 MGTK (100% of 7mtpa)
- FY14 AT5 = $2.90 / ‘000GTK and the Access Holder rails 100% diesel, they will be charged ~ $8.3M per annum
- Allowable diesel GTK = 0%
- The Access Holder will not be entitled to a rebate
- The net impact is an additional $8.3M in diesel haulage rates for this haul

Scenario B: Access Holder rails electric
100% electric traction (3x3800 EL + 120 wagons = 3,408 MGTK)

- Electric GTK = 3,408 MGTK (100% of 7mtpa)
- If FY14 AT5 = $2.41 / ‘000GTK, the Access Holder will be charged $8.3M per annum
- The Access Holder will not be entitled to rail any diesel GTK

A broad range of mines have been modelled to determine economically viable electric investments

Indicative threshold criteria for feasible electric paths in the Blackwater system[1]



1. See Appendix for detailed examples based on a series of hypothetical mines

QR NATIONAL

Agree actions and next steps

1. Confirm timing of individual customer TCO model review sessions
2. Meet with individual customers to confirm nature of any transitional arrangements
3. Confirm extending invitation to customers and other industry representatives not currently represented in TWG
4. Confirm next steps regarding engaging with the QCA
    - Independent TCO model audit and detailed 1-1 review with the QCA
    - Draft alternative DAAU including ‘Mutual Commitment’ for review by the TWG by 15 June
    - TWG to provide feedback to draft by 29 June
    - Target July for TWG agreed position

Historic and future drivers of AT5 in Blackwater (1/5)

Economic criteria for assessing the feasibility of creating electric paths for **existing** mines

Haul 1: >10mtpa and >50km spur

Haul distance - km	400		
Spur distance - km	100		
Feeder station units	0	1	1
Capex (Growth + Maint.) PV 2014 $m	0	138	138
Opex - PV 2014 $m	0	96	96
Haul electric	No	Yes	Yes
Spur electrified	No	Yes	Yes
Spur electrification in system RAB	No	Yes	No
RAB AT5 Tariff (2014) $/000 GTK	3.05	2.90	2.70
Non RAB Spur AT5 $/000 GTK	0	0	3.10
Total Haul AT5 (2014) $/000 GTK	3.05	2.90	5.73
Delta - from prior option $/000 GTK	0	-0.15	2.83
Economically viable?		**Yes**	**No**

Haul 2: <5mtpa and >50km spur

Haul distance - km	400		
Spur distance - km	100		
Feeder station units	0	1	1
Capex (Growth + Maint.) PV 2014 $m	0	141	141
Opex - PV 2014 $m	0	96	96
Haul electric	No	Yes	Yes
Spur electrified	No	Yes	Yes
Spur electrification in system RAB	No	Yes	No
RAB AT5 Tariff (2014) $/000 GTK	2.90	3.25	2.70
Non RAB Spur AT5 $/000 GTK	0	0	15.62
Total Haul AT5 (2014) $/000 GTK	2.90	3.25	18.32
Delta - from prior option $/000 GTK	0	0.35	15.07
Economically viable?		**No**	**No**

Spur line electrification assumptions:

- *Over head wiring (OHW) infrastructure development capex $0.7m per km*
- *OHW infrastructure maintenance capex $6682 per km per annum*
- *Feeder station infrastructure development capex $41.5m per unit*
- *Feeder station infrastructure maintenance capex $1.1m per unit per annum*
- *Feeder stations connection opex $6m per unit per annum*
- *Tax and Accounting straight line depreciation approach over 30 years with no residual*
- *Non RAB spur infrastructure WACC post tax nominal 10%, CPI 2.5%*

Historic and future drivers of AT5 in Blackwater (2/5)

Economic criteria for assessing the feasibility of creating electric paths for **new** mines

Haul 3: ~1.5 mtpa and ~10km spur

Haul distance - km	300		
Spur distance - km	10		
Feeder stations units	0	0	0
Capex (Growth + Maint.) PV 2014 $m	0	7.6	7.6
Opex - PV 2014 $m	0	0.8	0.8
Haul electric	No	Yes	Yes
Spur electrified	No	Yes	Yes
Spur electrification in system RAB	No	Yes	No
RAB AT5 Tariff (2014) $/000 GTK	2.93	2.92	2.78
Non RAB Spur AT5 $/000 GTK	0	0	1.03
Total Haul AT5 (2014) $/000 GTK	2.93	2.92	3.81
Delta - from prior option $/000 GTK	0	-0.01	0.89
Economically viable?		**Yes**	**No**

Haul 4: ~3.5 mtpa and ~7km spur

Haul distance – km	300		
Spur distance – km	7		
Feeder stations units	0	0	0
Capex (Growth + Maint.) PV 2014 $m	0	7.5	7.5
Opex - PV 2014 $m	0	0.6	0.6
Haul electric	No	Yes	Yes
Spur electrified	No	Yes	Yes
Spur electrification in system RAB	No	Yes	No
RAB AT5 Tariff (2014) $/000 GTK	2.90	2.79	2.78
Non RAB Spur AT5 $/000 GTK	0	0	0.49
Total Haul AT5 (2014) $/000 GTK	2.90	2.79	3.27
Delta - from prior option $/000 GTK	0	-0.11	0.48
Economically viable?		**Yes**	**No**

Spur line electrification assumptions:

- *Over head wiring (OHW) infrastructure development capex $0.7m per km*
- *OHW infrastructure maintenance capex $6682 per km per annum*
- *Feeder station infrastructure development capex $41.5m per unit*
- *Feeder station infrastructure maintenance capex $1.1m per unit per annum*
- *Feeder stations connection opex $6m per unit per annum*
- *Tax and Accounting straight line depreciation approach over 30 years with no residual*
- *Non RAB spur infrastructure WACC post tax nominal 10%, CPI 2.5%*

Historic and future drivers of AT5 in Blackwater (3/5)

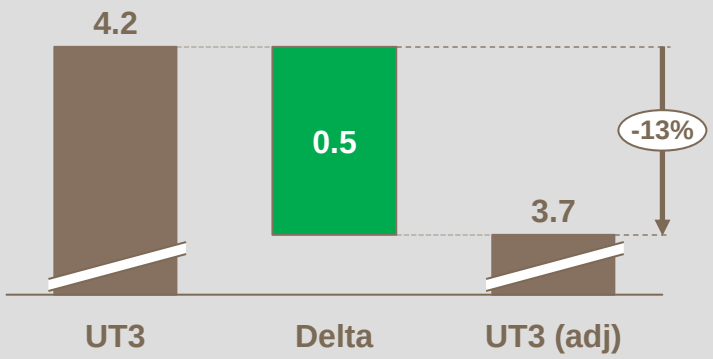
Adjustments to several key UT3 assumptions significantly improve the competitiveness of electric traction in Blackwater:

- 30 year straight line depreciation (increased from 20 years)
- $100m reduction in capital indicator (mainly due to deferral of renewals program)
- $6mpa reduction in Powerlink connection fees based on updated estimates from Powerlink

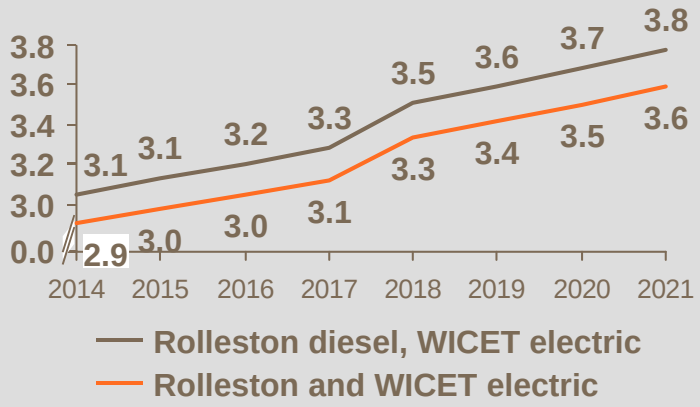
QR Network is prepared to commit to a cap on AT5 in Blackwater where users commit to utilising 90% of feasible electric paths

- Forecast AT5 paths based on stress-tested and conservative capex, opex and Powerlink connection costs
- AT5 cap will be linked to the level of customer commitment to minimum levels of electric utilisation along with variations in the price of diesel fuel

Blackwater AT5 adjustment (FY10, $/ '000gtk)



Forecast AT5 in Blackwater ($/ '000gtk)

