Draft Decision on QR's Draft Undertaking

Volume 3 – Reference Tariffs

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GLOSSARY

ABS	Australian Bureau of Statistics
above-rail business groups	QR Coal and Mainline Freight and Metropolitan and Regional Services groups which provide and operate the equipment running on the infrastructure providing the services to the railway customer. These groups have track under their control and will be accessing the common user infrastructure such as the mainline.
above-rail costs	Costs and/or assets associated with the provision of above-rail services.
above-rail services	Activities, other than below-rail services, required to provide and operate train services including rollingstock provision, rollingstock maintenance, non-train control related communications, train crewing, termina provision and services, freight handling and marketing and administration of those services.
ACCC	Australian Competition and Consumer Commission
access	Utilisation of a specified section of rail infrastructure for the purposes of operating train services.
access agreement	Agreement between QR and a railway operator for the provision of access.
access application	Request for access by a third-party operator which has been prepared in writing and which complies with the information requirements of paragraph 4.3(b) of the Draft Undertaking.
access charge	Price paid by a railway operator for access under an access agreement.
access co-ordination plan	Plan prepared by Network Access and the scheduling and train control officers detailing operational and interface requirements for a specific railway operator.
access plan	Access Co-ordination Plan
access rights	Entitlement of a railway operator to access in accordance with a specified capacity entitlement.
access seekers	Third-party operator or an end user who proposes to gain access to the network under the terms of the Undertaking.
Access Undertaking or Undertaking	Document approved by the Queensland Competition Authority in accordance with the Queensland Competition Authority Act 1997 (Qld) in respect of QR.

accreditation	Rail safety accreditation in accordance with Part 4, Chapter 6 of the Transport Infrastructure Act 1994 (Qld).
AD	Accelerated depreciation
additional information	Information that is to be provided by QR to a third-party operator during the negotiation period as set out in Schedule D, excluding any information that is provided as part of the preliminary information, but only to the extent required either by the third-party operator or as part of the access agreement.
allocation	Sharing of joint costs/assets between functions/services.
AMC	Australian Magnesium Corporation
AME	AME Consulting Pty Ltd
APT	Arbitrage pricing theory
ARTC	Australian Rail Track Corporation
attribution	Sharing of costs between functions/services on a basis of cost causality where there is a causal relationship between the resources used and the function/service provided.
available capacity	Capacity that is not committed capacity including committed capacity which will cease being committed capacity prior to the time in respect of which capacity is being assessed.
axle load	Weight limit applied to trains passing over a line by the railway engineer. It is the limit allowed to be applied to any one axle on the train.
backbone telecommunications	The telecommunications assets that provide major trunk telecommunications and are used by many groups simultaneously.
ballast	Material upon which the sleepers bear; normally a load distributor to the formation or sub-grade.
balloon loop	Rail line terminus that backs upon itself in a circular shape.
BCM	Ballast cleaning machine
below-rail costs	Costs and/or assets associated with the provision of below-rail services.

below-rail service	Activities associated with the provision and management of rail infrastructure, including the construction, maintenance and renewal of rail infrastructure assets, and the network management services required for the safe operation of train services on the rail infrastructure, including train control and the implementation of safeworking procedures.
block	In signalling terminology, a physical length of track protected by a fixed signal which indicates to a driver whether it is safe to proceed into the section.
bottleneck	A track section that limits the throughput of the network by restricting the number of trains able to pass through it.
breakdown	Mechanical or electrical breakdown, where the particular piece of equipment is rendered inoperable.
bridgemaster	A supervisor with resources suitable for bridge works and generally available to a district.
broad-gauge	General name given to gauges of track greater than standard-gauge of 1435mm
BSNF	Burlington Northern Sante Fe Corporation
cant	The term used to denote the raising of the outer rail on curved track to allow higher speeds than if the two rails were level. Cant compensates for the centrifugal force arising from a train traversing a curve.
capacity	Capability of a specified section of rail infrastructure to accommodate train services within a specified time period. This is after providing for QR's reasonable requirements for the exclusive utilisation of that specified section of rail infrastructure for the purposes of performing activities associated with the repair or enhancement of the rail infrastructure, including the operation of work trains.
capacity analysis	Assessment of the available capacity of a specified section of rail infrastructure including an assessment of whether that capacity is sufficient for the proposed access requirements. If the available capacity is not sufficient for the proposed access requirements the term includes an assessment of rail infrastructure expansion or other capacity enhancement required to meet those proposed access requirements.

capacity entitlement	Railway operator's entitlement under an access agreement to operate a specified number and type of train services over the rail infrastructure within a specified time period and in accordance with specified scheduling constraints for the purpose of either carrying a specified commodity or providing a specified transport service. Until such time that access agreements have been developed for all existing QR operated train services, the term includes capacity that is demonstrably required for the purpose of QR operated train services and in respect of which access charges are applicable.
CAPM	Capital asset pricing model
capping	A layer of material between the ballast and the sub-grade which prevents the sharp rocky material of the ballast from degrading the sub-grade.
centralised traffic control	A generic term for remote monitoring and control of field signalling systems.
CEO	Chief Executive Officer
CIB	Capital indexed bonds
clip fastener	Similar to track spike, but are spring clips which secure the rail to concrete sleepers.
Coal and Mainline Freight	QR's above-rail business group whose major customers are the mining industry, minerals processors, electricity generators and freight forwarders.
coefficient of adhesion	The factor used to determine the maximum tractive effort which can be applied by a locomotive under a given rail condition before slipping off the wheels occurs.
commencing date	Date from which the Undertaking takes effect.
committed capacity	Portion of capacity required to meet the capacity entitlements of railway operators.
common costs	Costs associated with the provision of rail infrastructure that are not incremental costs for any particular train service using that rail infrastructure.

confidential information[1]	That information which is not publicly available and the disclosure of which might reasonably be expected to affect materially the commercial affairs of a person, where such information: • is not already in the public domain; • does not become available to the public through means other than a breach of confidentiality; • was not in the other party's lawful possession prior to such disclosure; and • is not received by the other party independently from a third party free to disclose such information.
consist	Composition of a train, in terms of locomotive and wagon identification and its loading.
corporate overhead costs	Costs that relate predominantly to the overall management, strategy and governance of the corporation including, for example, head office, internal audit, corporate strategy and planning, corporate finance, information strategy, safety and industrial relations.
corporate services costs	Costs of services that are provided at the corporation wide level to groups and divisions within QR including, for example, legal services, computer services, motor vehicle fleet management, administration building services, payroll preparation and employee relations;
corporations law	The meaning given to that term in the Corporations (Queensland) Act 1990.
cost allocation manual or costing manual	Manual prepared by QR which identifies the matters outlined in Paragraph 5.5(a) of the Draft Undertaking.
CPI	Consumer Price Index
crewing	Manning of the locomotive at the front of the train with a crew. The crew is usually one or two

[1] QR defines confidential information as any information, data or other matter marked confidential by a party when disclosed to the other party or disclosed to the other party with an express requirement in writing that the information, data or other matter be treated as confidential, where such information data or other matter
- is not already in the public domain;
- does not become available to the public through means other than a breach of confidentiality;
- was not in the other party's possession prior to such disclosure; and
- is not received by the other party independently from a third-party free to disclose such information, data, or other matter.

	locomotive drivers and/or assistant.
cross subsidy	The shortfall contributed by another train service or combination of train services where one train service or combination of train services pays access charges which are insufficient to meet: • the incremental cost imposed on the rail infrastructure by that train service or combination of train services; and • in respect of a group of train services, the common costs related specifically to sections of rail infrastructure that are used solely for the purpose of train services within that combination of train services.
CSO	Community service obligation
CSX	CSX Corporation
CTC	Centralised traffic control
DAC	Depreciated actual cost
daily train plan	Daily train schedules for all train services operating on QR's infrastructure together with the track possessions and train paths allocated to infrastructure maintenance providers on a daily basis. The master train plan will form the basis for development of the daily train plan which may be varied as a result of: • the capacity entitlements of railway operators under current access agreements; • business requirements, • project and maintenance works; and/or • any other planned or unplanned event which may lead to a requirement for alteration to the plan
DCE	Deputy Chief Executive
declared infrastructure	Infrastructure declared available for access by third-party operators in accordance with the Queensland Competition Authority Act 1997 (Qld).
DED	Dragging equipment detector
delay	The time a train is prevented from operating at the speed it would operate if it did not need to stop at

	passing sidings, signals or stations.
depot	Rollingstock depot or workshop depot. A rollingstock depot is a place where maintenance is carried out and where components are swapped in and out of equipment. A workshop depot is a place where components are manufactured or modified to be subsequently swapped in and out of equipment. Sometimes it is the sign-on location for infrastructure gangs.
Deputy Chief Executive	A corporate group within QR whose major responsibilities include finance, employee relations, information systems and telecommunications, legal and property issues.
district	A geographic area, a number of which make up a region in the infrastructure organisation. District resources or gangs are available to the entire district, whereas local gangs and resources are generally confined to a small infrastructure length within the district.
DNR	Department of Natural Resources
DORC	Depreciated optimised replacement cost
double track or dual track	A railway line consisting of two parallel tracks usually used for trains travelling in opposite directions.
draft amending undertaking	One or more documents specifying amendments to the Draft Undertaking, or the undertaking submitted to the QCA in circumstances envisaged in Part 5 of the Act.
Draft Undertaking	The document lodged with the QCA by QR on January 23, 1999.
dragging equipment detector	A track-mounted device capable of detecting whether a piece of rollingstock equipment has fallen or is not in its design configuration, such as derailed wheels or hanging brake-gear.
duplication	The construction of a second parallel track over section(s) of the network.
EBA	Enterprise bargaining agreement
end user	A purchaser of train services (for example, a mine, a livestock producer, a power station).
environmental investigation	Study of the likely short-term and long-term beneficial and detrimental effects on the environment of the third-party operator's operations insofar as they interact with the rail infrastructure

	and other train services.
environmental management system	Third-party operator's plan of management to address all environmental risks and ensure compliance with all environmental laws and licences.
environmental risk management plan	Plan identifying the controls and measures agreed between QR and the third-party operator to address risks identified through the environmental investigation. The plan identifies the party responsible for implementation of those controls and measures.
EPA	Environmental Protection Agency (Qld)
EPA Act	Environmental Protection Act 1994 (Qld)
ER	Employee relations
evaluation period	In relation to:- • an individual train service - the period which is equal to the length of the expected duration of the existing or proposed access agreement in respect of the relevant train service; • a group of train services - the period which is equal to the length of the expected duration of the longest existing or proposed access agreement in respect of any of the train services comprising the combination of train services; provided that such period does not exceed ten years.
expansion	An increase in network or system capacity.
explanatory guide	Document developed for the purpose set out in Paragraph 1(d) of the Draft Undertaking.
failure mode effect analysis	An analysis of work functions designed to ensure levels of maintenance are appropriate to the consequences of failure.
financial statements	Annual accounts prepared in accordance with the requirements of the Financial Administration and Audit Act (1997) and audited by the Queensland Auditor-General.
flange	Larger part of wheel form used as the principal means of the railway guidance system.

FMEA	Failure mode effect analysis
FMS	Freight management system
freight management system	Mainframe computer based application that monitors overall train performance.
frog	The component in a turnout where one rail from one line crosses the other rail from the other line. The shape of the two rails coming together and diverging apart is in the shape of a frog. Also, swing nose frog relates to an arrangement where the continuity of each rail is maintained.
geographic region	Sections of the rail infrastructure identified as such in the cost allocation manual.
geographic system	Sections of the rail infrastructure identified as such in the cost allocation manual.
geotextile	A man-made fabric used in earthwork applications to constrain movement of material whilst allowing water drainage.
GHD	Gutteridge Haskins and Davey Pty Ltd
GOC	Government owned corporation
gross tonne kilometres	Total weight of a train multiplied by the distance travelled.
gross-to-tare ratio	Ratio of the total weight of a loaded wagon to the weight of the empty wagon.
GSA	Government service agreement
GST	Goods and services tax
GTK	Gross tonne kilometres
HBD	Hot box detector
head-hardened rail	Rail that has been heat-treated so that the head is approximately 30% harder than standard carbon rail
headway	The distance or time between train wishing to use the same section of the track, either in the same direction or in opposite directions.
healthy train	A train that has experienced no deviation – in excess of agreed tolerances – from the path in the daily train plan.
heavy-haul	Rail transport associated with the movement of bulk commodities, for example coal and iron ore, hauling

	in excess of 20 million gross tonnes per annum.
hot box detector	A track-mounted device with the function of measuring the axle box temperatures of a passing train. Axle box bearings have a risk of failing, causing bearing heating and eventual axle box shearing, resulting in a derailment.
identification	Where costs are directly incurred, or assets directly used in the performance of a function/service, the identification of those costs to that function/service.
impact assessment study	A detailed study of the short and long-term beneficial and detrimental effects on the environment of the third-party operator's operations insofar as they interact with the rail infrastructure. The study includes an assessment of all relevant environmental factors, including social, economic and biophysical factors related to such operations.
incident	Any rollingstock derailment, rollingstock disablement or breakdown, accident, collision or any other unplanned occurrence on the infrastructure that causes or could cause injury to any person, damage to property, environmental harm or a loss to process including a cancellation by QR of any train movement.
incident management	Reporting, management and investigation of incidents occurring on or affecting the rail infrastructure.
incremental costs[2]	The costs to an efficient network provider of providing access that would not be incurred if the particular train service or group of train services did not operate.
indicative access proposal	Non-binding response from QR to an access application of a third-party operator, prepared in writing, including the information set out in Cl 4.5 of the Draft Undertaking.
infrastructure improvement	Physical works applied to the infrastructure to increase the number of paths available on the system.
infrastructure payments	Payments to QR from the Queensland Government to enable QR to provide specified sections of rail infrastructure.

[2] QR defines incremental cost as the costs of providing access, including capital (renewal and expansion) costs, that would not be incurred (including the cost of bringing expenditure forward in time) if the particular train service or group of train services (as appropriate) did not operate.

Infrastructure Services Group	QR's business group which supplies track maintenance and construction services to QR's above-rail business groups and Network Access.
interlocking	Generally signalling interlocking where various functions such as points switching cannot occur without other conditions occurring, such as the passage of a train. Proprietary systems for this function are known as VPI, Westrace, Microlok and Relay.
initial capacity assessment	Preliminary capacity analysis undertaken in a manner that gives an indicative assessment only and which will require further analysis as part of a final capacity analysis.
interface coordination plan	Plan which identifies the procedures to be followed and the responsible officers from both QR and the third-party operator, in respect of all regular operational interfaces between the parties that arise in the exercise of rights and the performance of obligations under the access agreement.
interface plan	Interface co-ordination plan
intermediate loops/signals	Passing loops or signals constructed at an intermediate point between two existing loops or signals to assist in increasing the capacity of the system.
internal access agreement	Arrangement between Network Access and another QR business group for the provision of access for the purpose of QR operated train services.
IPART	Independent Pricing and Regulatory Tribunal of New South Wales
ISG	Infrastructure Services Group
IT	Information technology
KPI	Key performance indicator
linear tariffs	Tariffs that vary with a dependent variable, such as distance travelled or tonnes hauled, and which are portrayed as a single price without differentiation between fixed and variable elements.
Line-section	Section of railway route as defined in QR's chart of accounts from time to time and that is identified for the purpose of classifying the rail infrastructure into line sections with reasonably consistent traffic and reasonably consistent track standards.
Line-section specific	Costs and assets able to be specifically identified or

	attributed to a line section.
LNG	Liquefied natural gas
local resources	Resources of gangs whose field of work is confined to a relatively small geographic part of the district, which in turn is a subset of the region.
MA	Moving average
Manual	Costing manual
marshalling	Process of joining or separating locomotives and rail wagons to make up or split train consists.
marshalling yard	Typically, a train yard in which wagons are shunted to or from a train consist. Marshalling yards perform other functions including stabling, light maintenance, train inspection, and queuing.
master train plan	Collectively, the train schedules for all train services contracted to operate on QR's infrastructure from week to week, together with the track possessions and train paths allocated to infrastructure maintenance providers for that same time. Specifically, the master train plan will detail: • the contracted capacity entitlements of operators using or planning to use the relevant infrastructure from week to week, including train service paths, pathing determination and railway operator specific requirements; • maintenance windows/possessions; and • the available capacity of the network being the difference between maximum capacity and capacity entitlements.
material change event	The occurrence of any of the following events on or after the date upon which the QCA approves the relevant reference tariff/s: • any amendment, repeal, modification or enactment of any acts, ordinances, regulations, by-laws, proclamations and subordinate legislation made under, by or pursuant to any Commonwealth or State statute or any relevant Authority ('legislation'); • any binding change in the interpretation or application of any legislation resulting from

a decision of a court or tribunal;

- the making of any new policy, instruction, direction or order ('directive') of an Authority (including without limitation QR's shareholding ministers) which impacts on QR, or the modification, extension or replacement of any existing directive;

- the imposition of a requirement for any licence, permit, approval, consent or other authority ('Authorisation') not required as at the date upon which the QCA approved the relevant reference tariff;

- after the date of grant of any authorisation, a change in the terms and conditions attaching to that authorisation or the attachment of any new terms or conditions;

- the imposition or abolition of, increase or reduction in the rate of, or change in the basis of calculating, any Commonwealth, State or Local Government-imposed tax, charge, levy, duty, impost, rate, royalty or imposition ('tax') imposed on, or payable by, QR including, without limitation, any tax relating to the protection of the environment imposed on users of electricity or imposing a form of consumption, value added or sales tax, but excluding any income tax; or

- a change in the Commonwealth Government 10- year bond rate of more than one hundred (100) basis points from the time that the reference tariff:

  – was endorsed by the QCA; or

  – was varied in accordance with Paragraph 5.3.2(b) of the Draft Undertaking to reflect a change in the Commonwealth Government 10-year bond rate;

whichever is the later.

material default

- repeated failure to comply with the terms and/or conditions of any of the agreements specified in Paragraph 4.1.2(c) of the Draft Undertaking; or

- any breach of a fundamental term and/or condition of any of the agreements specified in Paragraph 4.1.2(c) of the Draft

	Undertaking.
MEERA	Modern engineering equivalent replacement asset
Metropolitan and Regional Services	QR's above-rail business group whose major customers are metropolitan, long distance and tourist passengers, and the grain, livestock and small/express freight sectors.
MGT	Million gross tonnes
multi-part tariff	Tariff that consists of at least two components (but generally more) which individually indicate the price of different parts of the service being purchased, inclusive of or in addition to fixed cost elements.
NAG	Network Access Group
narrow-gauge	General name given to gauges of track, less than standard-gauge of 1435mm. QR operates a narrow-gauge network of 1067mm.
National Development Unit	A corporate group within QR, its role being to identify business opportunities in other Australian rail jurisdictions.
NCC	National Competition Council
neck	A section of track built to accommodate a locomotive involved in shunting operations which are carried out from one end of a yard.
negotiation period	Period during which the terms and conditions of an access agreement will be negotiated and which commences upon the third-party operator providing QR with a notification of intent to proceed with negotiations pursuant to cl 4.6 of the Draft Undertaking and concludes upon any of the events set out in Paragraph 4.7.1(c).
net tonne kilometres	Weight of the payload multiplied by the distance travelled in the loaded section of the cycle.
Network Access	Business group established within QR to manage the provision of below-rail services with the exception of stations, platforms and selected marshalling yards.
network wide costs	Costs and assets associated with the provision of below-rail services not able to be identified or attributed to a line section or a geographic region.
NPC	Network Planning Centre