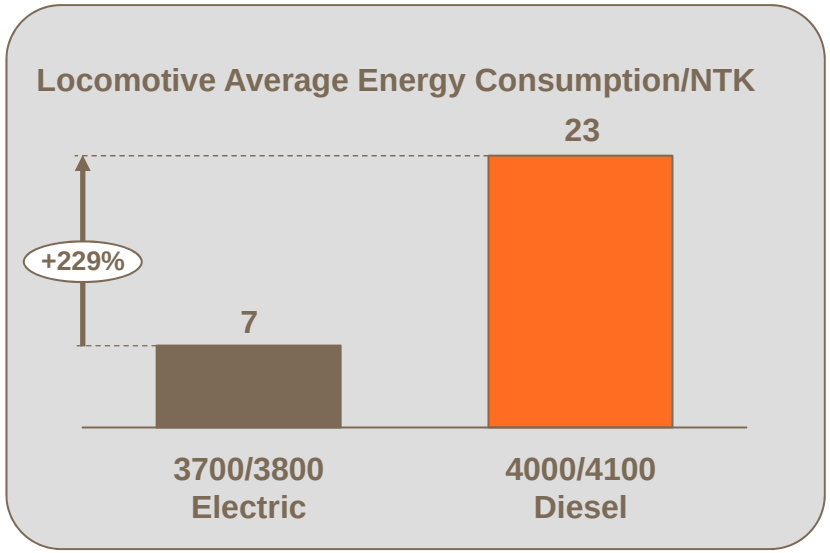


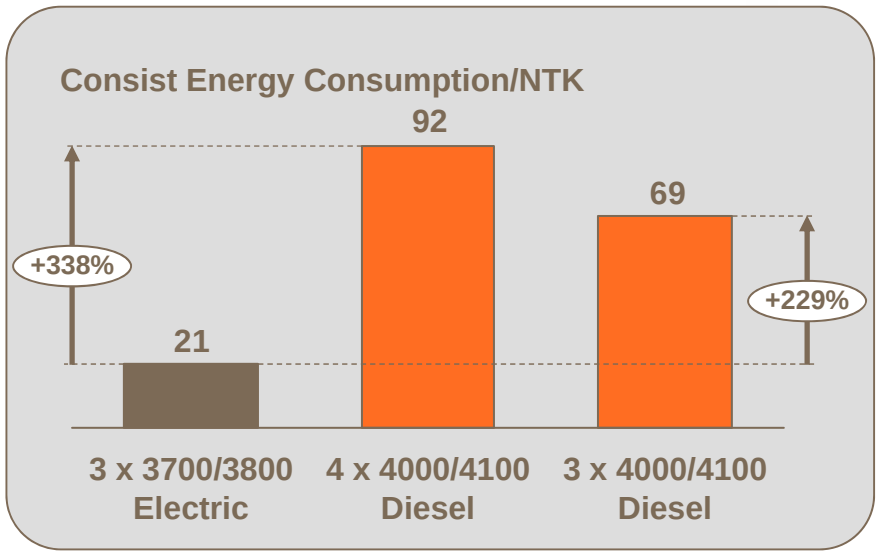
QR NATIONAL

Historic and future drivers of AT5 in Blackwater (4/5)

Significant investment in power system infrastructure to date allows the energy efficiency of electric locomotives to be realised by Blackwater and Goonyella customers

- QR National Engineering Services undertook a comparison of train services hauled between Blackwater and Yarwun
- Sample of all 88 individual journeys from14th of January 2012 to 29th of February 2012
- 30% of the input energy of the 4000/4100 diesel locomotive is applied at the traction motor output compared to 82% of input energy for a 3800 class locomotive



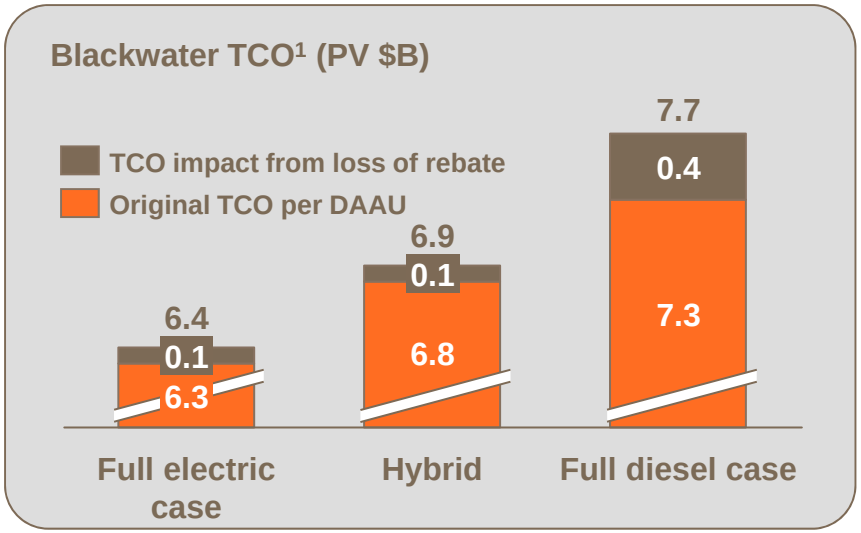


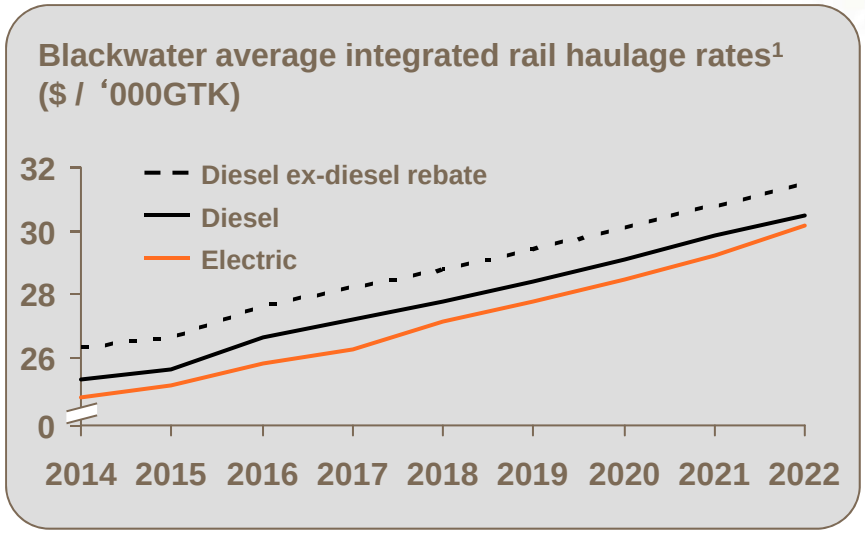
QR NATIONAL

Historic and future drivers of AT5 in Blackwater (5/5)

The second most significant driver of the difference in TCO between electric and diesel traction is the relative fuel burden of diesel versus electric traction

- In a scenario where the AUD$0.32 diesel fuel rebate was removed, the TCO for the full diesel case will increase by approximately $400m (PV, FY12) or $1.00 per ‘000 GTK (FY12)





1. Diesel rebate of $0.32 per litre is added to each years forecast diesel price

QR NATIONAL

Diesel versus Electric

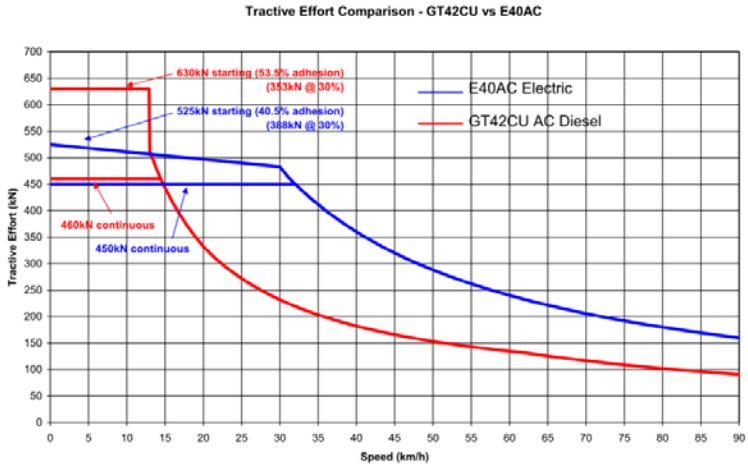
State of the art diesel and electric locomotives are based on very similar design principles. Both rely on electric traction integrated into the bogies and driven by similar traction converters. However the way the electric energy is provided to the electric traction system is very different. Some of the main characteristics of both types of locomotives are listed below with some facts around the systematic differences which need to be considered before deciding what locomotive type is most efficient for a given application.

Starting Tractive Effort

A high starting tractive effort is necessary for lifting a loaded train from stand still at a steep gradient.

The starting tractive effort of diesel and electric locomotives is limited by the mass (or weight) of locomotive. The maximum mass of the locomotives is defined by the capability of the below rail infrastructure.

Note: There is a small difference in the starting tractive effort between diesel and electric locomotives as can be seen in the below graph. Due to the small power output the Diesel loco traction system is optimised for (the theoretical) high starting tractive effort and low TE at speed. An electric loco maintains high TE at high speed and the nominal starting TE is therefore lower. However, for the dispatched load per loco the so called “dispatched adhesion” value is the determining figure. The electric loco provides sufficient starting TE to cope with the most daring dispatched adhesion calculations.



Continuous Tractive Effort

An ability to maintain continuous tractive effort is also necessary to ensure that the maximum amount of load can be hauled using the minimum number of locomotives.

The continuous tractive effort of diesel and electric locomotives are similar at low speeds. However, above 15-20 km/h they are different due to the amount of power available for each traction type. As more power is available to an electric locomotive (see comments below), the available tractive effort at higher speeds is considerably greater.

Average Speed / Acceleration

High average speed (and high acceleration in particular) is necessary to reduce headways, cycle times and generally to improve throughput without requiring investment in the below rail infrastructure.

Speed and acceleration of locomotives are defined by their maximum available power. Both electric and diesel locomotives have similar traction systems (main inverter – traction motor – gear box), therefore the maximum speed and acceleration characteristics of electric and diesel locomotives vary only by the way the electric power is generated and made available to the traction systems.