NSC	Norfolk Southern Corporation
NTK	Net tonne kilometre
NTS	New tax system
ODV	Optimal deprival value
operating plan	Description of how the proposed train services are to be operated, including the matters identified in Schedule H of the Draft Undertaking.
operational systems	An organisational sub-group of ISG comprising signalling and communications, asset maintenance and construction.
ORG	Office of the Regulator General
other activities	Activities undertaken by QR that are neither above-rail services nor below-rail services including for example, consulting activities and treasury activities.
other activities costs	Costs and/or assets associated with the provision of other activities.
out-of-course running	Occurrence where the movement of a train service differs from the train schedule for that train service as provided in the daily train plan.
passing loop	Section of track that has two ends, both of which lead onto the mainline which enables two trains travelling in the opposite direction on a single track to pass.
PCI	Pulverised coal injection
preliminary information	Information required to be provided by QR, prior to the submission of an access application, by a third-party operator.
price index	A composite measure of the prices of items expressed relative to a defined base period.
production resources	In the context of major track program maintenance, those resources available to the whole district and designed for rapid output of finished work, such as mechanised equipment and large gangs concentrating on specific jobs. This contrasts with routine or caretaker maintenance local track gangs.
protocols	Scheduling and train control protocols
provisioning	Supply of consumables to a locomotive such as fuel, water, sand, crew consumables and the crew

	itself.
QCA	Queensland Competition Authority
QCA Act	Queensland Competition Authority Act 1997 (Qld)
QMC	Queensland Mining Council
QR business groups	Above-rail business groups, Network Access, Infrastructure Services, Technical Services and Workshops.
QRCMF	QR Coal and Mainline Freight
QR's information systems	Systems used by QR for recording the planned and actual performance of train services operating on QR's rail infrastructure, including, but not limited to, consist specification, running times and the occurrence and management of incidents.
QRNA	Network Access
QT	Queensland Transport
QTC	Queensland Treasury Corporation
Queensland Transport	Department of Transport for the State of Queensland.
queuing	Time spent by train consists at terminals or intermediate points waiting on rail traffic to clear.
RAC	Rail Access Corporation
rail	Steel wheel guide with a head, stem and base.
Rail Access Corporation[3]	A vertically separated below-rail service provider that owns the NSW intrastate and interstate rail network.
rail anchors	On wooden sleepered track fitted with track spikes, a steel fitting that grips the rail base and prevents the rail sliding longitudinally with respect to the sleepers by wedging against sleepers. For concrete and steel sleepers, the mechanism of restraint is incorporated into the clip fasteners.
rail creep	Lengthwise movement of rail forcing buckles in rail

[3] The Transport Administration Amendment (Rail Management) Bill 2000 provides for the amalgamation of RAC and Rail Services Australia (which provides track maintenance services to RAC, FreightCorp, the State Rail Authority and other business clients) to form the Rail Infrastructure Corporation. The amalgamation is part of the NSW Government's recently announced reforms to the institutional arrangements, industry structure and operating structure of rail entities in the NSW rail sector. Given that the rail reform is yet to be fully effected, RAC rather than RIC will be referred to throughout the Draft Decision.

	and misalignment of sleepers.
rail grinding	Process performed by a machine whilst on the track where the head of the rail is shaped and surface defects removed by means of grinding wheels.
rail infrastructure	Rail transport infrastructure as defined in the Transport Infrastructure Act 1994 (Qld) for which QR is the railway manager.
railway manager	Meaning given to that term in the Transport Infrastructure Act 1994 (Qld).
railway operator	Person who has, or is seeking, access from QR to operate train services on the rail infrastructure and who is, or who will become, accredited in respect of those train services.
RAMS	Rail Access Management System
RCAF	Rail cost adjustment factor
RCS	Radio controlled signalling
reference tariff	Access charge applicable for a specified reference train service, established in accordance with Cl 5.3 of the Draft Undertaking. The purpose of the reference tariff is to provide information to third-party operators as to the likely level of access charge for train services of a similar type as the specified reference train service.
reference train service	Notional train service conforming to certain criteria, including carrying a specified commodity type, operating between specified geographical points and conforming to specified technical characteristics, operational characteristics and contract terms and conditions.
region specific	Costs and assets associated with the provision of below-rail services not able to be identified or attributed to a specified line section, but able to be identified or attributed to a geographic region.
re-railing	Carried out where the rail needs replacing but the sleepers still have reasonable life.
re-sleepering	The replacement of sleepers which are life expired.
re-surfacing	Maintenance of the geometry of the track using a machine called a tamper which lifts, lines and levels the track and packs the ballast to accommodate the new position of the track.
revenue limit	Maximum revenue which QR should be entitled to earn from the provision of access to the train service

	or train service group over the evaluation period.
RHA	Rail haulage agreement
Ring-fencing guidelines	Guidelines prepared by QR in accordance with Cl 3.5 of the Draft Undertaking.
RIS	Rollingstock Interface Standards
RMS	Rail Management Services Pty Ltd
road	In a marshalling yard situation, a track long enough to store, stage or marshal a train. A yard is generally composed of a set of roads which come together at either end of the yard. A road is usually double-ended in contrast with a neck and a siding which are single ended.
Roadmaster	A senior supervisor within a district allocated the responsibility of supervising resources that work across the district or are common across the district, in contrast to a track supervisor who supervises resources allocated to a sub-section of the district.
Rollingstock	Locomotives, carriages, wagons, rail cars, rail motors, light rail vehicles, light inspection vehicles, rail/road vehicles, trolleys and any other vehicle which operates on or uses the track.
Rollingstock configuration	Combination of rollingstock comprising a train that includes an identification number and a gross mass of individual items of rollingstock and the order in which those rollingstock items are placed in the train.
Rollingstock interface standards	QR's standards relating to the interface between rollingstock and the rail infrastructure with which the rollingstock and rollingstock configurations must comply in order for them to be able to be operated on the relevant parts of the rail infrastructure, including standards relating to the criteria identified in Part 2 of Schedule D of the Draft Undertaking.
Rollingstock standards	Rollingstock interface standards that relate to the design and performance of rollingstock.
ROR	Rate of return
RSAU	Rail Safety Accreditation Unit
RTBU	Rail, Tram and Bus Union
running inspection	Inspection of a train prior to the train starting its journey where no faults are expected to be found or

	at least the faults are very minor.
safety management system	In respect of:- • a railway operator - a system developed by the railway operator to manage all risks associated with the operation of train services including specifically those risks identified in the safety risk assessment; and • a railway manager - a system developed by the railway manager to manage all risks associated with the provision of rail infrastructure and safe management of train operations on the rail infrastructure, including specifically those risks identified in the safety risk assessment; and which forms the basis upon which the railway operator or railway manager becomes accredited.
safety regulator	The Chief Executive of Queensland Transport or delegate operating in accordance with Part 4 of the Transport Infrastructure Act 1994.
safety risk assessment	Assessment of the operational and safety risks associated with the third-party operator's operations insofar as they interface with the rail infrastructure and other train services.
safety risk management plan	Plan identifying the set of controls and measures agreed between QR and the third-party operator to address risks identified through the safety risk assessment, and the party responsible for the implementation of those controls and measures.
safety standards	Standards relating to safety, including occupational health and safety, established in published guidelines, industry practice or QR policies and all standards relating to safety, including occupational health and safety, prescribed by any laws.
safeworking procedures	Procedures and systems, including supporting communications systems, for the safe operation of trains and protection of work sites on rail infrastructure.
S&P	Standard and Poors
scheduling	Process of determining arrival and departure times for train services at the origin, intermediate locations and the destination of a journey to meet the requirements of individual railway operators and the integration of such times with the other planned and unplanned activities necessary for the

	management of QR's infrastructure. Scheduling also includes entering these times into QR's information systems.
scheduling and train control officers	Officers who provide train control and prepare the daily train plan.
scheduling and train control protocols	Protocols prepared by QR outlining the approach QR will adopt with respect to the matters outlined in Paragraph 3.2(e) of the Draft Undertaking.
sectional running time	The time it takes a train to traverse a section travelling at the speed it would be travelling if it did not have to stop at passing loops or stations.
shunting	The movement of locomotives and wagons in a yard situation. Normally associated with the creation or separation of specific train consists.
siding	Storage road leading nowhere.
single track	A railway line that consists, for the most part, of only one track and punctuated by passing loops.
sleepers/ties	The transverse members of trackwork, made of wood, concrete or steel which are used to secure the rail at the correct gauge.
solvent[4]	None of the following events have happened in relation to the third-party operator: • the third-party operator is unable to pay all its debts as and when they become due and payable or it has failed to comply with a statutory demand as provided in Section 459F(1) of the Corporations Law; • a meeting is convened to place it in voluntary liquidation or to appoint an administrator, unless the resolution is withdrawn within 14 days or the resolution fails to pass; • an application is made to a court for it to be

[4] None of the following events have happened in relation to the third-party operator:

- the third-party operator is unable to pay all its debts as and when they become due and payable or it has failed to comply with a statutory demand as provided in Section 459F(1) of the Corporations Law;
- a meeting is convened to place it in voluntary liquidation or to appoint an administrator;
- an application is made to a court for it to be wound up and the application is not dismissed within one month;
- the appointment of a controller as defined in the Corporations Law of any of its assets; or
- the third-party operator proposes to enter into or enters into any form of arrangement formal or informal with its creditors or any of them, including a deed of company arrangement.

wound up and the application is not dismissed within one month;

- the appointment of a controller as defined in the Corporations Law of any of its assets, if that appointment is not revoked within 14 days after it is made; or
- the third-party operator proposes to enter into or enters into any form of arrangement (formal or informal) with its creditors or any of them, including a deed of company arrangement.

SPI Share price index

SRA State Rail Authority

stabling Taking a train out of service and parking it in a siding without a crew.

staging Very short-term storage, where the train is required to wait for its train path on the mainline or at a terminal. Staging is built into timetables. During this time the train may be inspected and other non-invasive forms of maintenance and provisioning may be carried out.

stand-alone costs[5] The costs that an efficient network provider would incur if the relevant train service or group of train services was the only service or group of services being provided access.

standard-gauge Nominal gauge between rails of 1435 mm.

standard train path One of a number of similar hypothetical paths, in combination representing the least time-distance trajectories of trains over a network and therefore permitting the maximum number of trains of a given specification to be operated over the network.

STB Surface Transportation Board.

storage Parking of the wagons of a train. Storage can range from short-term to long-term depending on the reason for their storage. Short-term storage may be necessary during an industrial dispute, inclement weather or port equipment breakdown. Very short-term storage is better known as 'staging'.

stowage The temporary storage of trains off the running mainline. This occurs in unplanned circumstances

[5] QR defines stand-alone cost as the costs that it would incur if the relevant train service or combination of train services (as appropriate) was the only train service or group of train services provided access by QR.

	due to operational interruptions arising from weather conditions, loading and unloading problems and derailments, as well as in planned circumstances that relate to the operators' operational patterns. The unplanned circumstances could exist for up to a week or more, while planned stowage is in accord with the operators' capacity entitlements.
STP	Standard train path
sub-grade	The prepared earth upon which the trackwork is built.
surfactant	Spray to stabilise loose particles.
tamping	Process by which ballast is packed around the sleepers of a track to ensure the correct position for the location, speed and curvature.
Technical Services Group	QR's business group that supplies engineering, project management and supply services to QR's above-rail business groups and corporate groups.
terminal	Any facility that is used for the loading and unloading of goods onto a train.
TFP	Total factor productivity
third-party	QR's terminology for an access seeker in Schedule E.
third-party operator	Railway operator other than QR
TI Act	Transport Infrastructure Act 1994 (Qld)
TLM	Track laying machine
track	Part of the rail infrastructure comprising the rail, ballast, sleepers and associated fittings upon which trains operate.
track gauge	Distance between the inner faces of the rail heads of a railway track. A narrow gauge railway is designed for 1067 mm whilst a standard gauge railway is designed for 1435mm. The measurement is made 16 mm below the top of the rail on the inner face.
track geometry	The position of the two rails transversely and longitudinally with respect to the alignment of the track.
track laying machine	A track-mounted machine designed to be able to place or replace rails and sleepers simultaneously

	and continuously.
track occupation	The presence of a train on a section of track that precludes the presence of another train in order to maintain safe separation between trains. Occupation can occur by other means such as a maintenance occupation.
track relaying	The complete replacement of the track structure, usually carried out by track-laying machines, except where relatively small lengths are involved.
track section supervisor	Usually a supervisor with a geographic allocation of the track asset.
trackside systems	All assets, their maintenance and construction, comprising signalling, communications and overhead power provision.
track spikes	Large iron 'nails' with enlarged heads for securing rail to wooden sleepers.
traction current	Term used for electric power supply used on electric railways for trains. Normally supplied by overhead wire or third rail.
traction motor	Electric motor that drives the axle of a locomotive.
tractive effort	Power that a locomotive is able to deliver to the rail through its wheels notwithstanding the ability of the wheels to grip the rail.
tractive force	Longitudinal force that can be applied to the rails by the locomotive wheels, influenced by locomotive horsepower and wheel to rail adhesion.
train	Any configuration of rollingstock operating as a unit on the track.
train control	The control of train movements and of all other rollingstock operations in accordance with the daily train plan, QR's safety management system and other pre-determined procedures and of any other activities, including track possessions and other infrastructure maintenance activities, affecting or potentially affecting such train movements or rollingstock operations. In addition, train control includes: • recording train running times in QR's information systems; • reporting incidents occurring on the infrastructure;

	• scheduling; • management of incidents from within the control centre; and • exchanging information with railway operators.
train cycle	The period of time required for a train consist to load, transit, unload and return to load again.
train path	Defined entry, exit and transit time for a train consist on a particular network or corridor.
train schedules	The arrival and departure times for a particular train service at specified locations as contained in the master train plan and/or the daily train plan and entered into QR's information systems.
train service	Operation of a train between specified origins and destinations on the rail infrastructure.
train service group	Specified combination of train services that operate over discrete parts of the rail infrastructure and which is nominated as such in Schedule F of the Draft Undertaking.
train standards	Rollingstock interface standards that relate to rollingstock configurations.
transit time	The time it takes a train to run from an origin to a destination, usually over a number of sections, and composed of sectional running times, stopping allowances, starting allowances and waiting at passing sidings.
TSG	Technical Services group
TSS	Track section supervisor
turnout	Trackwork where a single track splits to become two tracks and is equipped with moving rails to change the route.
two-part tariff	Tariff that is divided into two components – a variable component, typically reflecting marginal costs, and a fixed component.
Undertaking or Access Undertaking	The document approved by the Queensland Competition Authority in accordance with the Queensland Competition Authority Act 1997 (Qld) that sets out the principles for negotiating access to QR's declared infrastructure.

UPC	Union Pacific Corporation
VERS	Voluntary early retirement scheme
WACC	Weighted average cost of capital
working groups	Meetings of stakeholders, convened by QCA in April and May 2000, to assist in the assessment of the Draft Undertaking. Participants were representatives from QR, QMC, FreightCorp, Toll, National Rail, ARTC, Queensland Treasury, QT, ACCC, NCC, Stanwell, WA Rail Freight Sale Task Force, RTBU and the QCA.
Workshops	QR's business group that undertakes maintenance, modifications, major overhaul, component exchange and manufacturing support for the rollingstock requirements of QR's above-rail business groups.

CHAPTER 9. REFERENCE TARIFF SUMMARY

KEY ASPECTS

Summary - this chapter provides an executive summary of the draft decision on QR's proposed reference tariffs.

9.1 Introduction

Part 5 of the Draft Undertaking sets out the pricing framework that QR proposes to use to determine access charges. Basically, this framework provides for access charges to fall between a floor (incremental cost) and a ceiling (stand-alone cost). This pricing framework therefore allows a wide range of possible prices.

In order to provide greater transparency and reduce negotiation costs, QR has developed reference tariffs for a specified train, known as the reference train service. The access charge for a train service may be higher or lower than the relevant reference tariff where the train service characteristics differ from the reference train service characteristics.

9.2 QR's proposed reference tariffs

QR submitted the following reference tariffs to the QCA.

Table 9.1: QR's reference tariffs

Price Component	Unit	Moura	Newlands
Track access	$/'000 GTK	$11.26	$9.95
Electric traction, inc energy	$/'000 GTK	n.a	n.a

Price Component	Unit	Central Blackwater	Stanwell	Gregory via Blackwater
Track access	$/'000 GTK	$6.13	$6.13	$5.69
Electric traction, inc energy	$/'000 GTK	$2.07	$2.07	$1.98

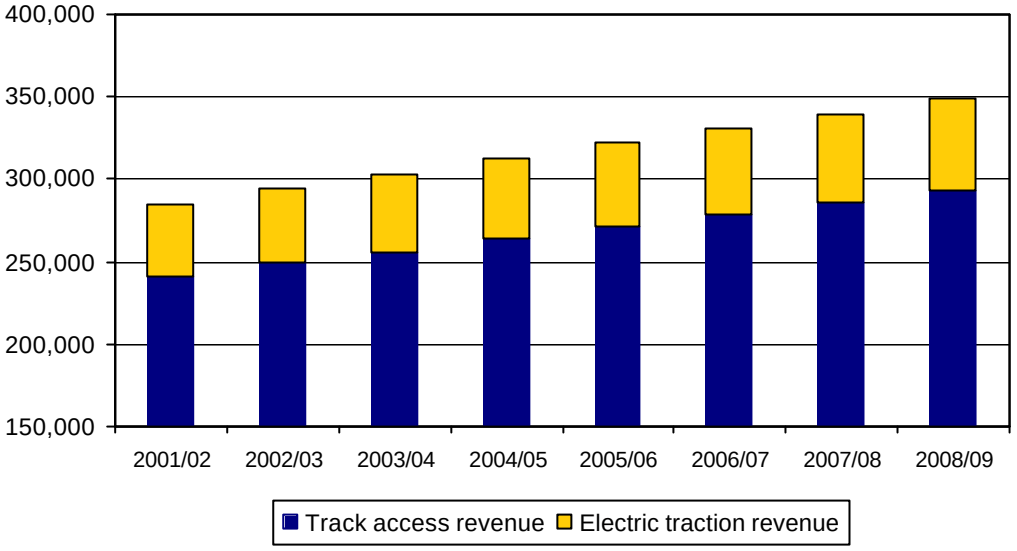
Price Component	Unit	Gregory via Goonyella	South Goonyella	North Goonyella	West Goonyella
Track access	$/'000 GTK	$5.69	$4.49	$4.49	$4.49
Electric traction, inc energy	$/'000 GTK	$1.98	$1.84	$1.84	$1.84

9.3 Reference tariff determination

On the basis of the QCA's proposed reference tariffs and QR's original coal growth forecasts, QR's access revenues from the coal network are expected to average approximately $240 million per annum (excluding electric traction charges) over the initial 3-year regulatory review period from 1 July 2001 to 30 June 2004. QR is expected also to earn approximately $40 million per annum for the use of its electric overhead system.

These revenues have been assessed in meeting the stand-alone cost of QR providing access to its network for coal traffics in Central Queensland. The forecast annual access revenues for the coal network are shown in Figure 9.1.

Figure 9.1: QR's coal system access revenues (Nominal $'000s)



Excludes revenue from electric energy sales

Setting prices, by its nature, requires that a standard be established. The QCA considers that the most efficient configuration provides the appropriate benchmark train service for the purpose of specifying a reference train. For the purposes of the first regulatory review, the QCA has adopted most elements of QR's proposed reference train service.

In addition, the QCA proposes to endorse QR's proposed assignment of mines into clusters as set out in table 9.2.

Table 9.2: Mines in each cluster

Moura	Newlands
Boundary Hill	Newlands
Callide	Collinsville
Moura	

Central Blackwater	Stanwell	Gregory
Curragh	Cook	Ensham
Jellinbah East	Blackwater	Kestral
Yarabee	Curragh	Gregory / Crinum
Cook	Ensham	
Blackwater		
South Blackwater		

North Goonyella	South Goonyella	West Goonyella
South Walker Creek	Peak Downs	Blair Athol
Coppabella	Saraji	
Burton	Norwich Park	
Moranbah North	German Creek	
Goonyella	Oaky Creek	
Riverside	Foxleigh	
North Goonyella		

Rail transport is different from many other natural monopoly industries such as electricity and gas networks because an operator's consumption of capacity is highly dependent upon the interaction of that user with others on the network. In contrast, electricity and gas networks each convey a homogenous product.

Access charges should contribute to facilitating the emergence of the above-rail market by reducing the costs of negotiating access agreements and providing a transparent basis against which above-rail operators are able to most cost effectively satisfy customer demand.

The importance of this function is highlighted by the fact that access charges will play a critical role in co-ordinating commercial activity in the above-rail market. Above-rail operators will be responsive to access charges when structuring above-rail solutions for coal haulage.