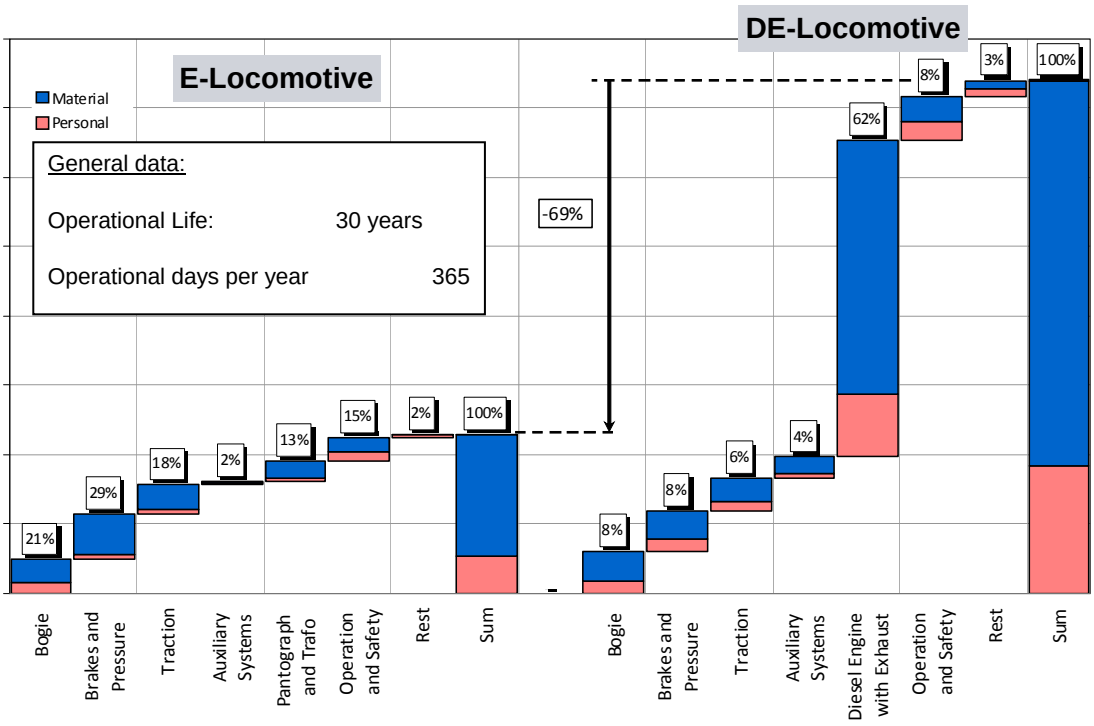
Available Power *Available power differs for electric and diesel locomotives due to their generation methods.*	
For electric locomotives, electric power is taken from the overhead and transformed to a suitable voltage using the traction transformer. As the amount of power is only limited by the power output of the power station (i.e. for this purpose this is unlimited), the electric power available to a electric locomotive is only limited to what the converters and traction motors can handle.	A diesel engine converts fossil fuel in rotating energy which is then converted into electric energy by a generator. The volume and maybe weight limitations in a locomotive and the limited power per volume ratio of diesel engines limits the maximum speed and acceleration of diesel locomotives to be always lower than on electric locomotives.
Note: The maximum speed of electric and diesel locos is often the same. However, when hauling a train the higher power output of the electric loco provides higher average speeds which means shorter cycle times and higher throughput.	Diesel trains slow the network down because of their power limitations. This could only be compensated by considerably more locos per given load (e.g. 5..6 diesels instead of 3 electrics).
Energy Consumption A comparison of energy consumption should always be based on primary energy and take processing and transport into consideration	
An inherent advantage of electric locomotives is their ability to regenerate electric energy while braking. Using this advanced technology energy consumption can be reduced by 10% to 30% depending on operational details (simulations can be used to investigate further). Note: 3700 and 3800 locomotives are already equipped with regenerative braking technology	Diesel locomotives can not use regenerative braking.
Energy Efficiency Having the similarity between Electric locomotives and Diesel locomotives in mind, a comparison of energy efficiency needs to focus on the whole chain of energy processing and transport.	
Coal Exploration: Unsure Power Plant: average of 38 % (peak and average) Electric distribution: 90% Main Inverter: 97% Traction Engines: 90% (average) Gear: 97% Average: 29%	Oil Exploration: unsure Transport to Australia: 95% Storing: 98% Refining: 90% Transport to provisioning facilities: 95% Storing: 99% Diesel Engine: 40% (optimal) 20% (average) Generator and Rectifier: 92% Main Inverter: 97% Traction Engines: 90% (average) Gear: 97% Average: 12% Note: Diesel Engines only achieve their maximal efficiency in a very narrow band of speed and torque. Outside this best spot the efficiency drops significantly, hence the low average

	efficiency
Primary Energy source	
Electric trains are exceptionally flexible regarding their source of energy. The primary energy source coal is securely available in Australia for the entire service life of the locomotives. While powered by aging coal fired power plants right now any future improvements will immediately benefit all existing electric locomotives. Through their 30 years service life modern filter technology will be introduced, efficency will increase by building new additional power plants or replacing existing ones. Any renewable energy will be used immediately in the electric train network.	The primary energy source of Diesel Trains is oil which is not sufficiently explored in Australia. There is a security risk in energy supply here. Prices are highly volatile and in average increase much faster than those of domestic primary energy sources. Availability can not be guaranteed for the entire life time of the equipment
Range	
The electric energy is drawn from the grid and therefore unlimited, no refuelling necessary	The amount of diesel fuel which a locomotive can carry is limited, so diesel locomotives need to be refuelled regularly, which leads to an additional downtime of about 5% of rolling stock involved. Additional infrastructure for refuelling (tank, filling infrastructure, personnel, training, environmental impacts, side roads, etc.) are to be considered.
Environmental Impacts	
Noise Electric locomotives have lower noise emissions	Diesel locomotives have higher noise emissions at the place of operation because of the diesel engine. Keep potential claims by residents in mind.
Exhaust gases Depending on the primary source of energy there might be emissions at the place of energy conversion at the power plant. This is usually outside residential areas, easy to control because of its large scale, existing and future improvements in filter technology ensures environmental impact of electric locomotives will be state of the art throughout the whole 30 years of lifetime.	Exhaust gases are released at the place of operation, sometimes in residential areas (). The emission levels of a diesel locomotive will not change throughout the lifetime of the locomotive. Improvements of diesel technology throughout the lifetime of the locomotive will not be utilized.
Hazardous materials Electric locos the main transformer oil and the converter cooling liquid. With reasonable maintenance those liquids hardly need replacement or top-ups. Apart from the savings in hazardous materials handling this provides extensive independency from oil product market.	Diesel locos carry at least two times the amount of mineral oil and need regular replacement and/or top-up. The amount of cooling liquid is at least ten times higher compared to an electric loco.

<table>
<tr><td>Energy Consumption</td><td></td></tr>
<tr><td>Higher efficiency & regenerative braking

+ Sustainability:
Use of local renewable energy is sustainable for the development of the mining business.

Brake energy regeneration:
• lower energy consumption, lower energy cost, less emissions
• Example coal traffic in Queensland, Australia: Energy regeneration for one Goonyella System round trip with 3 units E40AC + 124 wagons saves up to 4500 kWh (~1000 litres of fuel)
• Energy cost per ton kilometre will decrease accordingly.
• Saved CO_2 emissions per year and train 1740 t.</td><td></td></tr>
<tr><td colspan="2">Maintenance
There is no inherent difference of maintenance effort between electric and diesel locomotives for a low level inspection. However, electric locos often provide longer maintenance intervals and therefore have lower maintenance cost per gtkm from the start. The major differences are based on:</td></tr>
<tr><td>Main Transformer and high voltage components in electric locomotives are nearly maintenance free</td><td>Diesel engines require excessive maintenance about every eight years.
Ongoing maintenance of diesel engine, air filtering, exhaust, cooling plant, fuel tank etc., starter battery and alternator substantially increase maintenance cost of diesel locomotives over electric locomotives.</td></tr>
<tr><td colspan="2">As a result of huge cost of overhaul of diesel engines the overall lifetime maintenance cost is from 30% up to 70% cheaper for an electric locomotive than for a diesel locomotive (please see chart below).
Note: This figure is per loco and does not include the fact that a given haulage task requires more diesels than electrics.</td></tr>
<tr><td colspan="2">Flexibility for the Operator</td></tr>
<tr><td>Electric locomotives can be operated on electrified networks only</td><td>Diesel locomotives can be refuelled anywhere, even using mobile equipment.</td></tr>
<tr><td colspan="2"></td></tr>
</table>


E-Locomotive
DE-Locomotive
Material
Personal
General data:
Operational Life: 30 years
Operational days per year 365
-69%
21%
29%
18%
2%
13%
15%
2%
100%
8%
8%
6%
4%
62%
8%
3%
100%
Bogie
Brakes and Pressure
Traction
Auxiliary Systems
Pantograph and Trafo
Operation and Safety
Rest
Sum
Bogie
Brakes and Pressure
Traction
Auxiliary Systems
Diesel Engine with Exhaust
Operation and Safety
Rest
Sum

TRANSNET

delivering on our commitment *to you*

freight rail

Heavy Haul Operations in South Africa

IHHA 2011

Calgary, Canada

Willem Kuys, Transnet Freight Rail

19 June 2011

Presentation Outline

1	Heavy Haul in South Africa: Context
2	The Richards Bay Coal Export line
3	The Sishen – Saldanha Iron Ore Export line
4	Heavy Haul: Concluding Remarks