This means that a more complicated pricing structure than that proposed by QR is required to provide transparency and ensure that appropriate pricing signals are sent to market participants. In particular, it is necessary to separately identify causative elements in the pricing structure so that the costs that are imposed on the system through different operational arrangements are reflected in the prices that are charged. In the context of QR's below-rail coal network, these causative costs are the marginal costs of maintenance imparted to the infrastructure through usage and the cost of providing capacity.

Consequently, the QCA is proposing that the revenue be collected via a multi-part reference tariff which incorporates the following components:

- an incremental maintenance charge ($/'000 GTK);
- an incremental capacity charge ($/train path); and
- an allocated component (a combination of $/'000 NTK and $/net tonne).

This allocated component is calculated by dividing the allowed revenue that cannot be causatively attributed to capacity or maintenance evenly into two components. The first component ($/'000 NTK) is then calculated by dividing the residual amount by the forecast NTK for that cluster over the regulatory period. A similar approach is adopted for the $/net tonne component.

However, there are two exceptions to this approach:

- the cost per path of the South Goonyella cluster is marginally higher than applies to the other clusters on the Goonyella system as it is relatively more capacity constrained. In order to maintain parity with the West Goonyella and North Goonyella corridors, a small reduction has been made to South Goonyella's $/net tonne charge; and

- the price per NTK for the Gregory cluster has been removed so that the access charge for this cluster is the same as the charge that applies for the longest haul for the Central Blackwater cluster. The adjustment adheres to QR's intention of ensuring that more distant mines pay access charges that are at least as much as those levied on mines on the same system that are closer to the port whilst mimimising QR's asset standing risk by reducing the incentive for these mines to carry coal on the Goonyella system.

For assessing the access charges applicable to the Stanwell cluster, the Blackwater system was essentially broken into two systems – the system to Stanwell, and the system from Stanwell to Gladstone port. Reference tariffs for traffic terminating at Stanwell Power Station were calculated on a consistent basis to the other reference tariffs (that is, the unallocated costs attributable to the system up to the Stanwell Power Station were evenly divided between $/NT and ¢/NTK as if all traffic terminated at Stanwell Power Station). The reference tariffs that were generated became the applicable rates for the Stanwell cluster.

The revenue thereby recovered from Stanwell Power Station was then deducted from the revenue requirement for the remainder of the Blackwater system. Subject to the particular arrangements applying for the Gregory cluster, this revenue was then assigned to the Blackwater mines in the manner described above.

For above-rail operators who utilise the electric traction system, a further charge will be levied based on the use of the overhead system and the cost of energy supplied. These charges will be levied on a $/'000 GTK basis.

The reference tariffs proposed by the QCA are outlined below in Table 9.3:

Table 9.3: Reference tariffs[6]

Price Component	Units	Moura	Newlands
Incremental maintenance charge	$/'000 GTK	1.03	1.07
Incremental capacity charge	$/train path	0*	0*
Allocated Component 1	$/'000 NTK	7.87	6.86
Allocated component 2	$/net tonne	1.40	1.10
Electric traction access charge	$/'000 GTK	n/a	n/a

* Incremental capacity charges are yet to be developed for the Newlands and Moura systems. The levying of an incremental capacity cost for each system will correspondingly reduce each of the allocated components.

Price Component	Units	Blackwater Central	Stanwell	Gregory
Incremental maintenance charge	$/'000 GTK	0.55	0.55	0.55
Incremental capacity charge	$/train path	500	500	500
Allocated Component 1	$/'000 NTK	3.65	3.71	n.a.
Allocated component 2	$/net tonne	1.07	0.69	2.28
Electric traction access charge	$/'000 GTK	1.00	1.00	0.92

[6] The charge for electricity, as opposed to the use of the overhead electricity distribution system, is not included in these reference tariffs. QR's current price for electricity supplied through the overhead system is approximately 83c/'000 GTK. Under the current arrangements, this amount will be a pass through for those who use the overhead system. Electric traction charges will vary with the energy consumption of electric locomotives relative to the reference train.

Price Component	Units	North Goonyella	South Goonyella[7]	West Goonyella
Incremental maintenance charge	$/'000 GTK	0.38	0.38	0.38
Incremental capacity charge	$/train path	300	400	300
Allocated component 1	$/'000 NTK	2.74	2.74	2.74
Allocated component 2	$/net tonne	0.63	0.61	0.63
Electric traction access charge	$/'000 GTK	0.80	0.80	0.80

Figures 9.2 and 9.3 break up of the components of these reference tariffs for each system.

Figure 9.2: Contribution to Total Revenue

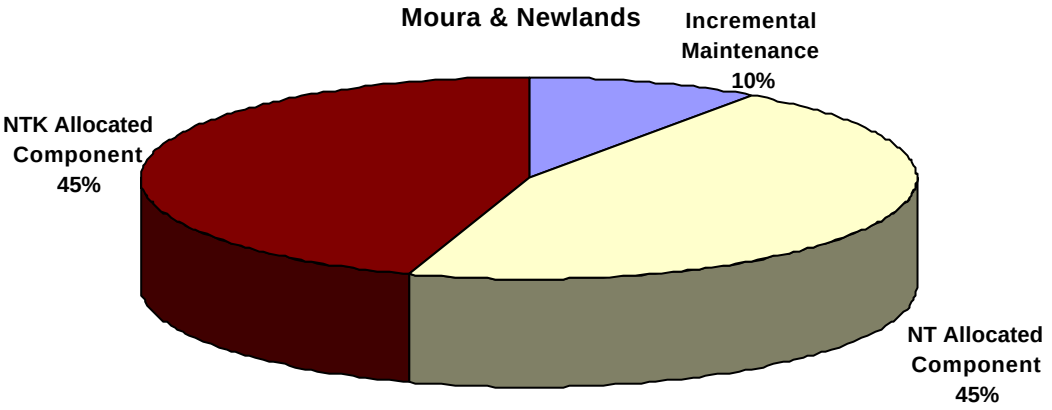
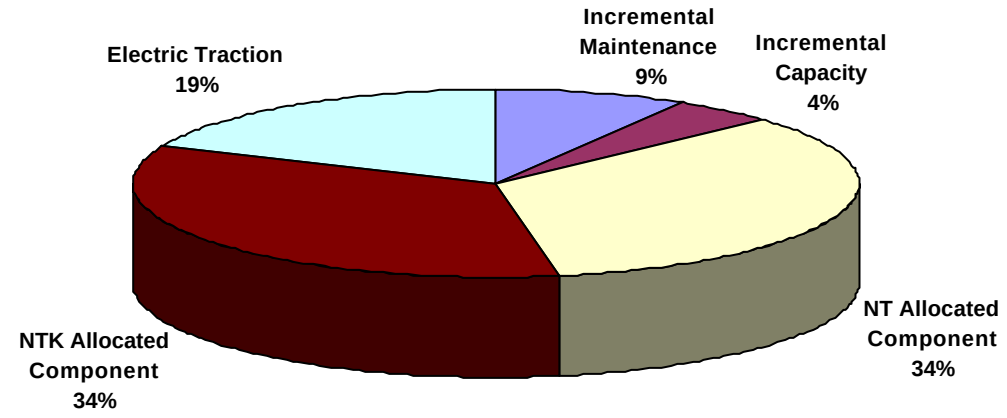


Figure 9.3: Contribution to Total Revenue

Goonyella, Central Blackwater, Gregory & Stanwell



[7] It has been assumed that the mines in the Gregory cluster would pay access charges for use of the Goonyella system on the same basis as applies to the South Goonyella cluster.

Figures 9.4 to 9.9 depict the reference tariff – net tonne relationship for each cluster and show how the access charge varies with haulage distance. The vertical lines indicate the approximate average haul for that corridor. Care must be taken with the interpretation of these diagrams as they assume the operation of the reference train service. Another train, which may, for example, consume additional paths, would not follow this precise relationship. In addition, incremental capacity costs are yet to be determined for the Moura and Newlands corridors. Further, for ease of reference, the incremental capacity charges have been averaged across the Goonyella system as the difference in the access charge-distance relationship between the clusters is very small.

Figure 9.4: Moura reference tariff

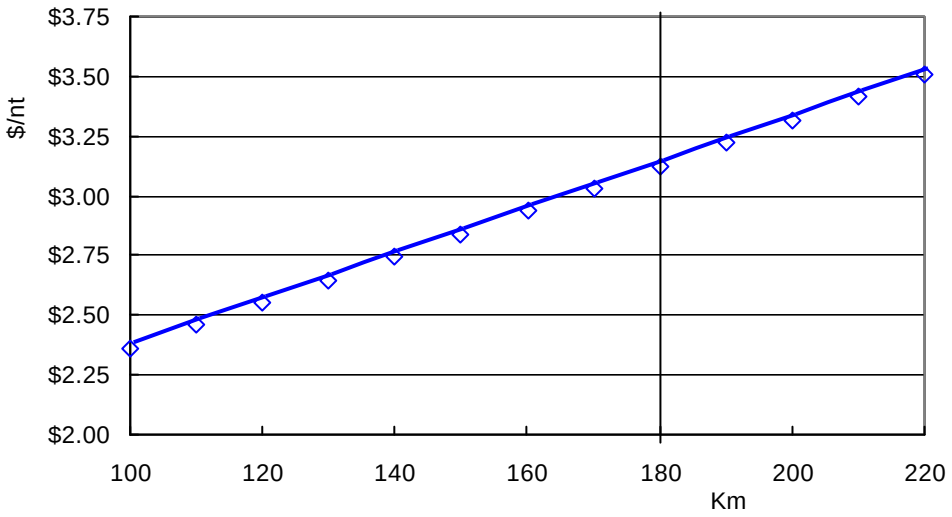


Figure 9.5: Newlands reference tariff

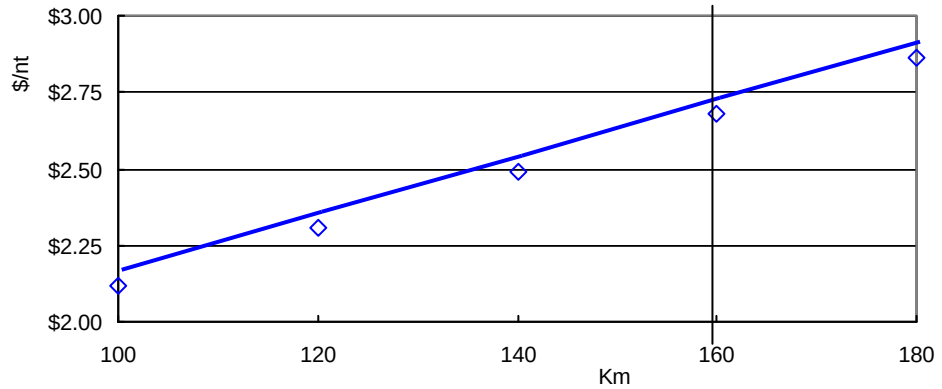


Figure 9.6: Central Blackwater reference tariff

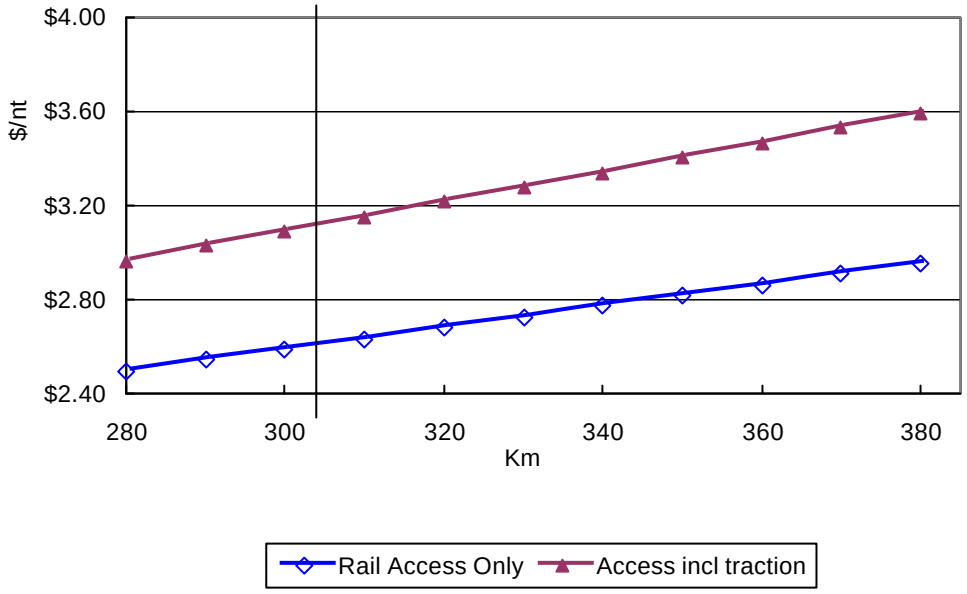


Figure 9.7: Stanwell reference tariff

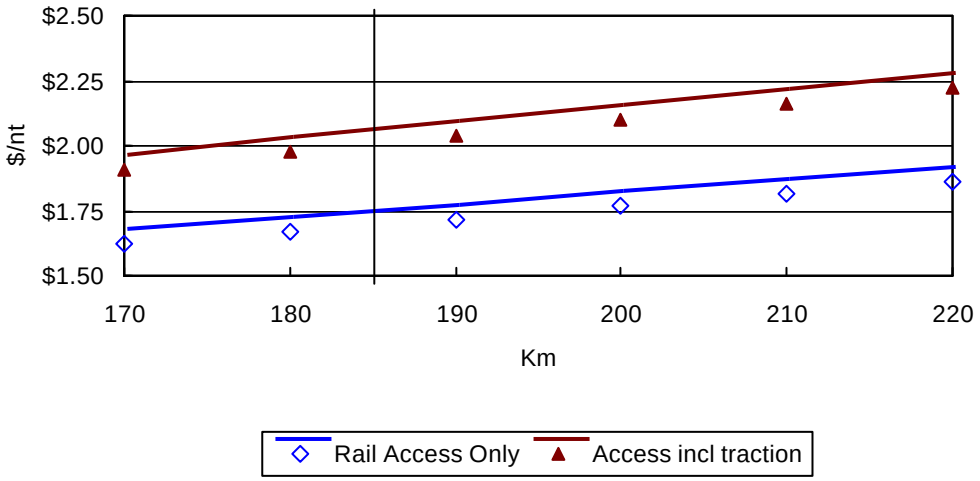


Figure 9.8: Gregory reference tariff

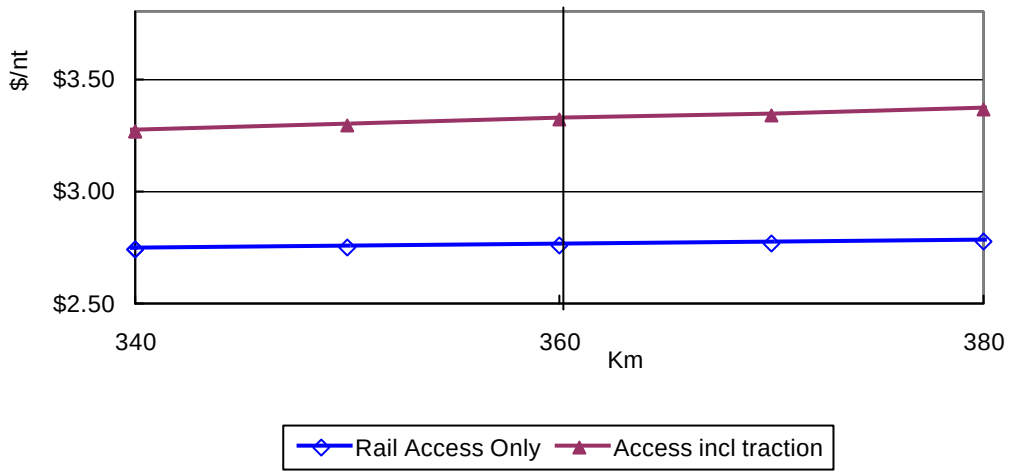


Figure 9.9: Goonyella reference tariff

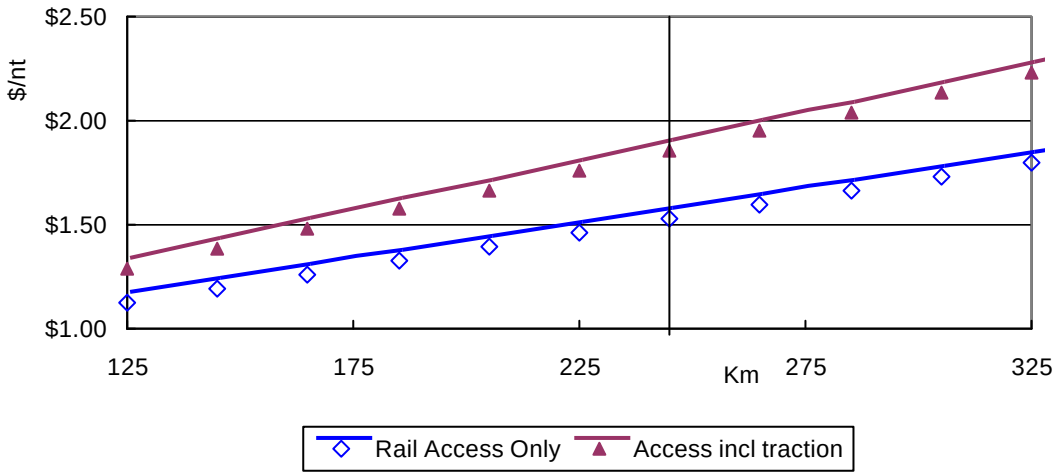


Table 9.4 compares the access charges applying under QR and the QCA's approaches for each mine, assuming operation of the reference train service.

Table 9.4: Comparison of access charges, excluding electricity charges

Mine	Route Kilometres	QR Rail Access $/nt	QCA Rail Access $/nt
Moura			
Boundary Hill	122	$2.08	$2.46
Callide	152	$2.75	$2.79
Moura	179	$3.32	$3.08
Newlands			
Collinsville	107	$1.73	$2.01
Newlands	175	$2.89	$2.61
Central Blackwater			
Jellinbah East	283	$2.88	$2.53
Yarabee	283	$2.88	$2.53
Curragh	305	$3.10	$2.63
Boorgoon	309	$3.14	$2.64
Blackwater	315	$3.21	$2.67
Kenmare	334	$3.40	$2.76
Laleham	334	$3.40	$2.76
Stanwell			
Curragh	180	$1.85	$1.69
Cook	182	$1.87	$1.70
Blackwater	184	$1.89	$1.71
Ensham	213	$2.19	$1.84
Gregory			
Ensham	338	$3.19	$2.76
Gordonstone	366	$3.46	$2.78
Gregory/Crinum	370	$3.49	$2.78
North Goonyella			
South Walker	125	$0.93	$1.14
Coppabella	138	$1.03	$1.19
Burton	168	$1.23	$1.28
Goonyella	197	$1.45	$1.38
Monanbah North	197	$1.45	$1.38
Riverside	203	$1.53	$1.41
North Goonyella	214	$1.57	$1.43
South Goonyella			
Peak Downs	190	$1.42	$1.36
Saraji	211	$1.57	$1.43
Norwich Park	255	$1.86	$1.56
German Creek Central	276	$2.05	$1.65
German Creek East	276	$2.05	$1.65
German Creek Sth	276	$2.05	$1.65
Oaky Creek No 1 UG	294	$2.16	$1.70
Oaky Creek OC	294	$2.16	$1.70
West Goonyella			
Blair Athol	278	$2.05	$1.65

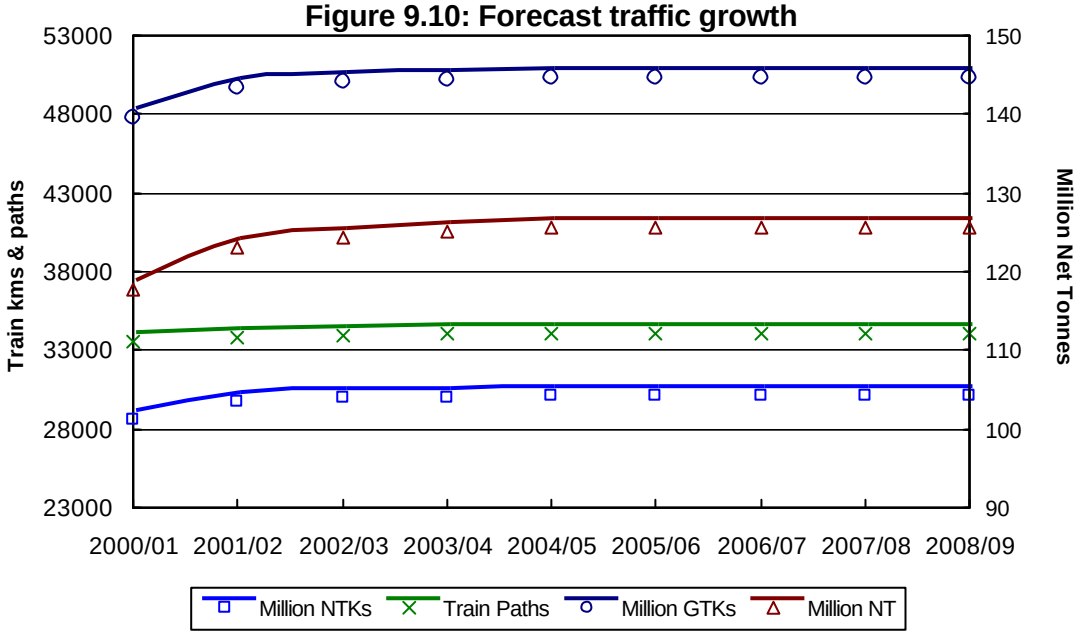
The following sections outline the key parameters that have underpinned the Authority's analysis.