Presentation Outline

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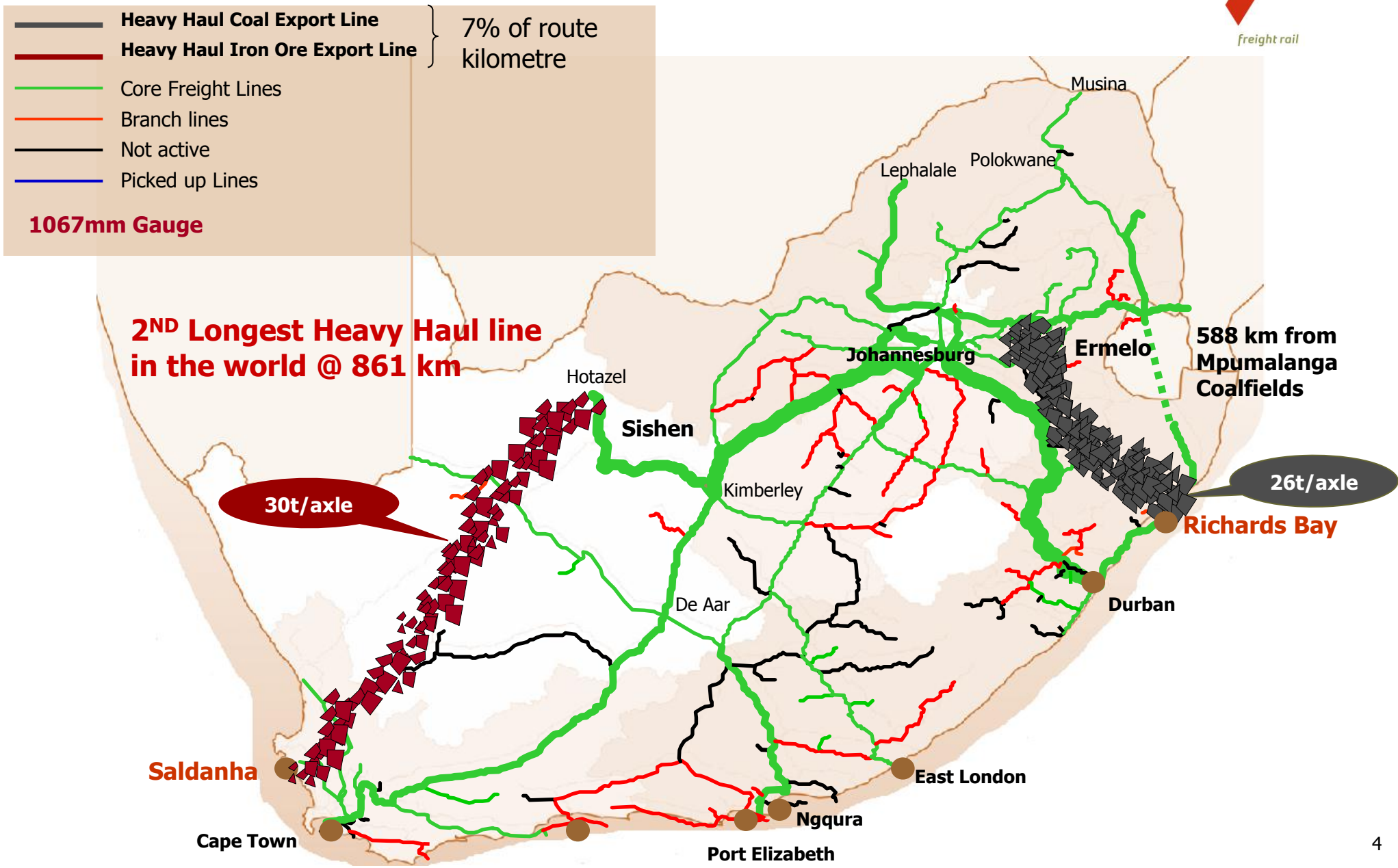
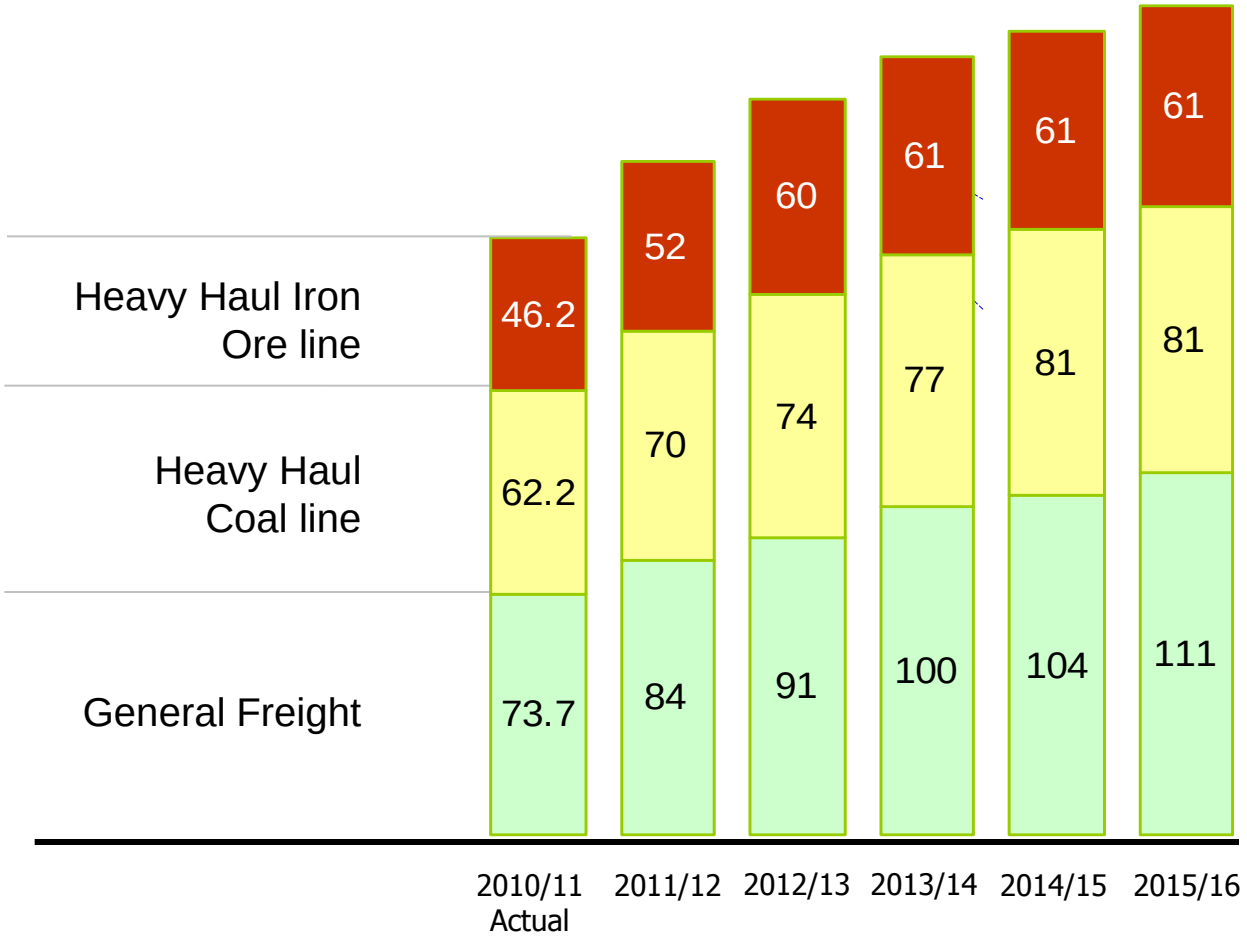
Transnet Freight Rail Network



Transnet Freight Rail: Projected Demand (Mt)



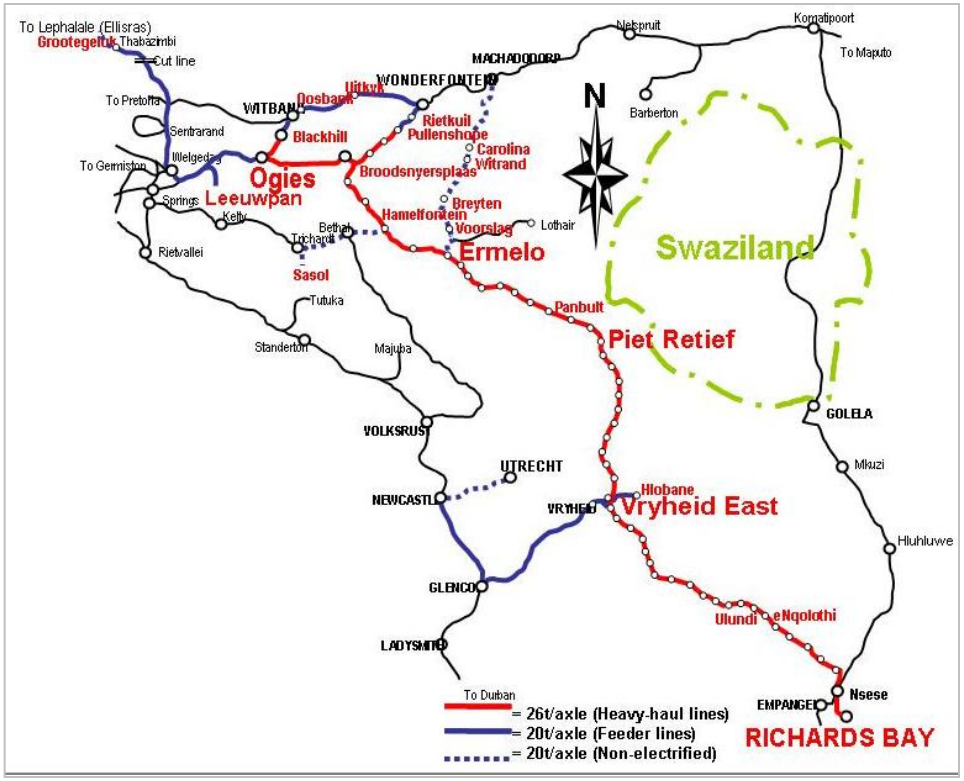
- 60% of Volumes generated from coal and iron ore exports
- Economic slowdown reduced volumes. Renewed effort to regain revenue and volumes to pre-slump levels
- Emphasis on General freight growth that is critical for viability
- Expansion programmes for export lines more conservative