9.4 Demand forecasts

The QCA has provisionally accepted QR's coal freight task forecasts for the purpose of assessing reference tariffs as part of the Draft Decision. However, the Authority is aware of the enormous growth that the Queensland coal industry is currently experiencing. It is possible that the forecast annual volumes for the regulatory period could be exceeded in the current financial year. Accordingly, it may become appropriate to adjust these forecasts during the consultation period as part of the Final Decision.

The pricing model requires four distinct measures of the forecast traffic volume facing each of the four coal corridors, namely net tonne kilometres, gross tonne kilometres, number of train paths required and net tonnes. These forecasts were based on QR's tonnage forecasts using average trip lengths and reference train configurations. The forecast traffic volumes are shown in Figure 9.10.

Figure 9.10: Forecast traffic growth



Matters in relation to demand forecasts are discussed in Chapter 11.

9.5 Assessment of stand-alone cost

As coal mines currently have no effective alternative means of transporting their product to market, they are tied to using QR's below-rail network, at least for the foreseeable future, notwithstanding their ability to choose their preferred above-rail operator.

The question therefore arises as to the maximum amount that should be able to be charged to these users. The stand-alone cost represents the maximum amount the owner of a natural monopoly can charge its users without providing those users (or someone else) with an incentive to replicate QR's network and offer an alternative service. Stand-alone cost therefore sets the maximum amount QR should be able to charge users of its below-rail coal network.

In theory, the application of the stand-alone cost test would require any non-coal traffics that contribute more than their incremental cost be considered as part of the stand-alone test. This would mean that the contribution above the incremental cost for these traffics would effectively be deducted from the total revenue from coal traffic for the relevant system. However, the Authority has assessed the non-coal traffics in each of the coal corridors and concluded that none of these traffics contribute more than their incremental cost. However, these non-coal traffics do materially affect capacity costs.

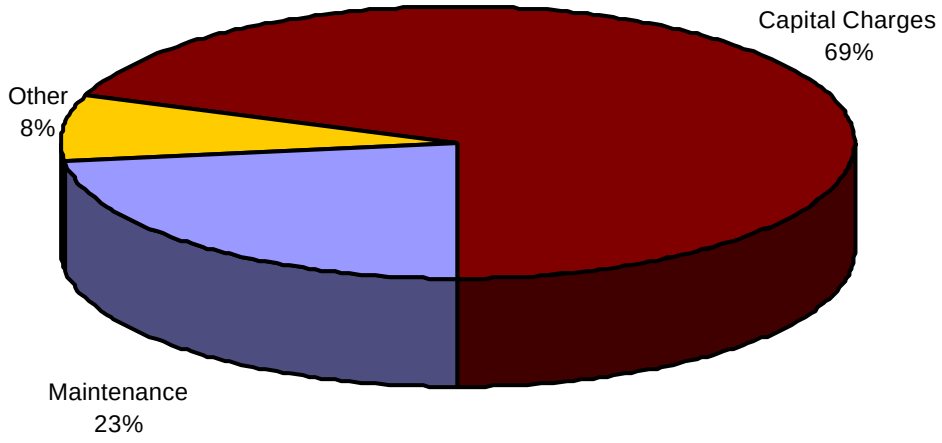
Non-coal traffics consume network capacity and bring forward network augmentation. Accordingly, non-coal traffics have been charged for each path they occupy on the same basis as applies to the coal traffics.

The stand-alone costs of providing the network can be broadly separated into the following components:

- maintenance costs;
- other operating expenses; and
- capital costs – which are a function of the opening and closing asset values and the rate of return.

Figure 9.11 depicts how stand-alone cost is comprised of these elements.

Figure 9.11: Coal region total below-rail costs 2000/01

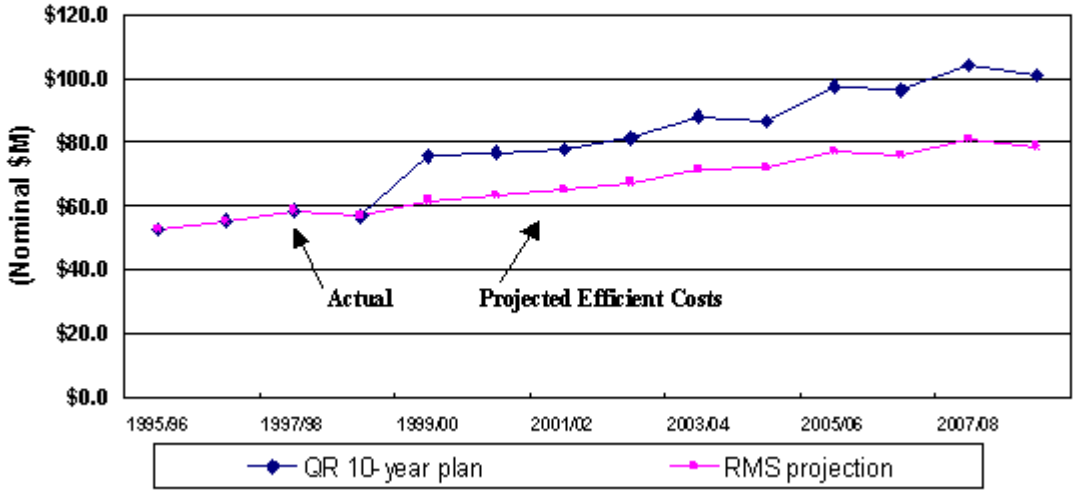


Maintenance costs - the Authority has undertaken a detailed review of QR's maintenance cost forecasts for the coal region and has determined the efficient level of these costs for a stand-alone coal-only network. The Authority's assessment entailed a review of both the quantum of maintenance activity planned for the coal region and the effectiveness with which that activity was to be performed.

In most instances, the scope of planned maintenance activity was considered reasonable given the current standard of the infrastructure and the expected traffic task over the evaluation period. Adjustments were made to QR's estimates to reflect maintenance expenditure related to non-coal infrastructure and non-coal traffic.

In terms of the cost effectiveness of QR's maintenance activities, the Authority determined that, on average, the unit rates employed by QR are approximately 15% higher than competitively determined contract rates for equivalent activities. Figure 9.12 illustrates the efficient maintenance costs used in the determination of reference tariffs.

Figure 9.12: Actual and projected expenditure on infrastructure maintenance - Central Queensland coal systems



Other operating costs - other operating costs include train control and safe-working, infrastructure management, business management, corporate overheads and other below-rail costs not directly attributable to specific line-sections, for example, an imputed risk premium required to cover the costs of insurance claims resulting from infrastructure induced incidents and financing charges.

By their very nature, the coal-specific element of these costs cannot be directly observed nor extracted from QR's financial accounts. The Authority therefore has relied principally upon an allocation of QR's existing expenditure as providing a reasonable proxy for the costs that would be incurred by a stand-alone coal railway (that is a railway that performed no function other than the provision of a network for the conveyance of coal).

The allocators were chosen on the basis of providing the most relevant cost driver for the particular function. The amount derived from this allocative approach was assessed as lying at the upper end of the reasonable range for an efficient stand-alone provider, based on a 'bottom-up' estimation.

The Authority's approach to the determination and allocation of maintenance and other operating costs is outlined in Chapter 12.

9.6 Asset valuation

The asset values were estimated using the depreciated optimised replacement cost (DORC) approach as outlined in section 13.2. Replacement costs for each major asset component were estimated as follows.

Table 9.5: Replacement costs

Asset component	Units	Unit rate
Track (inc. sleepers, ballast, laying & prelims)	$/km	$449,095
Turnouts:		
1:16 mainline turnout	$/turnout	$114,000
1:25 high speed mainline turnout	$/turnout	$173,000
Earthworks:		
strip	$/$m^3$	$4
cut to fill	$/$m^3$	$5
borrow to fill	$/$m^3$	$5
Bridges over seasonal water	$/mt	$10,000
Fencing	$/km	$1,100
Overhead conductor & catenary	$/km	$32,600
Overhead masts	$/mast	$4,500
Autotransformers	$/unit	$200,000

These values were subjected to the following adjustments:

- the addition of a 7% financing charge;
- incorporation of an allowance for the actual costs incurred in the brownfields development of the network, totalling $27 million; and
- exclusion of approximately 50 km of duplicated track, valued at $33.6 million, on the Callemondah to Rocklands section of the Blackwater system due to the capacity optimisation of the network.

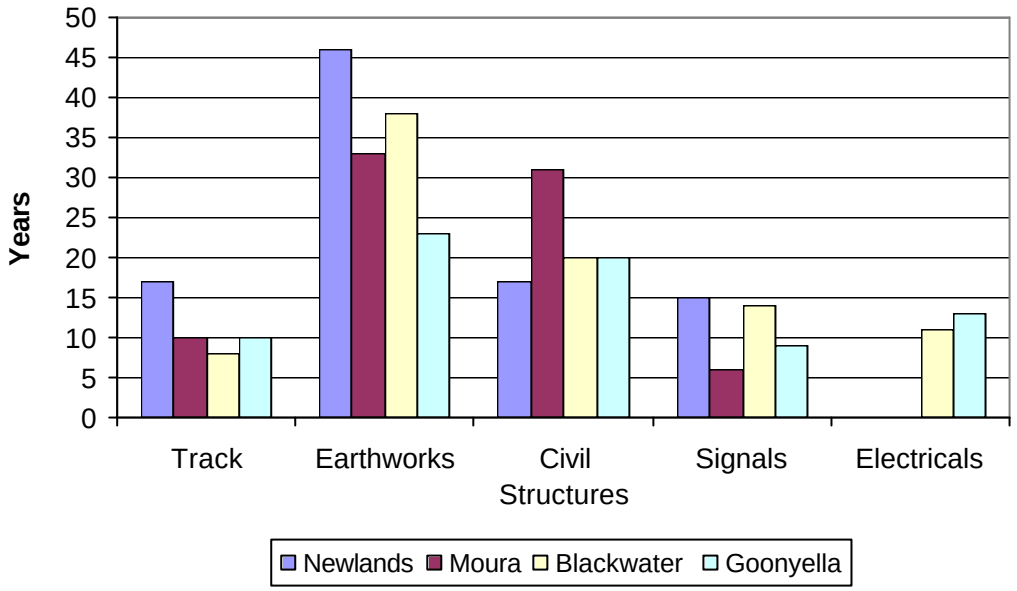
The straight-line method of depreciation has been applied to all asset classes. The asset lives used to estimate depreciation in each asset class are listed in Table 9.6.

Table 9.6: Asset lives

Asset classes	Asset life (years)
Culverts, earthworks, embankments, concrete pipes, steel bridges, road overbridges, retaining walls	100
Track – composite life	40
Steel pipes, timber bridges, yard drainage, access roads	50
Traction power distribution	40 – 50
Field signal equipment	10 – 35
Traction power system equipment, track turnouts, buildings	25
Traction power system control, fences and noise barriers	15

Figure 9.13 depicts average expired lives for each corridor with assets aggregated into major classes.

Figure 9.13: Expired asset lives



However in the case of the Goonyella system, depreciated asset value was reduced by a further $34 million on account of the fouled state of the ballast. This figure was determined by estimating the net present value of additional maintenance expenditure QR stated was required to repair the corridor relative to the level of expenditure required for track of a similar age.

The opening asset values, used in the calculation of reference tariffs, were $1.69 billion for below-rail assets (including track, signals, earthworks) and $350 million for electric traction assets or $2.04 billion in total, expressed in dollars of the day (1 July, 2001).

Closing or terminal asset values were calculated as follows:

- QR's capital expenditure program was assessed and capital expenditures that were consistent with the assumptions underpinning the assessment of reference tariffs were included as part of the cash flow modelling;
- the assets were depreciated on the same basis as the initial valuation of QR's assets; and
- the replacement cost of the network at the end of the modelling horizon (that is in 10 years time) was reduced by 5% on account of construction costs being expected to continue to decline at approximately 0.5% per annum.

The calculation of terminal values used the same depreciation rates/asset lives as those used to calculate the opening asset values discussed above. The forecast terminal values used in the calculation of reference tariffs are $1.8 billon for below-rail assets and $472 million for electric traction assets or $2.28 billion in total, expressed in dollars of the day (30 June, 2009).

Asset valuation issues are the subject of Chapter 13.

9.7 Contributed assets

The Authority considers that past contributions should only be recognised where a claimant can demonstrate that recognition beyond its existing haulage agreement is justified by way of documentary evidence. Any such contributions would be made as specific adjustments to the applicable reference tariff.

Contributed assets are discussed in Chapter 14.

9.8 Rate of return

The Authority adopted the Capital Asset Pricing Model to estimate the rate of return using a post-tax nominal weighted average cost of capital. It determined that it was most appropriate to estimate the rate of return on a sector-specific basis, that is for the provision of access to QR's coal network.

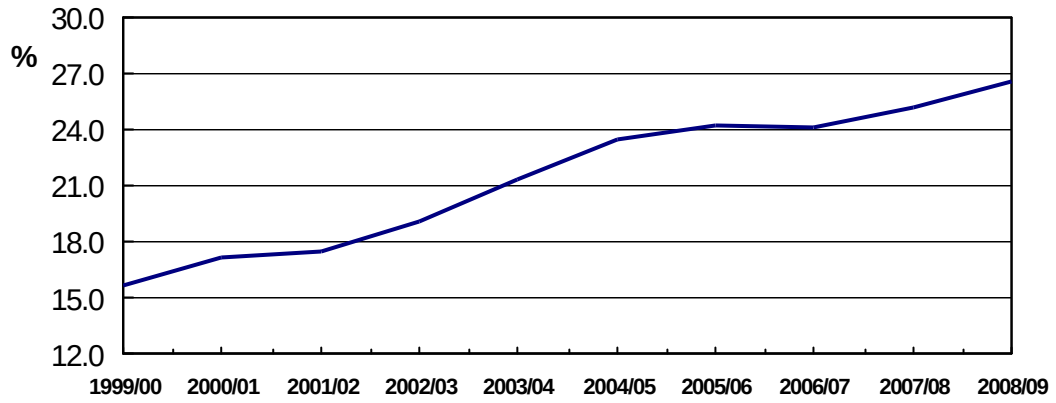
The Authority has estimated the nominal post-tax WACC for QR's below-rail coal network to be 8.63% which represents a margin of 2.7% over the risk-free rate. The WACC is estimated based on the following parameters:

- the risk-free rate is given by the 10-year bond rate on the day of the decision – as at 20 November, the rate was 5.92%;
- a market risk premium of 6%;
- a gearing level of 55%;
- an asset beta of 0.45;
- a debt beta of 0.2 (that is the debt margin of 1.2% above the risk-free rate);
- an equity beta of 0.76;
- a tax rate based on the prevailing statutory tax rate (see below); and
- imputation credits being valued at 50%.

The risk free rate for the Final Decision will be updated on a particular date that will be notified to stakeholders in advance.

As stated previously, the WACC used in the calculation of reference tariffs is a post-tax nominal rate. Consequently, it is necessary to include in the cost stream an allowance for corporate tax payments. The forecast tax liability of QR's below-rail coal business was calculated by applying the corporate tax rate (that is 34% in 2000/01 and 30% thereafter) to the estimated taxable income of the entity. The taxable income was calculated by adjusting the entity's profit before tax for permanent and timing differences.

Figure 9.14: Effective tax rate - QR's below-rail coal business



An inflation rate of 2.5% per annum has been assumed for the assessment of reference tariffs.

Matters in relation to the rate of return are discussed in Chapter 15.

9.9 X-factor

The Authority considers that QR's reference tariffs should be the subject of a CPI-X mechanism with an X-factor of 1.5% per annum. Incentive regulation and the X-factor are discussed in Chapter 16.

CHAPTER 10. REFERENCE TRAIN SERVICE

KEY ASPECTS

Tariff structure - the tariff structure departs materially from that proposed by QR. The Authority proposes a cost-reflective tariff structure to apply for the use of the coal network, with separate charges to be levied for maintenance and capacity costs.

Electrical overhead costs - the costs for the use of the electrical overhead infrastructure will only be levied on those who use it.

Costs unattributed - costs that cannot be attributed on a cost-reflective basis will be attributed on a combination of a charge per net tonne and a charge per net tonne kilometre.

Take or pay – a take or pay charge may be levied where system-wide railings depart by more than 10% from monthly averages.

Clusters - QR's revised proposal of nine separate clusters has been accepted. There will be one cluster for each of the Moura, Newlands and West Moreton systems, with each of the Blackwater and Goonyella systems being separated into three clusters.

10.1 Introduction

Reference tariffs, for specified reference train services, have been proposed by QR in relation to access charges for coal traffic to overcome the problems that arise from the very broad limits established by floor and ceiling prices under a negotiated pricing regime. QR's proposed framework should provide increased pricing transparency. This will increase certainty for rail users and reduce negotiation costs.

The process of establishing reference tariffs will inevitably impose a degree of standardisation in the way in which services are specified and priced. The specification of train characteristics will therefore have important implications for the evolution of the above-rail market. A related issue concerns the pricing structure to accompany the reference train service, that is the way in which charges will be levied for the reference train service as well as any other train service that utilises QR's network.

If the services covered by the reference tariffs are not representative of the coal traffic that traverses QR's network, or a pricing structure is created that does not provide relevant information to market participants, then the usefulness of the concept will be undermined. For example, it could result in the network being utilised in other than a cost effective manner, causing the total cost of coal transport to increase unnecessarily.

The Draft Undertaking specifies, but does not define, the relevant characteristics. However, on 9 November, 2000, QR submitted reference tariffs for certain defined services. The details of QR's proposal are set out in this Chapter. Assessing QR's proposed reference tariff approach requires a number of issues be addressed:

- the approach that should be taken to choosing the reference train service;
- the pricing structure for the reference train service;
- the characteristics of the applicable reference train service including the relevant standards of service and the specific technical parameters, including:
  - the tolerance around these dimensions before triggering an assessment as to the applicability of the reference tariff for the particular service in question;
  - where a variation is required, how it might be quantified;
- the geographic scope of the services to be considered as a group (or 'cluster') for the purposes of a reference tariff; and
- how new mines are to be treated under the arrangements.

In September 1999, the QCA released an Issues Paper, *Queensland Rail's Draft Undertaking - Reference Tariffs, Reference Train Services and Rate Regulation*, inviting comments from interested parties. Unless otherwise noted, the views ascribed to QR and other stakeholders in this Chapter are in relation to the issues raised in the submissions to that paper.

10.2 Basis for choosing the reference train service

Rail transport is different from many other natural monopoly industries, such as electricity and gas networks, because an operator's consumption of capacity is highly dependent upon the interaction of that user with others on the network. In contrast, electricity and gas networks each convey a homogenous product.