Presentation Outline

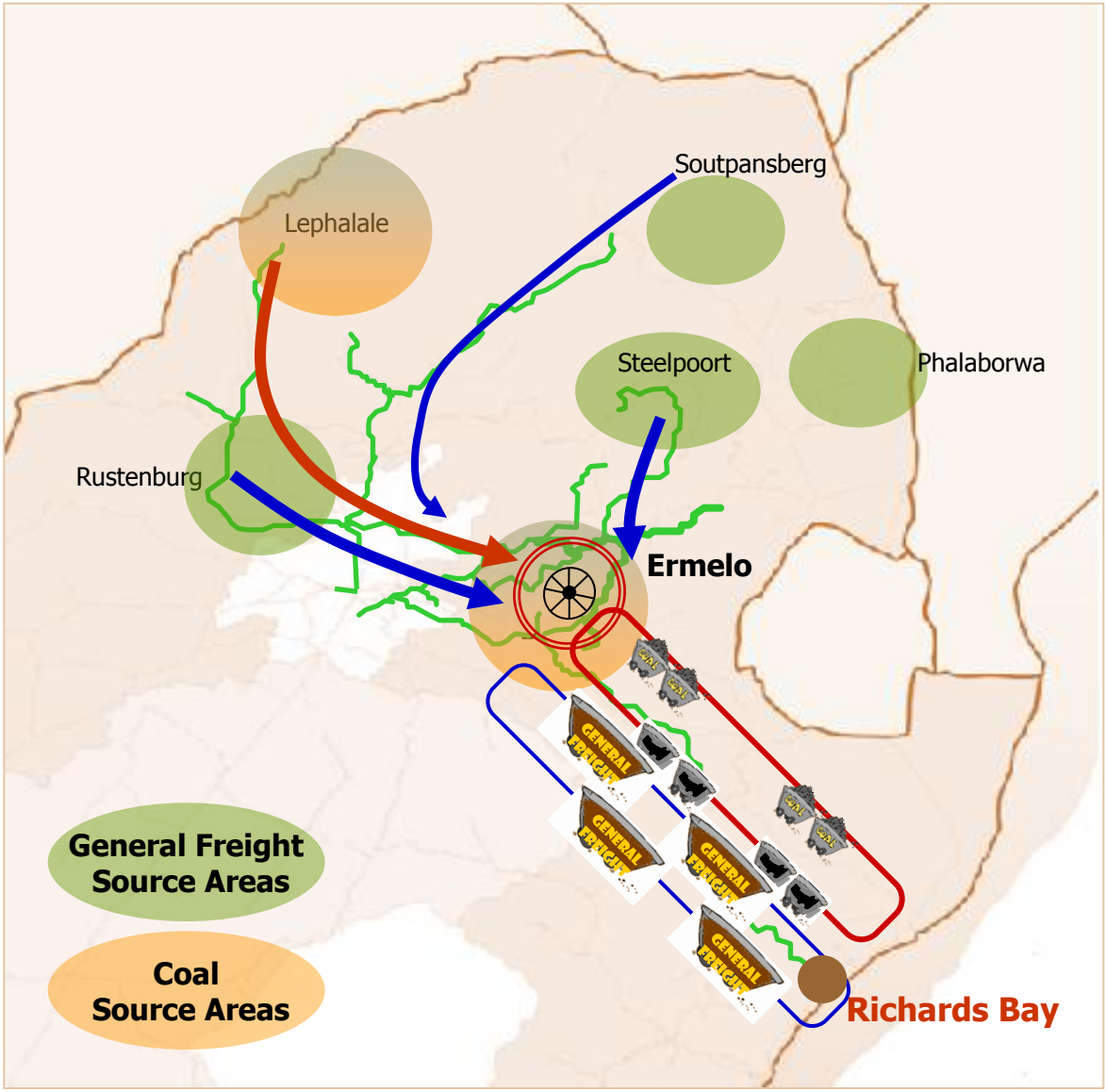
1	Heavy Haul in South Africa: Context
2	**The Richards Bay Coal Export line** o *Profile* o *Operating Philosophy* o *Technology* o *Expansion Programme*
3	The Sishen – Saldanha Iron Ore Export line
4	Heavy Haul: Concluding Remarks

The Coal Line: Profile

Distance	+/- 580km from Blackhill to Richards Bay
Topography	o Descends from 1700 meters altitude to sea level o Undulating topography and high rainfall
Axle loads	26 t/axle on heavy haul and some feeder lines
Ruling Gradient	1:100 North of Ermelo 1:160 for loaded trains South of Ermelo on one of the two tracks, and 1:66 for empties
Traction	3kV DC: North of Ermelo 25kV AC: South of Ermelo
Civil	137 bridges, 37 tunnels Overvaal tunnel = 4 km (single)
# of lines	Double, 3rd line on some feeder sections
Authorisation	Colour light signalling with CTC
Locomotives	o 7E/11E on AC, 10E on DC sections o 110 new AC/DC 19E in commissioning
Wagons	CCL gondola: max payload of 84 tons
Gross tons per train	22 000 tons at 2,2km in length
Volumes in 2010/11	62 mt export coal, 11 mt general freight
Capacity	74 mt export coal; 14 mt general freight
Competitiveness	Most affordable global coal transporter

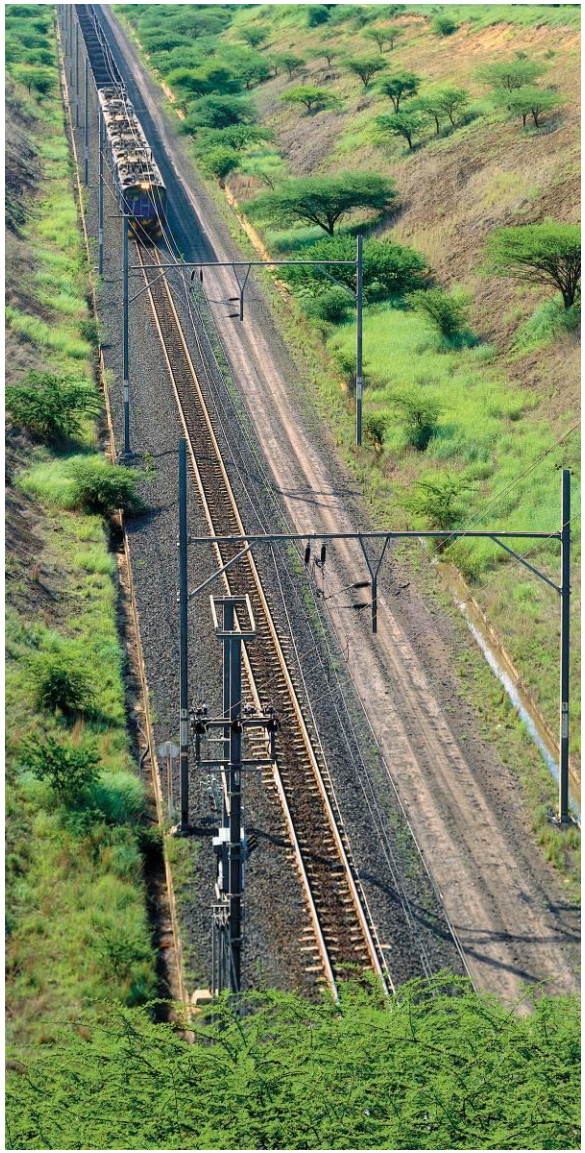


Coal line: Complexity of Operations



- **Operating Philosophy**
  - **100 wagon trains** on the feeder line ; train sets combined at Ermelo as **200 wagon trains** to RBCT
  - **Loaded coal trains** are run separately from general freight trains
  - Regular and evenly spaced weekly schedules to improve cycle times
- Richards Bay is developing as a **mega bulk port**
- Coal line is becoming a multi-product bulk export line
  - Coal export and general freight 'systems' evident
  - General freight potential in excess of 30mt
- General freight trains comply with **heavy haul philosophy**

Coal line: Technology



ECP/WDP

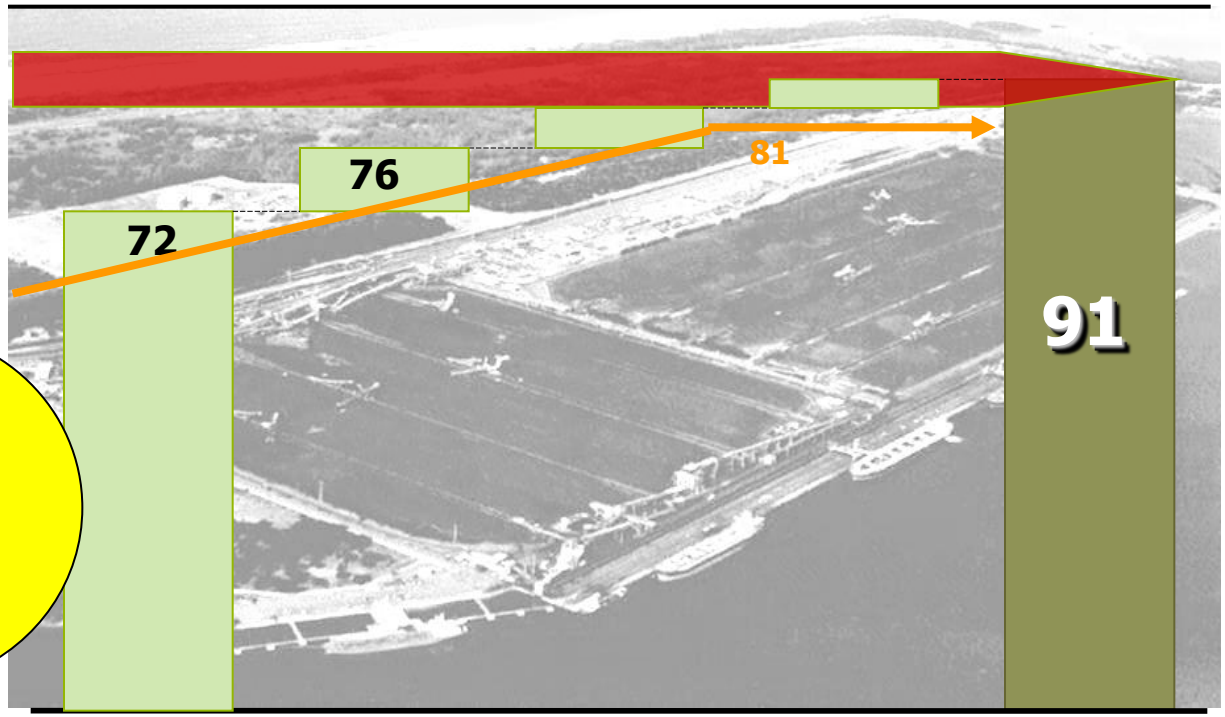
- Increases capacity: Higher speeds & improved braking
- Improves train handling - related derailments and train breaks
- Improves turnaround time
- Increase Safety margins

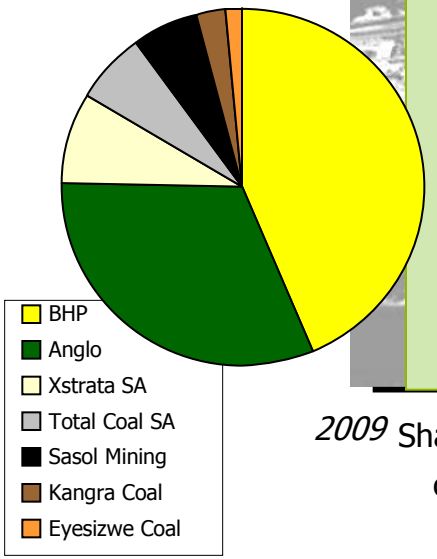
19 E AC/DC Locomotives

- Reduces cycle times in change over yards
- Improved energy efficiency of 18%
- Utilised on AD & DC powered sections or run through
- Increase reliability and availability of the locomotive fleet
- Freeing up of class 7E and 10E locomotive fleet to address the GFB growth requirement

The 19E AC/DC Locomotive

Expansion Plans (Mt p.a.) : Coal Stakeholders





% Volume of 72 Mt allocation

Mine capacity ramp-up | RBCT capacity | Rail capacity

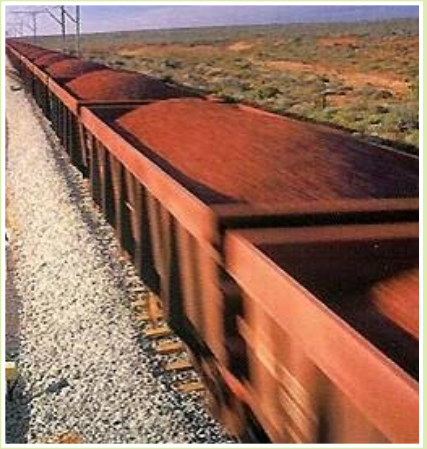
- RBCT 91mt expansion completed by end of 2009
- New capacity for new small entrants - accommodate broader spectrum of producers
- Rail capacity incrementally increased to 81mt
- Current volumes under potential of system
- Quantum rail expansion after 81mt

Coal Export line: Future Strategy

- 1067mm Gauge: Not a constraint as result of self-steering bogeys and rail/wheel management systems
- Focus currently on **Continuous Improvement,** system reconfiguration and **incremental** capacity expansion
- Investment in **Technology** only to maintain cost effectiveness and increase Safety
- Radical Transformation only **beyond 81mt** of export coal
  - Extension of the 'pipe' from 600km to 1200km
  - Increase in length of haul warrants review of **longer trains**
  - Elimination of infrastructure constraints such as **Overvaal Tunnel, cross over points.**
  - **No benefit** from further increase of axle loading beyond 26t/axle due to coal product density
  - **Wagon types** and off-loading technology (gondola vs. bottom-discharge)
- How to accommodate **small loaders**
  - New entrants and small loaders
  - Maintain the integrity of a heavy haul system
  - Consolidation yards
  - Broader economic participation

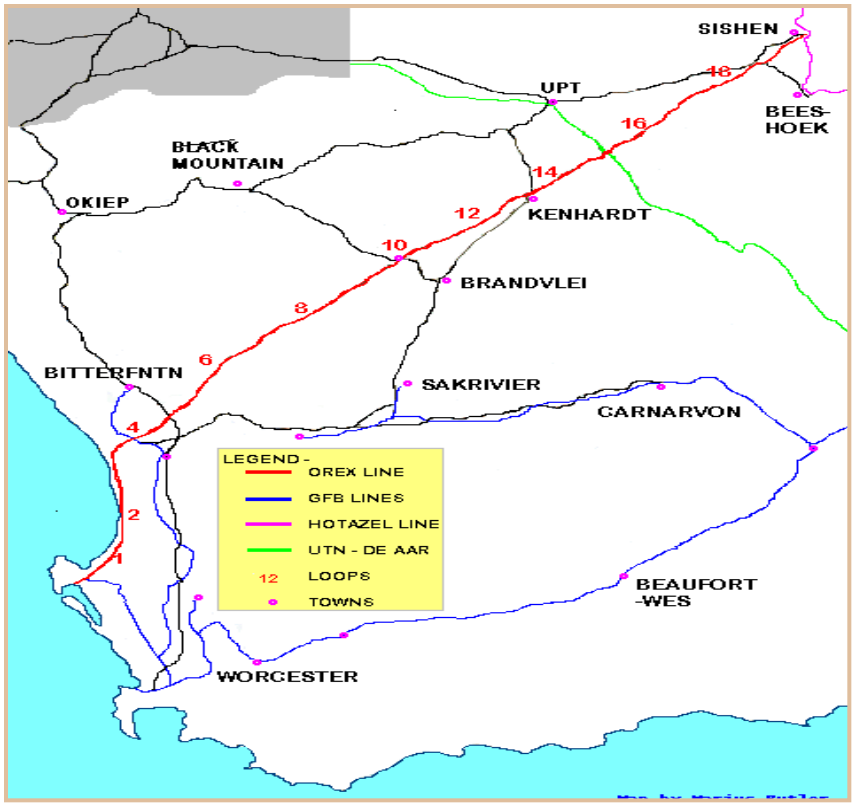
Presentation Outline

1	Heavy Haul in South Africa: Context
2	The Richards Bay Coal Export line
3	**The Sishen – Saldanha Iron Ore Export line** o *Profile* o *Expansion Strategy* o *Operating Philosophy and Resources* o *Maintenance* o *Technology* o *Future Strategy*
4	Heavy Haul: Concluding Remarks

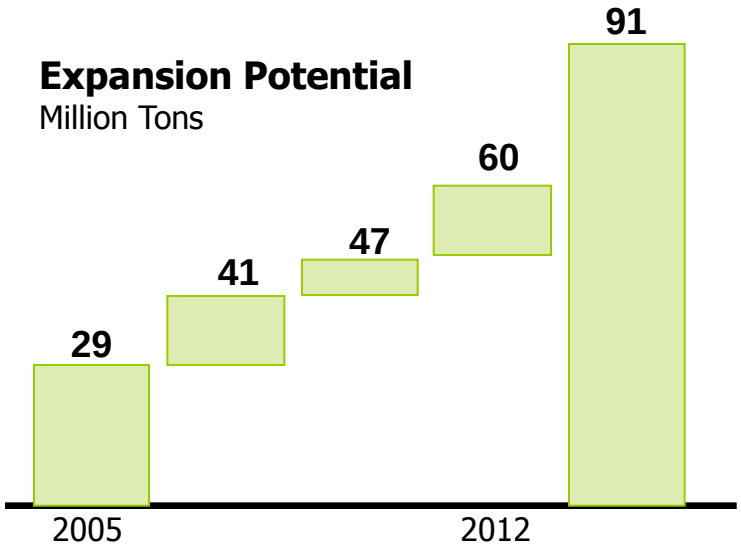


Iron Ore Line: Profile

Distance	861 km
Topography	Semi-desert, descending to the coast from 1 295 m above sea level at the Sishen mines.
Axle loads	Operated at 30 t/axle
Ruling Gradient	1:250 loaded trains 1:100 empty trains
Traction	50kV AC
Civil	Olifantsrivier Bridge
# of lines	Single line with crossing loops at 40km intervals
Train Authorisation	SIMS-S colour light signalling
Locomotives	oClass 9E and 34 Class Diesels oClass 15 E locomotives being commissioned
Wagons	CR type: max payload of **100** tons
Gross tons per train	41 000 tons @ 4km train length
Volumes in 2010/11	46 mt export iron ore, 1 mt general freight
Capacity	60 mt infrastructure capacity excl. power upgrades
Competitiveness	Longest heavy haul production trains in the world