This distinguishing characteristic has important implications for the regulatory process. A critical dimension to the emerging above-rail market concerns competitors establishing the most efficient configuration that will most efficiently serve demand. However, the definition of the reference train service will of necessity establish an element of standardisation to the process.

Reference tariffs will apply for a given set of train service characteristics (for instance axle load, indicative transit time, speed, commodity type and geographic area), which in turn will set the 'benchmark' for above-rail operators. Accordingly, the specification of train service characteristics will have important implications for the evolution of the market as a whole.

This is because departures from the standard that is set will result in different access charges applying. These price differentials could distort competition in the above-rail market. Failure to incorporate the most appropriate train service characteristics (considered in the context of the coal chain as a whole) will undermine the usefulness of the concept and may unnecessarily increase the cost of coal transportation.

QR's Position

QR considers it is critical that all parties recognise that the reference train service concept is being superimposed on a rail system that is currently operating. There are already standards in place based on the limitations of the rail infrastructure in relation to train length, axle load, speed and other rollingstock interface standards. Similarly there are already standard sectional running times and scheduling and train control procedures. Costs are likely to be incurred if a railway operator wishes to operate a new train service with standards different from those already in place. As a result, QR considers that a benchmark has already been set by its existing operational standards.

Therefore, in describing the reference train service, QR considers it is essential that the reference train service reflect the existing paradigm of the system, in particular, the predominant train service that is operating on that system.[8] To the extent that the predominant train service changes over time, the reference train service would be expected to change as well.

Stakeholder Comment

Views were expressed as to the desirability of the reference train approach.

Table 10.1: The reference train service

National Rail - the desire to lower negotiating costs and reduce the risk of adverse outcomes may induce an operator to use a train that conforms to the reference train specification even when, in the absence of these considerations, it would prefer to use a non-conforming train. QR's current operating practices are the outcome of the judgements that it has made as to the appropriate technical and operating characteristics for serving the current task. It is reasonable to expect that similar judgement will influence the specification of the reference train. If this does prove to be the case, then the reference train specification will have the effect of shifting the focus of competition towards a way of operating that conforms to the practice of the incumbent operator. The usefulness of a reference train approach will vary directly with the number of access applications to which it is directly relevant. This implies that each characteristic of the reference train should, wherever possible, be defined as a range of values. It also implies that, where a range is specified, the range should be as broad as reasonably possible.

[8] However, the QCA understands that the reference train service proposed for the Blackwater system does not currently operate on the system. It appears that QR expects this configuration to become the predominant service during the regulatory period.

FreightCorp - the desirability of reference tariffs is questionable. QR instead should provide the data from which it calculates reference tariffs, along with the formulas used and worked examples to ensure that the method to be applied is clear. This solution is superior because:

- all parties are able to understand the basis for access prices. It aids transparency of access prices in a way that reference prices do not;
- if the QCA is only required to approve the information package once, with perhaps an annual review of the data supplied, this should forestall a continual reappraisal as might be required if reference tariffs required approval each time a new price is sought; and
- it would be far simpler and less resource consuming for QR to provide the data and information on how to calculate reference tariffs to access seekers when they apply for access rather than requiring them to submit a service package and then wait for 28 days (plus the inevitable additional time whilst further details are sought). It would also allow access seekers to process their own requirements more speedily and conduct as many alternative scenarios as they wished.

QCA Analysis

The Authority notes the view expressed by one stakeholder that it would be better to avoid the reference train concept and instead provide data relevant to the calculation of access charges. However, even if all that is provided is data relevant to the calculation of access charges, the establishment of a standard remains fundamental to any network whose capacity to deliver services is a function of the interaction between participants.

Consequently, the Authority considers that the establishment of a reference train service forms a necessary part of QR's pricing structure. However, the Authority also acknowledges the critical importance of ensuring sufficient information is available for above-rail operators to determine for themselves the optimal above-rail solution for an end customer, allowing for both above and below-rail dimensions.

In practice, the specification of the 'benchmark' reference train service could have significant implications for the evolution of the above-rail market. This is because the Draft Undertaking envisages that train service characteristics that depart from the reference train service would normally (but not always) be expected to attract a price premium.

Therefore, in translating the concept of the reference train service for the purposes of QR's Undertaking, an important issue concerns the nature of the regulatory environment that will result from the implementation of the concept. The desirable attributes of such a regime include that it be:

- efficient in the sense that the arrangements should be consistent with minimising the long run cost of coal haulage by sending appropriate pricing signals to market participants. In addition, it is important the arrangements not distort the evolution of the above-rail market (for example, by providing a significant advantage to a particular above-rail operator) and do not result in an inappropriate assignment of risk;

- simple to the extent that it is understandable and able to be applied by above-rail operators and end customers. Adoption of such a framework should be consistent with a desire to minimise the transaction costs associated with the administration of the tariff arrangements;

- transparent so that Network Access, third-party operators and end users are able to understand how access charges are determined and assess those proposed by Network Access in light of that understanding; and

- predictable - the price signals that are provided by the arrangements will significantly influence long term decisions by above-rail operators and end customers. For example, end users and above-rail operators could normally be expected to enter long term contracts, especially in the early stages of third-party access. It would be desirable if parties could enter contracts with confidence in the stability of the access pricing environment. This would suggest stability is desirable. However, the arrangements must also be sufficiently flexible to accommodate changing circumstances. The key to resolving the tension between these conflicting objectives is that changes in tariff structure should be predictable and be foreshadowed as an inherent part of the pricing arrangements (such as a change to the reference train service).

The process of establishing reference tariffs could therefore result in a degree of standardisation in the way services are specified and priced. For example, the capacity of the system is dependent upon train speeds – thus the choice of train speed for the reference train service will dictate the standard from which the costs of departures will be assessed. Consequently, if the standard is 80 km/h, then a 70 km/h train will require additional capacity and therefore could be a more expensive path, even allowing for the 70 km/h train creating less of a maintenance requirement. Accordingly, the adoption of specific parameters may have significant implications for the evolution of the rail market and the realisation of benefits for customers.

As such, the effectiveness of reference tariffs depends upon ensuring that the specification of the reference train service represents the most appropriate set or bundle of train service characteristics (both technical and operational), consistent with customers obtaining their preferred price/service quality trade-off.

In the above-rail market, competing operators will develop alternative above-rail solutions to better satisfy end customer requirements. This is the essence of how above-rail competition will benefit end customers. Consequently, it could be highly deleterious if the reference tariffs were based exclusively on the incumbent's existing operation. Such an outcome is the very antithesis of the dynamic environment that the above-rail market is expected to become. It could constitute a significant barrier to entry. In particular, choosing the reference train service will need to take account of the fact that it will influence the long term use of the system.

Nevertheless, the Authority recognises that, at this stage, there are no alternative above-rail operators on QR's coal network. Consequently, for the purposes of this initial regulatory period, the Authority recognises the need to make a start and therefore accepts that the predominant train service will influence the specification of the reference train service. The Authority is however concerned that this recognition is a reflection of the most likely traffic flows in the first regulatory period. It should not be interpreted as a natural advantage flowing from incumbency.

If a cost-reflective approach is adopted for pricing purposes, as the QCA proposes, the reference train need not be as prescriptively defined as QR has submitted. It is therefore proposed to adopt only those elements of QR's reference train as are necessary, having regard to the form of the tariff structure and the efficient utilisation of the infrastructure.

The key differences between the approaches of QR and the QCA to the definition of the reference train service are as follows:

- the gross tonnage of the reference train is redundant if a cost-reflective approach is adopted; and

- the level of priority assumed for the reference train service is that which is consistent with the standard train path rather than the actual level of priority at which QR's trains currently operate.

The application of this approach is considered in the following section.

The nature of the consumption of capacity on a network is that the cost of departures from the relevant benchmark could increase as the proportion of non-standard trains increase. At some point, a decision could be made that the benchmark standard configuration operating on a corridor is not in fact the most appropriate from the perspective of overall system efficiency (that is, minimising the long run cost of rail transportation). In the long run, the Authority considers that this is the key criterion for identifying the relevant reference train service.

QCA Position

In assessing QR's reference tariffs, the QCA does not accept that the predominant service operating on the corridor should be the reference train service. Instead, those elements of QR's reference train that are necessary will be adopted, having regard to the cost reflective tariff structure and the efficient utilisation of the infrastructure. In future reviews, the reference train service will be judged on the basis of providing the most efficient outcome for end customers.

10.3 Structure of reference tariffs

In any market, prices play a central role in co-ordinating commercial activity. The market involving the provision of rail infrastructure by QR is no different. Under a competitive market, above-rail operators will develop rail transport solutions which take into account the access charges they will be levied. Access charges must therefore be consistent with efficient utilisation and expansion of the rail infrastructure. The structure of access charges will therefore significantly influence the evolution of the above-rail market.

A key economic characteristic of the rail industry is that a large proportion of the total cost of providing infrastructure services is fixed, in the sense that the costs cannot be assigned unequivocally to any particular user. Setting access charges on the basis of marginal cost would result in QR failing to satisfy revenue adequacy requirements. Accordingly, the fixed costs need to be allocated amongst users. It would be desirable if these costs are recovered in a way that does not distort the operational arrangements above-rail operators propose to carry coal.

In order for the reference tariff concept to be useful, it is important that it provides parties with certainty about the likely results of dispute resolution where it is feasible. In addition, it is desirable that the pricing structure be transparent and simple so that all parties can have confidence that reference tariffs represent a reasonable price for the service, especially where the service departs from the reference train service.

The structure of reference tariffs will send important signals to users for the efficient rationing and augmentation of capacity in the rail system. In addition, the structure of reference tariffs could also have implications for the assignment of risk between the parties, for example, higher fixed charges could, under certain circumstances, impose greater risk on users and a lower risk on QR (and vice versa).

Consequently, the definition of the reference train service and the charging schedule are inextricably linked.

QR's Position

QR questioned whether it is necessary for the pricing structure to be identified as part of the published reference tariff but acknowledged that some guidance on appropriate pricing structures could be given in the reference tariff information. QR did not support the application of a two-part tariff for rail access, on the grounds that a two-part tariff structure would provide a volume discount to a railway operator, as the average cost of access per unit of usage would reduce as usage increased.

QR further argued that the application of a fixed charge that related to train path usage would require the identification of the fixed and variable components of QR's costs and this is ambiguous. Incorrect calculation of the variable cost component could lead to the inefficient use of the infrastructure. QR stated that because reference tariffs should not be structured with regard to fixed and variable costs, there would seem to be little point in developing highly sophisticated costing models to identify the variable cost of access.

Therefore, QR prefers a linear tariff based on gross tonne kilometres for each nominated reference train service and to review the linear tariff to take account of the productivity changes associated with volume variations outside the nominated volume range. In conjunction with this approach, QR proposed that reference tariffs include a take or pay element to encourage the efficient utilisation of available capacity.

QR envisages that the take or pay element of the access charge will be a percentage of the total grossed-up charge which, for a reference train service, is based on the linear reference tariff and the contracted gross tonne kilometres. Hence, the take or pay component would not be based on actual usage, either gross tonnes or train paths, but would represent a fixed periodic payment to QR.

QR also proposed that access charge arrangements would allow different access charge structures to be negotiated in order to reflect acceptable risk sharing arrangements. QR noted that, in certain circumstances, it might require up-front contributions from rail operators to compensate for any increase in risk associated with the provision of access to that operator.

In addition, QR proposed that the reference tariffs would refer only to a given range of total tonnage on the relevant cluster.[9]

However, QR recently proposed that each customer's total access charge be split into fixed and variable components. These components would be estimated based on the reference tariff multiplied by the number of gross tonne kilometres expected to the consumed in the upcoming year, and be calculated as follows:

- a fixed charge per month which comprises 35% or 40% (depending on the cluster) of the total amount to be recovered through equal monthly instalments, effectively operating as a take or pay arrangement; and

- a variable amount per gross tonne, through which the remaining 60% or 65% of the access charge will be recovered, based upon the number of gross tonnes carried over the course of the year.

The fixed component of the charge would be levied on the basis of the number of train services contracted in the relevant month as defined by the capacity entitlement. In other words, the fixed charge will be payable irrespective of the number of trains that are run in that month.

[9] The assessment of these ranges is addressed in section 10.4 below.

Therefore, if an above-rail operator operates less train services than its contracted capacity entitlement permits, it is required to pay what is effectively a penalty on account of the train services that were not operated in that month. However, if an above-rail operator operates more than that minimum, it pays a fixed component that increases in proportion with the number of services that are operated. For example, if an above-rail operator operated one and a half times the number of contracted services, than that operator would pay one and a half times the fixed component access charge for that month.

Stakeholder Comments

While stakeholders were not given the opportunity to comment on QR's proposed take or pay arrangements, there were a range of views as to the structure of reference tariffs.

Table 10.2: The structure of reference tariffs

Stanwell - if a two-part tariff is adopted, the fixed component should reflect the cost of providing access to the below-rail infrastructure and the variable charge should reflect the cost of usage of the tracks. Any risk borne by QR in providing a certain arrangement could be reflected in the amount charged.

QMC - a reference tariff should relate to a standard reference train service as proposed by QR and be expressed as an amount per gross tonne kilometres. Part of a mine's accumulated reference tariff would be collected monthly as a fixed charge to provide a take or pay component to the access charge.

ARTC - the variable/fixed split in the pricing structure, together with realistic take or pay requirements, represents a fair sharing of market risk between the network owner and user and QR's linear charging mechanism plus a reservation charge seems reasonable.

FreightCorp - the fixed component is a path charge payable over the life of the reservation of the path based on the kilometres travelled by the train over various broad line sections. Also, the charge should be structured so that the level of service (priority) should be reflected in the fixed charge. The variable component should be based on gross tonne kilometres with perhaps an adjustment for train speed.

National Rail - a two-part tariff structure should be applied. The variable component reflects the long-run incremental cost of providing, maintaining and operating the track for the service to which the tariff is applied and the fixed component should recover those costs that are necessarily incurred but which cannot be attributed even in the long run to the need to provide for a particular service. It might be appropriate to reflect both track loading (gross tonne kilometres) and network occupancy (train-hours) in the setting of the charge. The use of long run incremental cost over short run marginal cost is preferred on various grounds, including the potential, in the absence of congestion pricing mechanisms, for short run marginal cost to lead to congestion on the network and significant external costs. The tariff structure could, in addition to affecting the viability of some mines and the decisions of the train operator with respect to train configuration and frequencies, make entry into the industry more difficult. These effects may be significant enough to be taken into account in tariff design.

QCA's Analysis

Reference tariffs will be set so as to allow QR to recover the stand-alone cost of providing access to its below-rail network for coal traffic in Central Queensland. The determination of the stand-alone cost is discussed in Chapter 12.

Access charges will play a critical role in co-ordinating commercial activity in the above-rail market. Therefore the purpose of the reference tariff is to provide guidance as to the likely costs imposed upon the system by alternative above-rail operational parameters.

It is therefore fundamental to the Authority's assessment of the Draft Undertaking that an environment be created where parties are able to negotiate and that the basis for this negotiation be an assessment of the net cost of alternative arrangements on the system as a whole. In addition, in order to reduce the risk (and cost) of arbitration, the Authority believes it is desirable to provide as much clarity as possible about the likely outcomes of such a process.

In order to perform this role, the design of access charges should contribute to facilitating the emergence of the above-rail market by reducing the costs of negotiating access agreements and providing a transparent basis against which above-rail operators are able to most cost effectively satisfy customer demand. Transparency of charges, or linking charges explicitly to specific cost drivers, is an important element of this objective.

For a natural monopoly such as QR's below-rail coal network, it is necessary to ensure that access charges are structured so as to enable QR's below-rail costs to be recovered in a way that does not distort the above-rail market. For this to occur, it is necessary that access charges be structured so as to avoid inducing above-rail operators to respond to the demands of the market in a way that increases the total cost of rail haulage to end customers.

In other words, it is important to recognise that above-rail operators will be responsive to the tariff structure in the way in which they seek above-rail solutions to haul coal. An inappropriate tariff structure would seriously undermine the efficiency of the rail market and thereby result in unnecessarily high haulage charges (whether caused by relatively higher access charges because inefficient expansions are required or by more expensive haulage charges).

Two issues arise concerning the structure of reference tariffs:

- the way in which reference tariffs should be established with respect to the underlying cost drivers; and

- whether a take or pay component ought to be included in the arrangements.

Impact of cost drivers

In order to avoid distorting the above-rail market, it is critical that users pay access charges according to the costs they impose on the system.[10] A single tariff based on a charge per gross tonne kilometre would be simple to administer. However, it would not be transparent for signalling the cost implications of alternative above-rail operational configurations. Consequently, it is necessary to:

[10] In theory, this should extend beyond the costs imposed on the infrastructure to the costs imposed on other users as well (that is, congestion charges). However, the Authority is aware of the unanimous view amongst stakeholders that the rail industry is not as yet ready to incorporate an explicit regime of congestion charges as part of an access pricing framework.

- separately identify causative elements[11] – that is, those that impose costs on the infrastructure provider. In the context of QR's below-rail coal network, the two major below-rail causative elements are the marginal costs of maintenance imparted to the infrastructure through usage and the costs of providing capacity. Another cost, which is addressed separately below, concerns the cost of the use of overhead electrification infrastructure; and

- assess the extent to which pricing on the basis of those causative factors fails to achieve the recovery of QR's efficiently incurred costs. Identification of this shortfall will require recovery through another component in the charging regime, chosen so as to not distort above-rail decisions. For example, it should be different to the causative factors outlined above in order to avoid 'over signalling' (that is, attributing causation to a factor that is not causative in nature).

Separating the causative and non-causative (or allocative) elements of the infrastructure charging regime brings transparency to the pricing setting process in a way that can be understood by interested parties. It also enables the process of defining the reference train service to become less prescriptive than might otherwise be the case.

The Authority believes there is value in identifying the variable cost of access for the purposes of developing reference tariffs. The emergence of third-party operators with differing operational configurations will require an ability to price the impact of those departures and in turn achieve an understanding of the underlying cost drivers for the provision of access to QR's network. The approach adopted provides a basis upon which this assessment can be undertaken in a transparent way that is available to all market participants.

However, it is critical to note that long term decisions are affected by the reference tariff structure. Consequently, the signals that are implicit in the charging structure should be based on long term rather than short term considerations. It would seriously undermine the efficacy of the above-rail market if there were frequent, substantial and unpredictable changes in these pricing signals.

The Authority considers that departures from the following parameters of the reference train service are most likely to have predictable implications for below-rail costs, and in turn, access charges:

- use of the electrical overhead infrastructure;

- maintenance-related charges for changes to axle load and train speed; and

- capacity-related charges for trains consuming more or less capacity than the reference train service (as applied in this Draft Decision), due to, for example, differing sectional running times or levels of priority.

These factors are discussed in turn followed by an analysis of the most appropriate basis for the recovery of non-causative costs.

[11] However, such an approach also potentially increases the risk of introducing forecasting error. All other things being equal, the Authority considers it desirable to avoid exposing QR and customers to unnecessary risk that outcomes will depart materially from forecasts. For example, the forecasting of throughput is a function of world supply and demand for coal. In order to translate this total output forecast into a net tonne kilometre forecast it is also necessary to assess the average distance that each tonne of coal is carried. It is more complex again to estimate the number of gross tonne kilometres for a period as this requires the net tonne kilometre figure to be adjusted for the gross to net ratio of above-rail operators. Finally, estimation of the number of train paths requires an estimate be made of the average tonnage each train hauls.

Overhead Electrification Infrastructure - the Authority considers that one of the critical aspects of the third-party access regime is that it must not distort choice between diesel and electric above-rail technology. Accordingly, it would be inappropriate if diesel engines were confronted with a charge for either the use of the electricity distribution infrastructure or electrical energy.

QR's electricity distribution network is sunk but vulnerable to be bypassed by above-rail operators utilising diesel-powered locomotives. In this sense, QR's electricity distribution network is a contestable asset, but one to which customers are tied, once they are on the network, because of the feasibility in changing fuel source once a diesel or an electric locomotive has been purchased.[12]

From an economic perspective, as long as the long-run incremental costs of the use of the electrical overhead network are covered, it is desirable if the use of this infrastructure is priced so as to remove the incentive for above-rail operators to bypass it. The Authority is also concerned to ensure that it avoids creating an incentive to bypass this infrastructure by requiring QR to levy a use of system charge that makes electricity an unattractive energy source relative to diesel.

Consequently, the QCA believes that QR should have the right to set the prices for the use of this infrastructure to the extent that the services provided can be bypassed, subject to the following rules being observed:

- all incremental charges, including energy costs, are recovered;
- the same charges are available for QR above-rail businesses as for third-party operators;
- the use of system charges remain constant over time - QR's control over the infrastructure and the pricing of the use of it could be manipulated by QR to provide its above-rail business groups with a distinct competitive advantage; and
- the service is not priced in a way that would recover excessive returns. It is possible with rising diesel prices that QR could recover an excessive return on its electricity overhead assets due to an ability to increase electricity charges inappropriately. The Authority would be reluctant to interfere in response to a short term 'spike' in diesel prices.

The 'value' of the electrical overhead infrastructure will depend on not only the price of diesel, but also the price of electrical energy. The QCA is minded to endorse a pricing arrangement where QR may, for example, set a price for the use of the electrical overhead network on the basis of a formula that includes the price of diesel and the average electricity spot price. Such an approach would minimise the asset stranding risk for QR.

However, the Authority is not minded to endorse frequent revisions to these charges. A formula-based approach might involve frequent revision, but on a predictable basis that is known to all interested parties (and, in particular to parties when they enter contracts). Subject to the principles outlined above, this variation does not concern the Authority. Rather, the Authority's concern is that QR should not be in a position to frequently change use-of-system charges. The Authority will be influenced by this concern in the context of approving amended arrangements.

[12] Technologies are available to enable trains to be both diesel and overhead electrically powered.

Capacity Charge - every above-rail operator who consumes a train path should face the cost associated with providing that path.

Capacity consumption for an individual train is affected by several factors including speed, length and braking profiles. However, its assessment is complicated by the fact that the capacity consumed by a train service cannot be considered in isolation of the preceding, following and oncoming trains.

A standard therefore needs to be developed to provide a basis for assessment. One basis for assessing the capacity of a system is to calculate the number of theoretical paths available by assuming that the longest section is occupied at all times by the dominant train, observing relevant safeworking requirements.

QR has proposed that this criterion form the basis of an objective benchmark to underpin an assessment of the theoretical capacity of the network, and the capacity that is consumed by above-rail operators. Under this approach, system capacity is measured in terms of the number of standard train paths (STPs) available after allowing for a reduction factor on account of normal below-rail events (such as weather and temporary speed restrictions).

The Authority proposes to accept this approach as a basis for assessing the cost of capacity consumption. This means that there are two inputs to quantifying capacity consumption:

- a comparison of an above-rail operator's sectional running times against those of the STP; and

- the level of priority sought relative to the STP.

Each above-rail operator may well exhibit different train performance characteristics that affect the number of STPs its train 'consumes' in each cycle. Consequently, by independently assessing the incremental cost of an additional path, the cost associated with the differing characteristics can be estimated for pricing purposes.

The Authority proposes adopting an approach whereby an operator's capacity consumption is assessed as the lesser of:

- the number of STPs consumed, based on the theoretical STP framework; and

- the number of STPs consumed, based broadly against the actual running of the dominant train.

The Authority has produced working paper 3 to elaborate and clarify its proposed approach to assessing the costs associated with capacity consumption for reference tariff assessment. This paper estimates the cost of the STP for the purposes of creating a component of the pricing structure for the reference train service.

The Authority considers that the party seeking to demonstrate that the approach set out in the working paper, endorsed as part of the Final Decision, is inappropriate, should bear the onus of demonstrating why that is the case in an arbitration.

Maintenance charges - two factors significantly influence the forces imparted to the track by an above-rail operator, which in turn affects the maintenance task for a below-rail manager:

- a train's axle load; and

- a train's speed.

Above-rail operators seeking to operate trains at below the maximum axle load or train speed can be expected to impart less damage to the track than the reference train service. There is a substantial body of research on the incremental maintenance cost impacts of differing axle loads and train speeds. Whilst this data has been developed from other rail systems, the Authority considers that this research provides a basis for reasonably accurately estimating the impact of departures from the maximum axle load using publicly available data.

The Authority has estimated the incremental maintenance cost attributable to an above-rail operator of a given speed and axle load for each corridor of the Central Queensland coal system. The Authority considers that departure from the reference train service in terms of the axle load or train speed will have a predictable impact on maintenance costs. Consequently, the Authority considers that an above-rail operator with differing characteristics to the reference train service should be charged according to the impact of those departures via a separate component to the access charge.

The extent to which these incremental costs are affected by changes in either axle load or train speed is outlined in working paper 2. This working paper elaborates and clarifies the Authority's proposed approach in respect of assessing the maintenance component of access charges.

If either QR or an above-rail operator wishes to argue that the approach set out in this working paper is inappropriate, then that party should bear the onus of demonstrating why that is the case in an arbitration.

Allocative element - there are several possible ways in which the non cost-reflective component of the reference tariff may be recovered from users. Examples include:

- a fixed charge per mine (that may or may not vary with distance from the port);
- a fixed charge per above-rail operator;
- a mark-up above incremental cost inversely with the sensitivity of output to the charge;
- a rate per gross tonne kilometre (which is implicit in QR's current arrangements);
- a rate per tonne; and
- a rate per net tonne kilometre.

In assessing the appropriateness of alternatives, a number of factors are relevant:

- achieving the objectives of efficiency, simplicity, transparency and predictability;
- ensuring no customer or group of customers pays more than the stand-alone cost of the services they use. In practice, the application of this approach is not straightforward. For example, the interconnection of customers as part of a system produces network benefits that may not be captured in a simple application of the stand-alone cost test. This is an important consideration on the Goonyella and Blackwater systems. Adherence to this principle should guarantee that the 'combatorial' test is satisfied, which ensuring that excessive pricing for any particular customer or group of customers does not occur (subject to assigning the benefits of being part of a system);

- there is a propensity for non-linear charging structures in input markets (such as for the use of QR's network) to distort downstream markets (such as the above-rail market). For example, simply dividing the unrecovered portion of the revenue requirement by the number of above-rail operators will produce an outcome where only one above-rail operator exists in the market. Similarly, establishing a fixed charge per mine per annum would distort the expansion of the mining industry in Queensland because it would create a disincentive for smaller mines to be established. It could also breach the stand-alone cost test for particular mines;

- the sensitivity of demand – from an economic perspective, distortions to the total output of the system are likely to be minimised where prices are charged so that products whose output is less sensitive to higher charges pay relatively more of the unallocated costs. The application of such a rule[13] results in those users whose demand for use of the network is less sensitive to access charges paying relatively more compared to those users whose use of the system is more sensitive to access charges. However, the Authority's research has highlighted that the output of all types of coal from the Queensland mining sector is relatively insensitive to small changes in access charges (although thermal coal is more sensitive than coking coal) and that such an approach would materially complicate the arrangements, increasing transaction costs for little additional gain;[14]

- in order to have an efficient charging structure, it is necessary to avoid over-signalling the impact of alternative operational configurations. For example, ascribing unallocated costs to above-rail operators on the basis of gross tonne kilometres (which is the same driver that is used for maintenance charges) would significantly over-signal the impact of less efficient operational configurations by inflating the maintenance charges they are levied. This will disadvantage incumbent operators and create a distortion in the above-rail market;

- equity – it is intuitively appealing that unallocated costs be recovered on a basis that reflects the intensity of usage of the system, which in turn would suggest that both volume and distance should form at least part of the assignment of unallocated costs to users; and

- the public interest, which the Authority interprets as increasing State output and involves encouraging expansion of the mines that QR's network currently or potentially serves.

In assessing these potentially conflicting objectives, the Authority considers that the most appropriate allocators to use is to assign the unallocated costs equally[15] between:

- net tonne kilometres; and

- net tonnes.

Charging for non-causative costs on this basis:

- is efficient, simple, transparent and predictable;

- is consistent with minimising transaction costs;

[13] Known as the inverse elasticity rule or Ramsey pricing.
[14] As indicated in section 10.4, thermal and coking coals, whilst presenting different chemical compositions, are increasingly exhibiting end-use substitutability.
[15] While this assignment reflects the relevant factors, it is ultimately arbitrary.

- recognises that all users benefit from the existence of the network which would not be captured if below-rail access charges were based exclusively on distance;

- recognises that the infrastructure is heavily concentrated at the port and environs, including for example, duplicated track, relative to the remainder of the system; and

- provides a distance taper that should encourage development of the Queensland coal industry.

Under this approach, the residual allowed revenue for the regulatory period, that cannot be causatively attributed to capacity nor maintenance, is allocated evenly into each of these components. The first component ($/'000 ntk) is then calculated by dividing the residual by the forecast net tonne kilometres for that cluster over the regulatory period. A similar approach is adopted for the $/net tonne component.

However, charging for the unallocated costs should be seen as a means to an end (allowing QR to generate sufficient revenue in a way that does not distort the above-rail market) rather than an end in itself. Accordingly, this method should be regarded as a general approach that can be altered if particular circumstances warrant, depending, for example, on the nature of the clusters. Possible adjustments to this approach are considered in section 10.5.

Take or pay component

The QCA accepts that it is desirable for QR to include a take or pay component as part of its reference tariff arrangements to:

- encourage consistent network utilisation by above-rail operators, and, in turn, by mines, to achieve efficient utilisation of infrastructure;[16] and

- discourage above-rail operators and mines from systematically overestimating their capacity requirements and misleading QR's capacity planning process.

Whilst the Authority recognises that QR's proposal has merit in providing discipline to mines and above-rail operators, there are a number of concerns with QR's proposed approach which:

- includes a high fixed component in the charging structure;

- is inflexible;

- does not distinguish between events within an above-rail operator's control and those beyond an above-rail operator's control (including where QR is at fault);

- could discourage system-wide co-operative scheduling; and

- could discourage multiple operators from serving a mine.

[16] The Authority also notes that the competitive above-rail market is likely to create strong incentives for even railings in order to achieve maximum rollingstock utilisation to minimise haulage rates.

Level of fixed component - what QR's approach essentially achieves is to require an above-rail operator to purchase a given number of paths each year. The driver for this charge therefore ought to revolve around the incremental capacity charge, which on average, constitutes less than 10% of the total access charge. Accordingly, whilst any percentage is in a sense arbitrary, the Authority would prefer that the fixed component of the access charge constitute 20% rather than 35% or 40% of total charges reflecting the nature of the arrangement and the threshold that the QCA proposes (discussed below).

However, it is also proposed that above-rail operators (or end customers for unbundled contracts) commit to purchase the number of paths they propose to consume for the upcoming year. This would operate as a take or pay arrangement over the course of year, rather than on a monthly basis.

Inflexibility – QR's approach does not allow for any variability in railing levels. The QCA considers that QR's proposed allowance for variability is unrealistic. This is because, for the corridor as a whole to achieve even railings, it is not necessary for every mine to operate without variability. For example, the Authority's analysis of railing performance for the Blackwater system for 22 of the 24 months between July 1998 and June 2000 (the only months in this period for which data was available) revealed:

- relative stability in system-wide usage with only one month exhibiting system-wide variability greater than 10%; and

- marked variability for individual mines (with more than half of the months exhibiting individual mine variability greater than 20%).

These points are illustrated in Figures 10.1 and 10.2. Figure 10.1 indicates that system-wide railings departed from the average by more than 10% only once in 22 months examined. However, Figure 10.2 indicates that individual mines comprising the Blackwater system would have had the arrangements triggered in every single month of the 22-month period. In 40% of the months (that is, in 9 out of the 22 months), more than half of the mines in the system would have had the take or pay arrangements triggered.

Figure 10.1: Total Blackwater system average railing variation

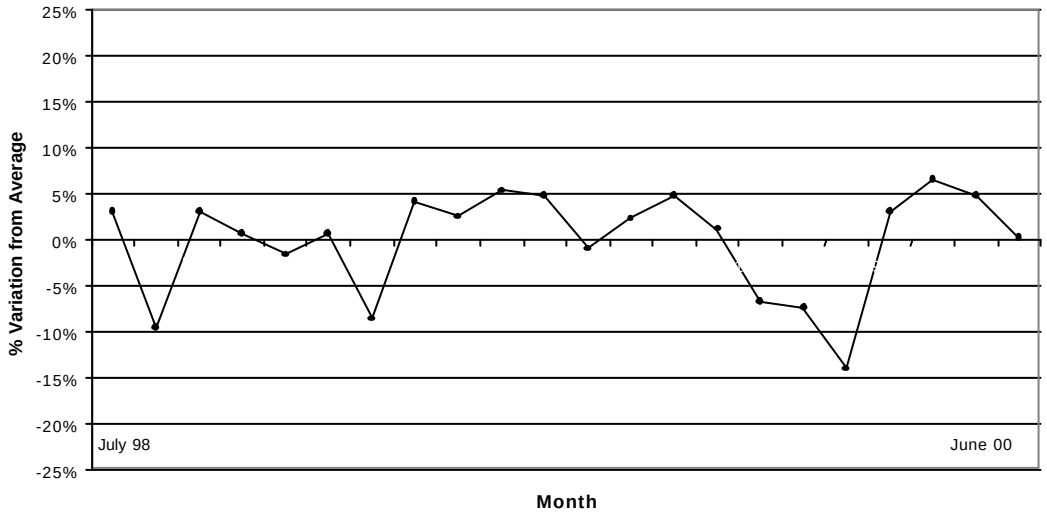
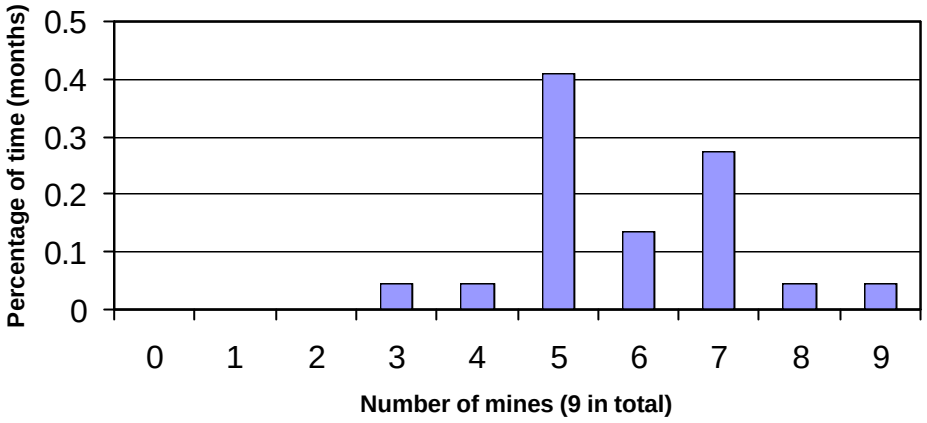


Figure 10.2: Percentage of months where individual mine variation on the Blackwater system is greater than 10%



Network Access' risk exposure is to fluctuations in system railing rather than fluctuations in railings for the individual mines that comprise a system. Therefore, the Authority believes that a system-wide threshold should apply in the first instance to provide for a more appropriate test. A system-wide test would reflect the fact that uneven railings is ultimately a system-wide issue and effectively recognises the secondary market that co-operative scheduling is designed to create.

Moreover, the limitations of the monthly arrangements should make allowances for scheduling arrangements within the month. For example, the number of paths should be based upon the number of days in the month rather than simply determining the monthly quota by dividing the expected annual number of trips by 12. Another factor is that a month may straddle two scheduling periods such that an above-rail operator operates all scheduled services, yet is still required to pay a charge higher than the access charge normally applying simply because of the way in which the scheduling is arranged between those months. Consequently, the Authority considers that more flexible arrangements should apply.

Events beyond a mine's or operator's control - QR's approach penalises an above-rail operator's variability irrespective of the cause. For example, QR provides no allowance for events that it causes and result in an above-rail operator being unable to operate its trains.

Given the levels of capacity available on QR's system, it is inappropriate that events beyond an above-rail operator's control, or the control of the mine it serves (such as a derailment), should require it to pay penalties for uneven railings that arise. Accordingly, the application of such a test should be tempered by allowances for these factors.[17]

[17] However, the Authority accepts that it may be appropriate for take or pay arrangements to apply to mine related disruptions as such a mechanism will encourage least cost carriage of coal throughout the entire coal chain. For example, the take or pay arrangements might encourage mines to make judgements about the most efficient stockpile levels at the mine.

Discouraging co-operative scheduling - applying a system-wide threshold test will serve to encourage co-operative scheduling arrangements whereas QR's proposal could discourage this practice. This is because mines will be reluctant to 'take up' another mine's 'slack' if they will be subsequently penalised for doing so (because of that mine's below average railings in future months).

Distortion to the above-rail market - the most likely cause for triggering the take or pay threshold is likely to be mine performance. Poor operator performance is likely to result in another operator performing the haulage task relatively quickly. Consequently, it is particularly important to avoid the rules operating to create a bias in favour of mines choosing a single operator to perform their above-rail haulage. This could become a significant barrier to entry to the above-rail market.

The Authority considers that where more than one operator serves a mine, the threshold requirement to trigger the take or pay requirement should apply to the mine rather than the individual operator. This would require bundled access agreements acknowledging that the threshold must be applied on the basis of a particular mine's total railing (based on notification from the end customer direct to Network Access).

Where two operators serve a mine and the threshold is met, then the operators should be assigned the cost of the penalty in proportion to their haulage commitments. Contracts between above-rail operators and mines could contain back-to-back indemnity arrangements to avoid above-rail operators being penalised for mine failures.

These arrangements, whilst complex, will serve to protect QR's legitimate business interests in securing smooth railing performance whilst avoiding the creation of distortions to the above-rail market.

Proposed test - in proposing a take or pay threshold, the Authority's first concern is to ensure that it applies to system-wide railings rather than focusing on individual mines. Accordingly, it is proposed that the trigger for the operation of the take or pay test applying be that cluster railings depart by more than 10% for the average for the month (adjusted for the number of days in the month).[18]

If this first threshold is met, then the second stage should be based on whether an individual mine fails to meet its haulage requirement. However, it is not thought appropriate to focus exclusively on the month the system-wide threshold is triggered for the purpose of assessing individual mine liability. This is because the prospect of being caught out in future months would discourage mines from exceeding their monthly commitment. The achievement of system-wide consistency requires mines to occasionally operate at above their average throughput.

Consequently, it is proposed that mines be required to meet take or pay liabilities if the mine's railings were more than 10% below average for both the month in question and the 3-month period that ends with the month that the system-wide threshold is met. Mines under common ownership in a cluster should be able to aggregate their railing for the application of the second limb of the test. The application of this test should minimise the risk of uneven system-wide railing activity whilst preserving the incentives for individual mines to engage in co-operative scheduling arrangements.

[18] The mines serving the Stanwell Power Station and those forming the Gregory cluster are to form separate clusters. However, their railings should be included as part of the Blackwater and Goonyella systems.

QCA's Position

In assessing QR's proposed reference tariffs, the Authority considers that the reference tariff should be structured as follows:

- **a usage-based charge which reflects the incremental operating and maintenance costs expressed on a per GTK basis;**
- **a capacity charge that covers the incremental cost to the network owner of the provision of capacity expressed per train path;**
- **a charge for the use of the electrical overhead network only if an above-rail operator uses it;**
- **an allocative charge for the remainder of QR's revenue which is based, for each cluster, on equal amounts being collected on:**
  - **a per tonne basis; and**
  - **a per net tonne kilometre basis; and**
- **take or pay arrangements which are only triggered for a mine where:**
  - **the cluster in which the mine belongs fails to rail 90% of the monthly average requirement for that cluster (adjusted for the number of days in the month); and**
  - **the mine fails to rail 90% of its monthly average requirement (adjusted for the number of days in the month);**
  - **over the preceding 3 months, the operator and the mine fails to rail 90% of its average requirement over that period.**

10.4 Specification of the reference train service

The specification of the 'benchmark' reference train service could have significant implications for the evolution of the above-rail market. This is because the Draft Undertaking envisages that train service characteristics that depart from the reference train service could normally be expected to attract a price difference.