Ore Line : Expansion Strategy



Due to the **long haul**, alternatives to increase capacity are:

- Increase train speeds
- Increase axle loads of wagons
- Increase the train lengths
- Additional crossing loops to run more trains at shorter intervals

Expansion Strategy adopted:

- Increase **axle loading** to operate at **30t/ axle**
  - Wagons: Upgrade to carry 100 tons & Component changes
  - Condition-based Infrastructure Maintenance
- Increase **train length** from **216 to 342** wagons *(Safety limit)*
  - RDP to improve Train handling /safety
  - More powerful Tractive effort
  - Infra Changes (terminals, loops & power)
- **Train Operating Philosophy**
- Beyond 60 mt: **Infrastructure quantum changes**

Iron Ore Line: Operating Philosophy

TRANSNET freight rail

1 **KUMBA/ASSMANG/BURK/Small loaders**
Loading Stations

Beeshoek

New Kolomela link

ERTS

Khumani

2 **Rail operations**
Train operations, Crews, Traffic Control, Per way, Communication, Signalling, Power supply, Infrastructure- and Rolling Stock maintenance
Haul distance of 860 km

System 1: Mines
System 2: Rail
System 3: Stockpile
System 4: Ship-loading

Halfweg – Re-manning of trains
Crew book off

Port Terminals
Tippler,
Stacking/Reclaiming

To Saldanha Steel

National Ports Authority
Berth capacity, Berths, Marine services

SALKOR
Compiling/De-compiling trains, Shunting, NTG, Wagon & Locomotive maintenance

3

4

Port Terminals
Reclaiming & Ship Loading

342 wagon RDP Trains – total mass 41 000 tons
114 wagon rakes – total mass 13 667 tons

Iron Ore Line: Resources

- 30 x 9E electric locomotives
- 104 Diesel Locomotives – 34 class GE 2500 HP
- 44 x 15E electric locomotives – 5 MW
- 5 600 CR13/14 wagons - payload 100 tons
- Radio Distributed Power
- Gross Train mass 41000 ton
- 6 locomotives per train
- 3 x 114 wagon rakes
- 3 x 9E and 7 x 34 Diesels

[1x9E+2x34D]+[114 wagons] + [1x9E+2x34D]+[114 wagons] + [1x9E+1x34D]+[114 wagons]+[2x34D]

Iron Ore Line: Resources

- 30 x 9E electric locomotives
- 104 Diesel Locomotives – 34 class GE 2500 HP
- 44 x 15E electric locomotives – 5 MW
- 5 600 CR13/14 wagons - payload 100 tons
- Radio Distributed Power
- Gross Train mass 41000 ton
- 6 locomotives per train
- 3 x 114 wagon rakes
- 3 x 9E and 7 x 34 Diesels

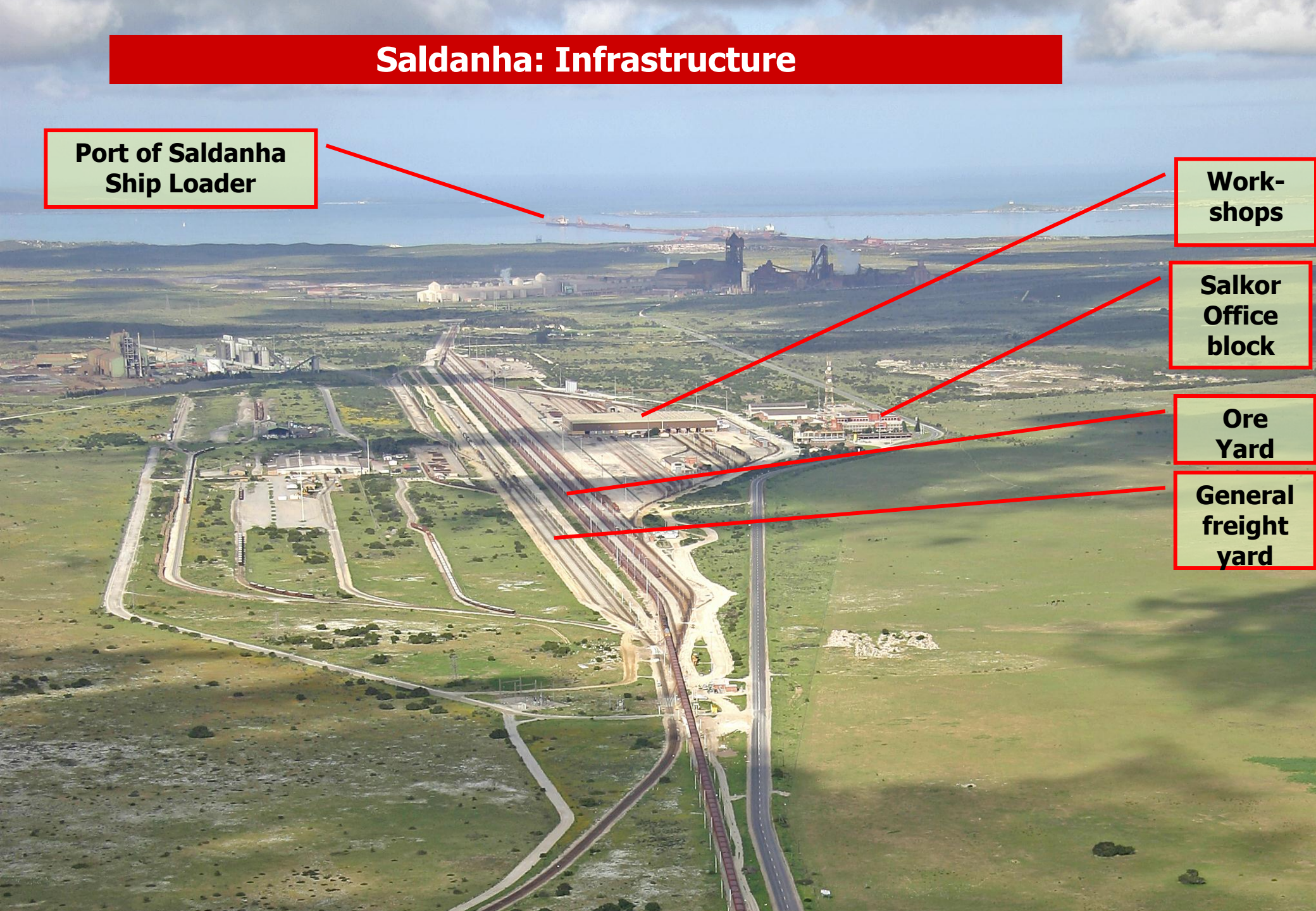
[1x9E+2x34D]+[114 wagons] + [1x9E+2x34D]+[114 wagons] + [1x9E+1x34D]+[114 wagons]+[2x34D]

- Train with all electric 15E locomotives

- Train length 4.1 km
- 1 x Train Driver and 1 x Train Assistant

342 Wagon RDP Train

Saldanha: Infrastructure



Iron Ore Line: Track Maintenance

Track Maintenance Philosophy

- Scheduled Preventative Maintenance
- Asset Based Condition Inspections
- Plan the work, work the plan
- Daily maintenance - between trains
- Annual "Shut Down" Activities

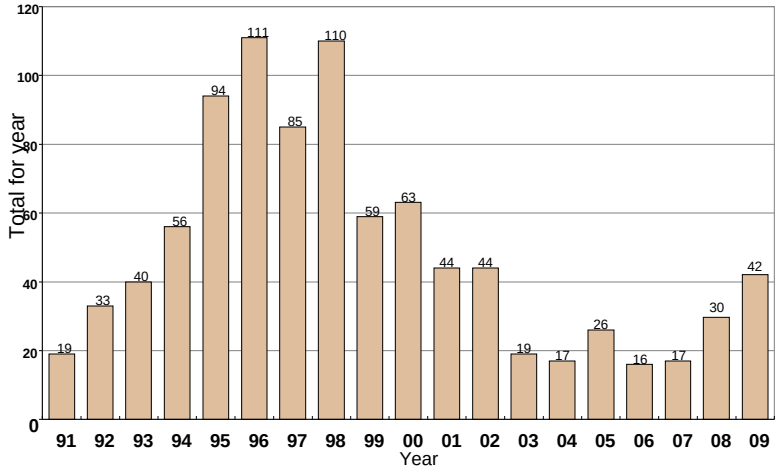
Inventory Management

- Medium & long term contracts with approved suppliers.
- Stock levels based on asset condition, usage, budget and lead times.
- Delivering of material just in time.
- 10% emergency stock levels based on history & lead times.