The process of establishing reference tariffs will therefore result in a degree of standardisation in the way services are specified and priced. Accordingly, the adoption of inappropriate parameters may have significant implications for the evolution of the rail market and the realisation of benefits for customers.

As such, the effectiveness of reference tariffs depends upon ensuring that the specification of the reference train service represents the most appropriate set or bundle of train service characteristics (both technical and operational), consistent with customers obtaining their preferred price/service quality trade-off. Failure to incorporate the most appropriate train service characteristics (considered in the context of the coal chain as a whole) could unnecessarily increase the cost of coal transportation.

It is also desirable that the regulatory environment provide as much certainty as is feasible to minimise the risk of parties instigating arbitration processes.

QR's Position

QR stated that it is essential that the service characteristics used to define the reference train service include those elements that, if changed, potentially could significantly increase or decrease the costs and risks to QR of providing access. QR also stated that it is entirely appropriate that both the defined technical and operational characteristics of a cluster be applied uniformly within a cluster.

QR's explanatory guide notes that, where the physical or operating characteristics of a train service proposed by a railway operator results in more capacity being used to transport the same quantity of the commodity, QR will reflect the additional capacity required for that operation in the access charge it offers to that railway operator.

QR noted that it is likely that each specific access agreement will incorporate an access charge that incorporates either a discount or premium relative to the reference tariff, to reflect differences between the proposed train service compared to the reference train service. QR rejected the notion that the reference tariff schedule should incorporate information on how the access charge would vary for identified variations from the reference train service. QR's position is that the assignment of a monetary value even to a few of the variations, if it were in fact feasible, would be extremely costly and it questioned the benefits of such an approach.

On 5 September, 2000 QR submitted a series of reference tariff schedules corresponding to the 7 clusters it proposed. These schedules substantially expand on the description of the reference train service that was originally contained in Schedule G to the Draft Undertaking.

On 9 November, QR submitted further reference tariffs that effectively separated the Blackwater system into three clusters (being the Central Blackwater cluster, the Stanwell cluster and the Gregory cluster) and provided a reference tariff for mines on the Gregory cluster to travel on the Goonyella system. Accordingly, QR's proposed reference tariff approach now involves 9 clusters, with one cluster being the Gregory cluster, having reference tariffs for coal transportation on either the Blackwater or Goonyella systems. These schedules are contained in an attachment to this volume of the Draft Decision.

These arrangements are summarised in table 10.3.

Table 10.3: QR's proposed reference tariff clusters

	West Moreton	Moura	Central Blackwater	Stanwell	Gregory via Blackwater	Gregory via Goonyella	South Goonyella	West Goonyella	North Goonyella	Newlands
Maximum length (metres)	625	1,000	1,670	1,670	1,670	2,070	2,070	2,070	2,070	1,380
Max. axle load (tonnes)	15.75	22.5	26	26	26	26	26	26	26	20
Loaded direction gross tonnage	2,600 (+/- 10%)	5,800 (+/- 7.5%)	8,900 (+/-8%)	8,900 (+/-8%)	8,900 (+/-8%)	13,000 (+/- 5%)	13,000 (+/- 5%)	13,000 (+/- 5%)	13,000 (+/- 5%)	6,300 (+/- 7.5%)
Unloaded direction gross tonnage	800 (+/-10%)	1,400 (+/- 7.5%)	2,150 (+/-8%)	2,150 (+/-8%)	2,150 (+/-8%)	3,100 (+/- 5%)	3,100 (+/- 5%)	3,100 (+/- 5%)	3,100 (+/- 5%)	1,550 (+/- 7.5%)
Traction	Diesel	Diesel	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Diesel
Operational Times	Off-peak only	All	All	All	All	All	All	All	All	All
Loading Facilities	Ebenezer Box Flat	Boundary Hill Dunn Creek Moura	Boonal Koorilgah Curragh Boorgoon Kinrola	Koorilgah Curragh Boorgoon Kinrola	Ensham Yongala Kestral Gregory	Ensham Yongala Kestral Gregory	Peak Downs Saraji Norwich Park German Creek Oaky Creek	Blair Athol	South Walker Ck Macarthur Burton Moranbah North Goonyella Riverside North Goonyella	Newlands McNaughton
Unloading Facilities	Fisherman Is.	Q'ld Alumina RG Tanna Barney Point G'stone Power Q'ld Cement	Q'ld Alumina RG Tanna Barney Point G'stone Power Q'ld Cement	S'well Power	Q'ld Alumina RG Tanna Barney Point G'stone Power Q'ld Cement	Dalrymple Bay Hay Point	Dalrymple Bay Hay Point	Dalrymple Bay Hay Point	Dalrymple Bay Hay Point	Abbot Point
Reference Access Charge ($ / '000 GTK)	$12.08	$11.26	$8.20 comprising: track - $6.13 el. access and energy - $2.07	$8.20 comprising: track - $6.13 el. access and energy - $2.07	$7.67 comprising: track - $5.69 el. access and energy - $1.98	$7.67 comprising: track - $5.69 el. access and energy - $1.98	$6.33 comprising: track - $4.49 el. access and energy - $1.84	$6.33 comprising: track - $4.49 el. access and energy $1.84	$6.33 comprising: track - $4.49 el. access and energy $1.84	$9.95
Monthly take or pay proportion	35%	30%	35%	35%	35%	40%	40%	40%	40%	30%
Review of access charge (GTK based)	Annual GTK outside 250-305 million traffic volume range	Annual GTK outside 2.5-3 billion traffic volume range	Annual GTK outside 13.6-16.6 billion traffic volume range	If review trigger for Central Blackwater cluster triggered	Annual GTK outside 14.1-17.3 billion traffic volume range	If review trigger for Gregory via Blackwater cluster is triggered	Annual GTK falls outside 19.9-24.3 billion traffic volume range	Annual GTK falls outside 18.1-22.1 billion traffic volume range	Annual GTK falls outside 17.1-20.9 billion traffic volume range	Annual GTK outside 2.1-2.5 billion volume range

For ease of analysis, QR's reference train service description can be subdivided into a number of components:

- the service to be provided;
- commodity type;
- geographic scope;
- technical characteristics;
- capacity related characteristics; and
- conditions of access.

Service

Two aspects of the service are provided for in the reference train schedule:

- stowage, including a maximum stowage time (as yet undefined); and
- the use of electricity from QR's electrical overhead infrastructure.

Commodity type

QR proposes that the commodity type relate to bulk coal with no differentiation being made between coal qualities or types or between the end use markets of the coal.

Geographic scope

QR proposes the reference train service operate between nominated loading and unloading facilities within the boundaries defined by the cluster.[19]

Technical characteristics

The following technical characteristics are referred to in the schedule:

- maximum length limitations;
- maximum axle load limitations;
- maximum speed restrictions;
- compliance with rollingstock interface standards applicable to the nominated infrastructure;
- nominal gross tonnage requirements (with allowed variation); and
- requirements to reduce coal spillage and leakage on route. QR proposes the reference train utilise bottom dump, open top wagons with an adequate side height, having regard to the density of the coal carried, and a positive door operating system equivalent to, or of similar reliability to, the existing system 'KWIKDROP'.

[19] The arrangements in relation to the clusters for the reference train services are discussed in section 10.5 below.

A summary of the technical characteristics proposed for each cluster is as follows:

Table 10.4: Technical characteristics

Mine Cluster	Max. Train length (Metres)	Max. Axle load (Tonnes)	Gross Tonnage of Loaded Train		Type of traction
			Nominated Gross Tonnage	Allowable Variation (+/- %)	
Newlands	1,380	20	6,300	7.5	diesel
Moura	1,000	22.5	5,800	7.5	diesel
Cent. Blackwater	1,670	26	8,900	8	electric
Stanwell	1,670	26	8,900	8	electric
Gregory via Blackwater	1,670	26	8,900	8	electric
Gregory via Goonyella	2,070	26	13,000	5	electric
Sth Goonyella	2,070	26	13,000	5	electric
Nth Goonyella	2,070	26	13,000	5	electric
West Goonyella	2,070	26	13,000	5	electric
West Moreton	625	15.75	2,600	10	diesel

Traffic volume range = +/-10% of annual contracted gross tonnes

Capacity

The following capacity related characteristics were referred to in the schedule:

- operating in accordance with nominated sectional running times;
- complying with agreed loading section and unloading section occupancy times;
- utilising loading and unloading facilities that each have a balloon loop terminal configuration;
- operating as an empty train on the return journey from the relevant nominated unloading facility to the relevant nominated loading facility;
- complying with external noise limits as required by the Environment Protection (Noise) Policy 1997;
- operating within agreed transit times between nodes;
- being able to demonstrate a reasonable expectation that the tonnage volume upon which the capacity entitlement is based will be hauled;
- availability for continuous operation (24 hours, 365 days per year);
- achieving even loadings over the course of each year, month and weekly period;
- specifying within its capacity entitlement the number of train services required per week; and
- complying with QR's scheduling and train control principles.

Traffic volume

QR has proposed that a condition to the determined reference tariff be that it is only valid within a nominated annual traffic volume range (as measured by GTK) on the basis that traffic volume has a significant impact on QR's cost of providing access. The traffic volume range will be equal to plus or minus 10% of the forecast traffic volume. Ranges for each of the mine clusters, in billions of GTK, are given below.

Table 10.5: Traffic volume range for reference tariffs

Cluster	West Moreton	Moura	Central Blackwater	Stanwell	Gregory via Blackwater
Output Range	.25-.305	2.5-3.0	13.6-16.6	n.a.[20]	14.1-17.3

Cluster	South Goonyella	West Goonyella	North Goonyella	Gregory via Goonyella	Newlands
Output Range	19.9-24.3	18.1-22.1	17.1-20.9	n.a.[21]	2.1-2.5

Conditions

The conditions under which the reference train schedule is based are as follows:

- the contract must be consistent with the standard coal access agreement (or, until this is available, the summary principles applying as part of the Undertaking);
- 10 year term; and
- incorporate a rate review provision so that access charges will be adjusted in line with changes in the reference tariff.

Rights of above-rail operators

QR listed the key issues in the definition of the capacity entitlement for a train service as:

- the allowable transit time for train services. QR will only be able to commit to a nominated transit time as part of the reference train service assuming no above-rail delays (which are beyond QR's control). QR will also incorporate in the description of the reference train service a measure of the allowable below-rail transit time for the most critical nodes for each cluster. QR also intends to provide information (if available) on transit times and other capacity entitlement defining factors for a proposed train service as part of the indicative access proposal; and
- the allowable interval between train services.

However, these matters were not mentioned in the reference tariff schedule submitted to the Authority. The transit time arrangements were represented as obligatory for a third-party operator rather than a minimum requirement for QR to deliver in accordance with the contract (subject to above-rail incidents beyond the control of Network Access).

[20] Rate is reviewed if review trigger for the Central Blackwater cluster is triggered.
[21] Rate is reviewed if review trigger for the Gregory via Blackwater cluster is triggered.

QR also noted that because a reference train service is a generic description that is intended to apply across different operators and different origin - destination combinations within a specific cluster, it is not possible to specify all of these capacity entitlement factors for the reference service.

QR also raised the potential for defining certain train services as 'priority train services' which means that they would be given automatic priority at crossings where a standard service and a priority service are due to cross. QR submitted that it was inappropriate to provide trains with automatic priority status. QR argued that once an operator has negotiated a capacity entitlement in terms of transit times and train frequency, QR should be allowed to deliver that outcome in the most cost effective manner. QR further argued that where an operator seeks faster transit times than available to the standard service and agrees to meet any additional costs of providing the higher quality service, it will manage all the inputs including train control and scheduling procedures to meet its obligations to that operator.

In addition, the schedule contains provisions for a take or pay element to apply to the calculation of access charges - this issue was considered above in conjunction with the assessment of the structure of reference tariffs.

Stakeholder Comments

While stakeholders generally endorsed the development of reference tariffs for the provision of access to the coal network in Central Queensland, the same degree of support was not forthcoming for the application of the reference train service approach to the development of those reference tariffs. There was substantial agreement that a single reference service as defined by a unique set of technical and operational characteristics would constrain initiative, particularly with regard to capacity and appropriate pricing signals that would encourage operational initiatives.

Table 10.6: Application of the reference train approach

National Rail - the specification of only one reference train service for each geographic pricing zone has a number of limitations including:

- it provides a very limited contribution to transparency;
- it has limited ability to reduce transaction costs;
- the complexity of the reference train definition makes it very likely that a proposed train type will differ from the reference train which effectively leaves the determination of the reference tariff to QR;
- such an approach may induce an operator to use a train that conforms to the reference train when it would prefer to use a non-conforming train; and
- such an approach will have the effect of shifting the focus of competition towards a way of operating that provides the incumbent operator (QR) with a material advantage.

Hence, the development of a reference train specification is not the best approach to the development of a reference tariff. Instead of defining specific values for the train operating characteristics of the reference train service, a range of values could be employed for a limited number of cost-related characteristics, from which a range of reference tariffs would be applicable. By relating reference tariffs to these cost-related characteristics, the need to define 'a' reference train largely is avoided. This 'parametric approach' would reveal the specific charge that is being levied for a particular parameter for example, axle load, maximum speed, train length, priority classification, etc. An operator's train conceivably could constitute any combination of the specified parameter values and avoid the problem of standardisation that results from the reference train approach.

QMC - the definition of the reference train service will not necessarily impose a degree of standardisation on service specification and pricing. Reference tariffs would only serve as benchmarks for comparison purposes and variations in services provided would and could occur. Only those operational characteristics that directly affect QR's costs and/or amount of access capacity consumed should be specified in the definition of the reference train service for example, train length, weight, speed, axle load, and compliance with scheduling and interface standards.

ARTC - because reference tariffs will relate to a reference train service with a wide range of operational characteristics, a range of reference tariffs would be more appropriate and these should reflect cost differentials.

FreightCorp - it is difficult to nominate a single set of criteria that should apply to all train services. However, one could nominate several broad categories of services that have differing requirements, and therefore could use different criteria. For example, most train operating characteristics have little impact on the cost of providing infrastructure services and therefore, while they are critical in the area of service provision, they are not particularly relevant to reference tariffs and the definition of access rights. The relevant service characteristic that affects the cost of infrastructure provision is the level of capacity or priority to be assigned to the operator. QR should establish quantitative guidelines for the positive or negative impact of variations from the reference train service for each operational characteristic included in the definition of a reference train service. Under this approach, an access seeker would then be aware of the impact on the reference tariff of any variation from the reference service and design the most efficient service on the basis of the tariff information available. QR should establish guidelines for the positive or negative impacts for each type of variation from the reference train service. For example, QR should quantify the negative or positive impact for a 10% increase in wagon loading and generically apply a standard variation to the set tariff for any operator that increases their loading.

Stakeholders expressed views about capacity entitlements.

Table 10.7: Capacity entitlements

QMC - access rights should be defined in a way that supports cooperative train scheduling, that is, in terms of trip frequency and minimal intervals rather than time slots. Transit time is not relevant to reference train services and the opportunity/time cost concept does not have a place in the co-operative train scheduling regime envisaged. In addition, transit times should be expressed as running times for groups of line-sections and not between defined cluster origin - destination points.

FreightCorp - priority is the most important issue for pricing capacity - not all variations from the train operational characteristics should result in an increase in the tariff charge. Some variations will result in a decrease in tariffs or have a neutral impact.

Submissions also made comment in regard to the price differentiation of traffic.

Table 10.8: Price differentiation of traffic

ARTC - access pricing should not be set in accordance with a particular customer's or industry's ability to pay. Differential access pricing should only be based on the cost impact of any operation on the market.

National Rail - to allow flexibility for the negotiation of mutually beneficial arrangements between QR and train operators, there should be some scope in the access regime for commercial negotiation. To limit the abuse of this flexibility, two safeguards should be provided:

- all users and potential users should have the option of securing access on the terms defined in the reference tariffs. This will protect train operators from monopolistic exploitation under the guise of commercial negotiation; and
- all negotiated arrangements that differ from the reference tariff should be publicly disclosed. It is especially important that this safeguard be rigorously observed with respect to any arrangements with QR as train operator.

The fixed component should not discriminate on the basis of coal hauled. While a theoretical case can be made for discrimination between cargoes on the basis of ability to pay, estimation of the required elasticities of demand is a complex procedure. It is unlikely that QR will be well placed to make sound judgements on how haulage prices – which are only one of a large number of components that will influence the saleability of coal – will affect behaviour in the final market for coal. Fixed price components can also be used to create artificial barriers to entry where there is a desire on the part of the incumbent operator to protect high-yield monopoly business.

Stanwell - reference tariffs should be developed having regard for the underlying goods transported on the rail network. This is because the different products result in:

- different risk profiles for stranded assets;
- demand product and associated rail transportation profiles; and
- quality of service required.

It is expected that that there will be greater volatility in the demand for coking coal compared with thermal coal, and this will be reflected in the need for transportation services. The higher risk nature of coking coal makes the transportation side more difficult for rail operators to plan. This uncertain demand profile and risk of stranded rail assets should be reflected in its haulage arrangements and tariffs for use of below track assets and services.

QMC - there should be no attempt to differentiate on the basis of product (for example coking and thermal coal) or use (domestic and export), as to do so would contradict user pays principles. Further QR is not competent to make (invariably arbitrary) judgements about the abilities to pay of different users in the same market and the trade effects of attempts to discriminate among them. QR's pricing decision should not be allowed to have a distorting effect on coal mine behaviour, and it is not QR's role to assist marginal mines into the coal market at the inevitable expense of more efficient, established operators. Moreover, special rail freight deals are not the appropriate means of assisting mines in difficulty. Should companies seek assistance, any response measures should be determined through whole-of-government consideration, and should not be disguised as 'market-based' rail access rates. A process, independent of QR, should be established for referring special cases to the regulator and for the whole-of-government consideration. Outcomes would need to be transparent, sun-setted and demonstrably in keeping with the government's CSO policy.

QCA's Analysis

The key purpose for establishing reference tariffs is to facilitate a negotiation of access to QR's network whilst protecting QR's legitimate business interests. In this regard, it is important to recognise that the reference tariffs are intended to facilitate the negotiation process rather than to provide posted prices. In performing this role, it is proposed that the reference tariffs will promote commercial negotiation by clarifying the pricing implications of departures from the reference train service.

However, in order to perform this role, a standard (that is, a reference train service) must, by its very nature, be prescriptively defined. Even if variation around the standard is made explicit, there will still be a requirement that that base be defined in some way.

Accordingly, the issues concern:

- what are the relevant parameters for the reference train service;
- what information is to be provided regarding variations from the reference train service; and
- how are the price implications for departures from the reference train service to be assessed.

QR in its submission indicated that the choice of parameters comprising the reference train service was driven by a desire to reflect those factors that are likely to significantly affect the costs or risks of providing train services. A similar concern was expressed by stakeholders who indicated that the purpose of the reference tariff is to provide guidance as to the likely costs imposed upon the system by alternative above-rail operational parameters. However, there was no consensus from stakeholders on whether the schedule should be confined to those parameters that will significantly affect access charges.

The Authority considers that the pricing implications of the parameters can be divided into two categories:

- those that are likely to materially affect the cost of providing access and hence the access charge payable by an above-rail operator; and
- those that are unlikely to materially affect the cost of providing access and hence the access charge payable by an above-rail operator.

The structure of reference tariffs, discussed in section 10.3, will explicitly incorporate pricing implications for those parameters that will materially affect access charges. However, there are limitations to the scope of predictable price impacts. For example, the nature of the infrastructure may be such that limitations must be imposed on above-rail operators. Proposals to transgress these limitations, which may be described as 'boundary conditions', would require detailed case-by-case analysis.

In assessing whether or not a parameter variation will have a predictable impact on the system, the Authority intends to simply respond to QR's proposal – which extends beyond parameters with minimal impact. In so responding, the Authority will indicate the parameters where departures are likely to involve material pricing implications as opposed to those that will not. The Authority considers that this is the approach that will provide the greatest transparency for QR, above-rail operators and end users in the long run.

For the purpose of assessing these issues for the reference train service, it is useful to adopt QR's categorisation:[22]

- the service to be provided;
- commodity type;
- technical characteristics;
- capacity related characteristics; and
- conditions of access.