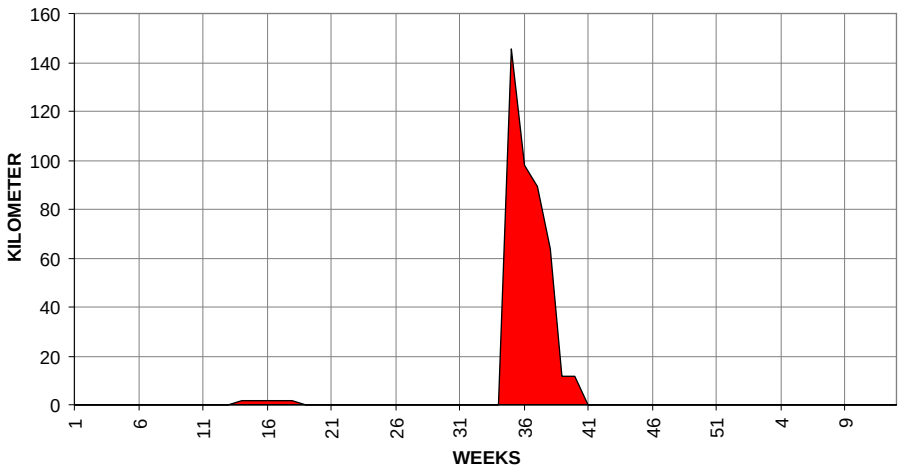
Increased maintenance with volume growth

Year	2007	2008	2009	2010	2011	2012	2013
Million Gross Tons	55	62	73	82	88	103	138
Tamping Cycle per year	7	6	6	5	5	4.8	4
Grinding cycle per year	2	2	3	3	4	4	6
Rail life span / rail replacement (per year)	27 (64Km)	24 (72Km)	21 (82Km)	18 (96Km)	17 (102Km)	15 (116km)	11 (158Km)
Ultrasonic Measurement Car cycles / year	4	6	8	8	10	10	12
IM2000 cycle per year	4	5	6	6	7	8	11

IN-SERVICE RAILBREAKS



SPEED RESTRICTIONS 2008/09



Iron Ore Line: Supporting Infrastructure

Signalling

- Electronic interlocking
- Saldanha CTC via microwave communication/fiber

Wayside Monitoring

- VIS Vehicle Identification System
- Hot Box Detector
- Dragging Equipment Detectors
- Wheel Impact Monitoring System
- Wheel profile monitoring system
- Skew bogie detector
- BAM- Bearing Acoustic Measuring System for wheels
- WILMA - Wayside Intelligent Long-stress Management system.
- UBRD – Ultrasonic Brocken Rail Detector system

Telecommunications

Telecommunication system is being upgraded to TCS-R and GSM train communication

Constrained by SKA (Square Kilometre Array radio telescope)

Iron Ore Line: Locomotive Statistics

	DIESEL	ELECTRIC
GTK per Loco per Annum: 371 415 756		
Average Monthly distance travelled	17,000 km	18,000 km
Wheels re-profiling	4 months	6 months
Wheels re-tyre / replace	18 months	24 months

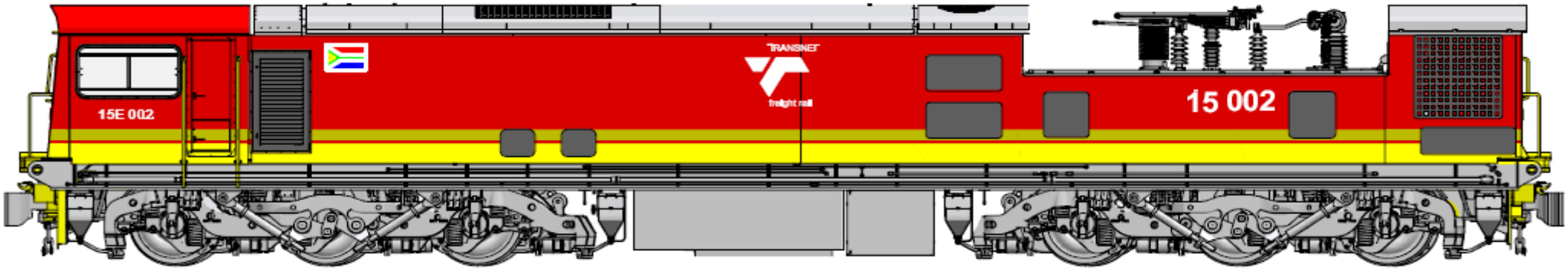
Inventory Management :

- Maintenance material stock levels are maintained at 135 days requirement (including strategic stock for electric locomotives

Maintenance Strategy :

- Condition based activities performed on fixed time schedule
- Each loco receives scheduled examination every 45 days
- Activities vary based upon A, B, C or D-type examinations
- Total staff complement of 106 currently

The New 15 E Locomotive



Iron Ore Line: Wagon Statistics

	Interval
GTK per Annum per Wagon: 10 016 736	
Scheduled maintenance based on hollow wear of wheels	o Average 24 months to reach 2 mm hollow wear o Hollow wear measured real time on ITCMS o Work rate of +-180 000 km/year and life span of +- 800 000 km/wheel
Maintenance/replacement of other components done on multiples of base cycle	o Bearings : 4 years (R) o Bogies : 4 years (M) o Couplers : 6 years (R) o Drawbar : 12 year (R) o Draw gear : 12 year (R) o Brake components : 10 years (M)
Wagon availability	o 97%
Annual maintenance cost	+- 4 % of new wagon

Iron Ore line: Technology

Radio Distributed Power

- Distribution of power over the entire length of the train
- Improves in-train forces
- Improves train dynamics, braking and stopping distances
- Fuel and maintenance savings
- Allows the running of longer trains with one crew - cost competitive

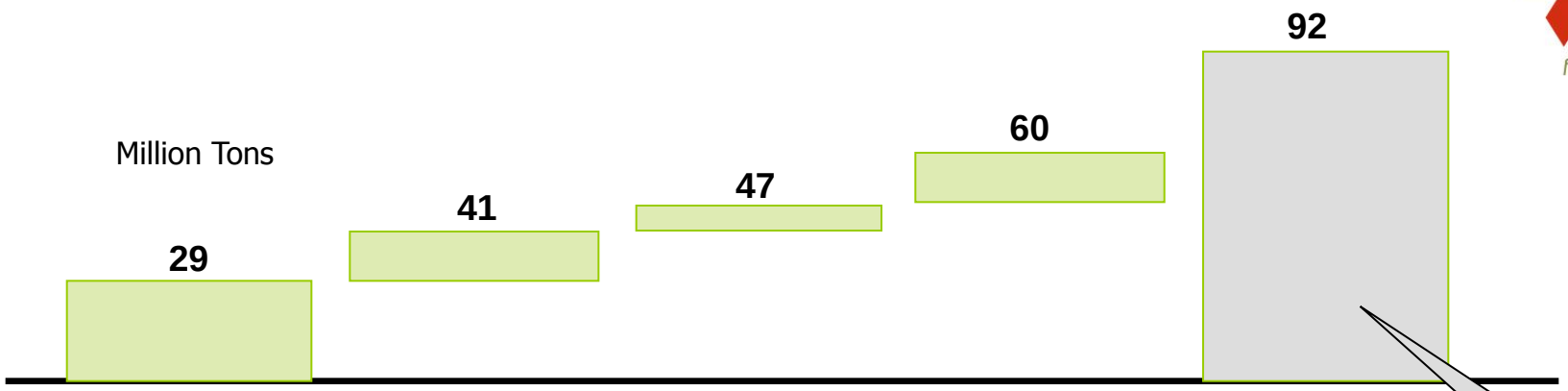
Wayside Monitoring for Condition-based Maintenance

- Technologies deployed on the line reflect the operational complexity & risk of running extremely long trains:
  - Acoustic bearing detectors, wheel profile measuring devices, dragging equipment detectors, weigh-in-motion bridges, hotbox detectors, hot wheel detectors, speed monitoring, wheel impact monitors, rail/ concrete and ambient temperature measures, WILMA & UBRD
- Trolleys of the line on statistically determined period all contribute to safe operations

15 E Locomotives

- Most powerful locomotive in TFR with continuous tractive effort of 480 kN
- GPRS and touch-screen cab displays
- Monitoring of all trip and technical data for automatic downloading via wayside readers

Iron Ore Line: Expansion Programme?



	29-41 Mt pa	41-47 Mt pa	47 – 60 Mt pa
Focus	Mines, rail and port infrastructural changes to handle 342 wagons	Rolling stock	Power supply upgrade and new links
Train length	216 to 342 wagons	342 wagons	342 wagons
Slot requirements	40 slot grid for 28 trains per week (use of even loops for ore trains)	From 45 Mtpa onwards a 72 slot grid is required.	72 slot double grid for 44 ore trains per week (use of all loops for ore trains)
Technology	Radio Distributed Power	Radio Distributed Power	Radio Distributed Power
Infrastructure	• Lengthen 19 loops to handle longer trains • Expansion of Salkor yard	• Minor adjustments to loops	• New Kolomela link line • 2nd line: Salkor - tipplers • 860km elec. feeder line
Wagons	• 483 wagons upgraded to 100 ton payload • 833 new 100ton wagons	• 638 additional 100 ton wagons	• 1050 new CR wagons
Locomotives	• 31 9E augmented with 34D locomotives	• 44 new 15E locomotives	• 32 additional 15E locos for all electric fleet

Feasibility being conducted

Balance of power supply and evenly spaced trains remains a challenge

Iron Ore Line: Future Strategy

- Any upgrading of capacity on the Ore line is crucial for:
  - the development of the mineral rich Northern Cape
  - Retaining a competitive export channel
  - Supporting sustainable development of emerging and junior miners
- General freight bulk commodities i.e. manganese, intermodal freight could be handled on the line, in compliance with heavy haul operations

Presentation Outline

1	Heavy Haul in South Africa: Context
2	The Richards Bay Coal Export line
3	The Sishen – Saldanha Iron Ore Export line
4	**Heavy Haul: Concluding Remarks**

Concluding Remarks

- Heavy Haul operations provides a **commercial, competitive advantage** in economies with vast mineral resources
- Heavy haul operations in South Africa are at the **cutting edge of technology** on a 1067mm gauge rail system
- Understanding the long term **cost/benefit** when introducing new technology is critical:
  - System-wide impact
  - Skills availability
  - Commissioning time
  - Training
  - Maintenance
- Philosophy of **longer heavy haul trains** have to be viewed against:
  - Operational and safety risks
  - Set up and cycle time
- Accommodation of **emerging small loaders** a challenge

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