The service to be provided

In its recent submission of the reference tariff schedule to the QCA, QR proposed the term 'stowage' to refer to the short term storage of trains to provide for the performance of above-rail services as well as for the storage of trains between scheduled cycles because of breakdowns in the system. QR proposes that a maximum stowage period apply to a particular above-rail operator but does not define what this time might be.

[22] The issue of geographic scope is considered in the context of the assessment of clusters below.

Circumstances could lead to an above-rail operator legitimately requiring 'stowage' for a considerable period of time. For example, poor weather conditions, a derailment or a problem at a mine could prevent operations for several days.

The QCA would be reluctant to endorse an outcome where third-party operators were required to remove rollingstock despite a short term break in activity that could, for example, be caused by QR itself. Accordingly, it is likely that maximum stowage times should be set with regard to the circumstances in which it is likely to be required – which in practice is likely to be for a period of at least one week.

The QCA accepts that it may be desirable to limit the length of time in which an above-rail operator is able to park its consist without incurring what is effectively a 'parking fee' (as opposed to merely remaining in staging areas as part of the normal scheduling arrangements). Lengthy stays may disrupt other traffic on the network.

However, such a charge should not apply where the above-rail operator is delayed as a consequence of QR's, or another above-rail operator's, actions. Moreover, until QR submits a variation to the reference tariff arrangements to explicitly define stowage times via an amending draft undertaking, it is not possible to adopt such an approach.

Whilst QR's approach now goes beyond the narrow origin-destination component of above-rail operations it put forward originally, the schedule does not clearly specify the services that are to be provided as part of the reference train service.

For example, the services contained in the declaration include the use of QR's rail transport infrastructure for the following rail transport functions, where they are provided as part of the normal cycle of operations:

- mainline running, including the use of passing loops;
- train queuing and staging for the following activities, as long as they are undertaken as part of the normal operational cycle:
  - loading and unloading;
  - transit; and
  - maintenance, provisioning and crewing activities;
- train loading and unloading at facilities other than freight centres and depots, undertaken as part of the normal operational cycle;
- train marshalling and shunting:
  - in preparation for transit;
  - in preparation before or after train loading or unloading; and
  - in preparation before or after maintenance and provisioning; and

- short term train storage:
  - in a breakdown situation;
  - for short periods where product flow has been disrupted; and
  - for short periods where the timetable does not allow use of the infrastructure.

The Authority considers that the reference train service should clarify that the range of services comprised within the reference train service extends to this range of services.

However, one declared service that above-rail operators may not seek to utilise is the use of QR's overhead electrification infrastructure. This is because operators are able to bypass this infrastructure by utilising diesel-powered locomotives. The Authority considers that the use of QR's overhead electrification infrastructure should be optional, so that only above-rail operators who use this infrastructure are required to pay for it. The charging structure for the use of QR's overhead electrification infrastructure is discussed below.

Commodity Type

QR does not propose to distinguish between different qualities or types of coal or between end use markets of the coal.

In Queensland, the coal that is mined falls broadly into two categories, being thermal coal and coking coal. Whilst it is technically possible to distinguish between these coal types on the basis of their chemical properties, end-use markets are increasingly substituting one coal type for another.

The public interest could be advanced by distinguishing between coal types for the purposes of assessing reference tariffs, if that distinction results in an increase in the net wealth of Queensland. For example, if the output of thermal coal is more sensitive to access charges than coking coal, requiring coking coal to pay a higher access charge than might apply to thermal coal could increase the total output from the Queensland industry, thereby increasing state wealth.

However, the Authority notes that there are a number of reasons why such a distinction for the purposes of setting access charges is inappropriate, including:

- the distinction in the end-use markets between coking and thermal coal has blurred in recent years – indeed there are examples of mines that sell what would normally be classified as thermal coal into coking coal markets;
- the Authority's research indicates that both thermal coal and coking coal are relatively insensitive to reductions in access charges (even though thermal coal is relatively more sensitive than coking coal). This means that there is likely to be little benefit to the state from adopting such an approach;[23] and
- the differentiation would cause considerable complexity, encourage behaviour aimed at minimising access charges and increase transaction costs to the provision of access.

Accordingly, the Authority accepts QR's approach of applying only one commodity type.

[23] The Authority's research suggests that the absolute value of the price elasticity of demand for both thermal and coking coal is below 0.15.

Technical characteristics

The train technical characteristics identified by QR include

- maximum train length;
- maximum axle load;
- maximum speed restriction;
- compliance with QR's rollingstock interface standards;
- compliance with nominal gross tonnage requirements;
- compliance with measures to reduce coal spillage;
- compatibility with nominated infrastructure;
- train size; and
- measures to minimise the risk of coal contamination of the track.

There is an important distinction between the specification of parameters that will result in predictable or relatively minor impacts to reference tariffs and those that represent departures from the design parameters for the infrastructure. Departures that fall into the latter category are referred to as 'boundary conditions' and will require considerable analysis on a case by case basis. Examples of these boundary conditions include:

- maximum train length;
- maximum axle load;
- maximum train speed; and
- terminal configuration.

The following discussion will address each parameter QR has proposed with a view to assessing the appropriateness of the parameter and the likely impact of variations from the reference train service.

Train length - the importance of train length arises because a rail corridor is designed with passing loops of a particular length. The length of these passing loops is a natural limit to the length of trains that may operate on the corridor. Accordingly, the QCA endorses QR's proposed maximum train lengths which are summarised in Table 10.9.

Table 10.9: Maximum length

Cluster	West Moreton	Moura	Central Blackwater	Stanwell	Gregory via Blackwater
Maximum Length[24] (metres)	625	1,000	1,670	1,670	1,670

Cluster	South Goonyella	West Goonyella	North Goonyella	Gregory via Goonyella	Newlands
Maximum Length (metres)	2,070	2,070	2,070	2,070	1,380

Exceeding the maximum train length would require the operator to assume absolute priority on the length of the haul. In heavily trafficked corridors, such as the Blackwater and Goonyella systems, this would raise safeworking issues and could seriously disrupt the network in breakdown situations. In addition, train length also affects train braking characteristics and safe train separation determined by signalling. Accordingly, the QCA accepts QR's proposed limitation of train length and considers it should operate as a boundary condition.

QR is justified in requiring an above-rail operator who seeks to operate a longer train than the reference train service to make specific arrangements in order to protect its legitimate business interests and the interests of other operators on the system. Alternatively, on heavily trafficked corridors, arrangements may be made to extend passing loops and affect other works necessary to accommodate longer trains. However, this would require case-by-case assessment of the capital costs involved. These arrangements may not be required if a single operator was the only operator on a system.

Seeking to operate shorter trains should not impose any additional cost on the above-rail operator. However, in doing so, that above-rail operator is likely to require greater below-rail capacity to carry a given number of tonnes and be required to buy more paths, thereby incurring a higher capacity charge per tonne carried.

Maximum axle loads - track infrastructure is built to accommodate the forces imparted by a train with a defined axle load. Accordingly, exceeding these parameters could require track reinforcement works to be undertaken or alternatively substantially enhanced maintenance. QR's proposed maximum axle loads are summarised in Table 10.10.

Table 10.10: Maximum axle loads

Cluster	West Moreton	Moura	Central Blackwater	Stanwell	Gregory via Blackwater
Maximum Axle Load (tonnes)	15.75	22.5	26	26	26

Cluster	South Goonyella	West Goonyella	North Goonyella	Gregory via Goonyella	Newlands
Maximum Axle Load (tonnes)	26	26	26	26	20

[24] Including locomotive.

It is understood that the infrastructure comprising the Newlands and Moura systems will support 26-tonne axle loads rather than the 20 and 22.5 tonnes that QR has defined for the reference train service for the respective systems. The issue therefore arises as to whether the maximum axle load should be prescribed as part of the reference tariff arrangements or that corresponding to the dominant train for the duration of the regulatory period.

The Authority considers that, in general, the most efficient configuration should be defined for the purposes of the reference train service. This would suggest that the maximum axle load that can be accommodated by the infrastructure should provide the basis for the reference train service.

However, for the first regulatory review period, the Authority proposes to accept QR's proposed axle loads for the Moura and Newlands systems as depicting the most likely dominant train on the system during this time. Accordingly, it is proposed to accept QR's proposed axle load parameters for the purpose of defining the reference train service for the first regulatory period.

Maximum axle loads defined through the reference train service for the Blackwater and Goonyella systems will set a boundary condition for access negotiations. Seeking to increase axle loads beyond this maximum (for example, where an operator wishes to run a 28-tonne axle load train despite the allowed maximum being 26 tonne) could be expected to involve case-by-case negotiations with QR.

Within the constraints of the boundary conditions, changes in axle load can be expected to have a predictable impact on the maintenance task required. To quantify the impact of differing axle loads, the Authority considers an explicit maintenance charge should be included as part of the charging structure for the reference tariffs.

Above rail operators seeking to operate trains at below (above) the axle load defined for the reference train service, but within the boundary condition constraints, can be expected to impart less (more) damage to the track than the reference train service. There is a substantial body of research on the incremental maintenance cost impacts of differing axle loads. Whilst this data has been developed from other rail systems, the Authority considers that this research provides a basis for reasonably accurately estimating the impact of departures from the reference train service axle load using publicly available data. Worked examples of the discounted (additional) access charges applicable to lower (higher) axle loads than the reference train service, assuming boundary conditions are observed, are contained in working paper 2.

Maximum speed restrictions - similar considerations apply to the assessment of QR's proposed maximum speed. Again, track infrastructure is built to accommodate the forces imparted by a train at a defined speed and axle load. Consequently, the maximum speed for which the track has been designed to accommodate sets a boundary condition for the reference train service.

However, trains operating at speeds below the reference train service could be expected to impart less damage to the track than the reference train service. As is the case with axle loads, changes in train speeds can be expected to have a predictable impact on the maintenance task required (within the constraints of the boundary conditions).[25]

[25] However, operators who operate at different train speeds to the reference train service are likely to consume additional capacity for which they would be charged according to the approach outlined in this section and working paper 3.

The research referred to above in relation to axle loads has also been undertaken for differing train speeds. This research is summarised in working paper 2. This paper elaborates and clarifies the Authority's proposed approach to assessing the implications for access charges of departures from the reference train service and consequent variations in track maintenance requirements. The Authority considers that if either QR or an above-rail operator wishes to argue that the approach set out in working paper 2, as endorsed as part of the Final Decision, is inappropriate, then that party should bear the onus of demonstrating why that is the case.

Rollingstock interface standards - QR proposes that the reference train service should comply with QR's proposed rollingstock interface standards. The QCA's assessment of QR's proposed rollingstock interface standards, in the context of the assessment of the safety management system, is contained in Chapter 7.

It is conceivable that departures from rollingstock interface standards could impart more or less wear and tear to QR's below-rail infrastructure or have safety implications involving capital expenditure. However, in practice, any such effect is likely to be of secondary importance to the axle load and speed of a train service. Accordingly, the Authority considers that QR should bear the onus of demonstrating that a departure from QR's rollingstock interface standards imposes a cost impact upon QR, on a case-by-case basis.

Alternatively, if an above-rail operator considers its arrangements impart less wear and tear than the reference train service, and QR does not accept this contention, then the onus will be on the above-rail operator to demonstrate the savings that arise from its proposal in order to secure a reduction in access charges.[26]

Nominated gross tonnage - QR proposes that the reference train service should comply with QR's proposed nominal gross tonnage requirements that allow for a variation of ± 5% around a nominated figure in both the loaded and unloaded direction.

The Authority does not accept it is necessary for such a range to be specified as part of the definition of the reference train service. Maintenance costs vary predicably with gross tonne kilometres for a given axle load and speed. In other words a 10,000 tonne train will impact proportionately higher wear and tear on the track than a 5,000 tonne train of otherwise similar characteristics.

The specification of a nominated gross tonnage as part of the reference train service is driven by the fact that QR does not have an explicit maintenance charge as part of its tariff arrangements. However, the adoption of a cost reflective pricing approach, where the charge for maintenance is explicitly identified, overcomes this requirement. Consequently, the Authority does not propose that nominated train gross tonnages form part of the reference train service.

The specification of a nominated train gross tonnage could be interpreted as allowing Network Access to adjust access charges in response to differing gross to net ratios. The Authority does not consider such an approach is appropriate. This is because the gross to net ratio is a key driver of above-rail efficiency. Consequently, conferring any capacity on QR to alter access charges on the basis of varying gross to net ratios could seriously distort the above-rail market. A more transparent means of achieving a satisfactory outcome is to adopt a cost-reflective tariff structure.

[26] It is recognised that this approach may inhibit innovation in rollingstock. However, in practice there appears to be the little alternative given that marginal maintenance savings from improved rollingstock are likely to be modest.

Terminal configuration - terminal configuration relates to the interface between the train itself and the loading and unloading infrastructure. This includes matters such as the nature of the unloading system (for example a bottom dump) and the train configuration (such as the placement of locomotives in the train consist).

The Authority considers that third-party operators must conform to these requirements or meet the costs of alterations to accommodate their proposed arrangements. This is particularly important given that port unloading capacity is normally constrained and critically affects the efficiency of the rail network as a whole. Consequently, any variation from nominated terminal configuration, at least for train configuration and unloading system, will require detailed case-by-case analysis.[27]

Measures to reduce coal spillage - coal contamination is a significant problem on parts of QR's network. These problems may be exacerbated by the emergence of above-rail competition. This is because above-rail operators will have an incentive to maximise their pay load unless there are arrangements in place to penalise them where this behaviour imposes costs on the system. For example, the overloading of wagons imparts additional stress to the track requiring greater maintenance, and risks coal spillage onto the track causing contamination of the ballast. This latter factor has been particularly severe on the Goonyella system.

Consistent with its approach elsewhere, QR has proposed that the predominant operation should form the basis of the reference train service for assessing whether an above-rail operator's train consist imposes a higher or lower risk of coal contamination. QR therefore proposes the following measures to provide a basis against which to assess this factor:

- open top wagons with an adequate side height; and
- a positive door opening mechanism equivalent to, or of similar reliability to, the existing system 'KWIK DROP'.

In practice, QR's first requirement is unworkable because there is no attempt to quantify what constitutes an adequate side height. However, the Authority accepts the principle that loading protocols should be formalised in the future in consultation with above-rail operators and the coal mining industry. Such protocols are likely to assume considerable significance in a competitive environment where above-rail operators will find it commercially advantageous to overload wagons, thereby exposing the infrastructure to coal fouling, unless they are penalised for doing so. In order to be effective, such protocols should include quantitative parameters against which compliance can be assessed.

The key point is to ensure that arrangements are established which eliminate coal tumbling over the sides of the wagon or being blown off during transit. It is conceivable that alternative measures could be taken to prevent this from occurring – such as utilising closed top wagons or applying a surfactant. The introduction of measures such as these may justify a reduction in access charges, although the QCA has not at this stage undertaken any work to quantify this effect.[28]

[27] The Authority sees no reason why operators should be constrained to operating bottom-dump wagons if a port offers a 'tippler' for unloading. The mode of unloading has no bearing on QR's below-rail costs so long as it does not cause delay.

[28] Further work may be undertaken in conjunction with an amending undertaking from QR establishing loading protocols during the course of the regulatory period, or in conjunction with the next review of QR's Draft Undertaking. Again, the QCA is aware that this approach could introduce a bias against the introduction of more efficient operational arrangements that reduce coal spillage. Accordingly, the arrangements may be reconsidered in conjunction with future reviews.

QR's other proposal involves KWIK DROP doors. KWIK DROP is a trade name for a bottom dump door mechanism. The mechanism is automatically activated by protrusions at the unloading pit. The system ensures that doors are either fully open or fully closed and locks doors in that position to:

- prevent the accidental spillage of coal onto the track while the train is transit; and
- ensure the wagon is fully empty when unloaded – wagons with residual coal destabilise the 'empty' train when returning to the mine, posing a safety threat.

The key point is to have the reliability of the door closure and opening mechanism rather than the KWIK DROP automation mechanism per se. For example, a compatible system could involve a manual mechanism comprising an over-centring arrangement for the door mechanism ensuring that it 'self locks' as it is operated.[29]

It is acknowledged that coal spillage is a cost factor. No alternative proposals to QR's position have yet been considered and in these circumstances the Authority accepts that the parameters of the predominant train should be adopted as an interim position.

Capacity related characteristics

QR's proposed train operational characteristics involve:

- nominated sectional running times;
- assumed loading and unloading occupancy times;
- utilisation of loading and unloading facilities, each of which has a balloon loop terminal configuration;
- operation as an empty train on the return journey;
- utilisation of rollingstock that has an external noise limit no greater than the noise planning level required by the Environment Protection (Noise) Policy 1997;
- operation within the nominated transit times between nodes (measured over a monthly time frame);
- not limit an existing operator utilising its capacity entitlement;
- demonstration of a reasonable expectation that the tonnage volume upon which the capacity entitlement is based will be hauled;
- assumed availability for operation - 24 hours, 365 days per year;
- the achievement of even loadings over the course of each year, month and weekly period;
- the specification of the number of train services required per week; and
- compliance with QR's scheduling and train control principles.

These matters are addressed in turn.

[29] However, it is possible penalties could apply for extended occupation of port unloading pits. This is discussed below.

Nominated sectional running times - one of the most significant issues likely to emerge from the application of third-party access to QR's below-rail network concerns the capacity implications of differing train consist configurations (and differing capacity entitlements). This issue is likely to have the greatest relevance to the choice of reference train service for a corridor.

The reference train service will therefore define the relevant sectional running times. An above-rail operator's proposed sectional running times will then be assessed against these parameters. Departures from these sectional running times will be assessed in terms of the number of units of capacity, measured in terms of standard train paths, that are consumed.

To quantify the impact of differing sectional running times, the Authority considers a charge per path should be developed as part of the tariff structure for the reference tariffs. The manner in which this will be applied is considered in section 10.3 and working paper 3.

The remaining capacity-related factors concern priority and congestion. The assessment of priority is considered below. It is expected that access agreements will contain key performance indicators for both above and below-rail operational performance. However, this is a different arrangement to that which might be adopted if explicit congestion-charging arrangements were to be applied. The Authority is aware of the unanimous view of interested parties that it would be premature to establish explicit congestion-charging arrangements at this time and will consider this issue further as part of future reviews of QR's Undertaking.

Loading and unloading occupancy times - unloading times will be significant for the assessment of capacity due to the limited unloading facilities at the ports. However, differing unloading times will not necessarily be known when access charges are negotiated. Accordingly, it may be appropriate to define allowed terminal unloading times as part of an access agreement and apply penalties for delays that reduce the capacity of the system.

Whether or not loading times will be relevant will depend largely upon the number of above-rail operators that rely upon the loadout. Where multiple operators are using the same loading section, there is a need to ensure an operator does not occupy the section to the exclusion of other operators.

However, the loading times at loadouts serviced by a single above-rail operator are unlikely to be significant so long as the loading time is consistent. For example, an above-rail operator who requires longer loading times than allowed under the reference train service is most unlikely to consume additional track capacity by doing so, and therefore additional access charges are unlikely to be warranted in such a case. Accordingly, the QCA considers that QR should bear the onus of justifying the imposition of an additional charge in such a case.

If a train experiences delays in loading, resulting in it taking longer than is allowed under its access agreement, it would be likely to present itself at the relevant balloon loop exit late, resulting in that train being deemed to be unhealthy.[30] Consistent behaviour of this type could have implications under the operator's performance agreement in its contract with QR.

[30] Section 6.4 describes what is meant by a healthy and an unhealthy train. Basically a healthy train is one that is on schedule or is delayed through no fault of its own.

Utilisation of a balloon loop terminal - the only reason that utilisation of a siding instead of a balloon loop for loading purposes might increase access charges is if it causes the train, as it is being loaded, to consume more than a standard train path, on account of the need to shunt the train out of the siding onto the main line or from the main line to enable wagons to be loaded. The resulting occupation of the main line could result in additional capacity charges applying unless loading was performed in a way that did not delay other traffics. It is more unlikely that shunting will cause additional train paths to be consumed at the extremities of the network.

There may even be a justification for a reduction in access charges for mines serviced by a siding rather than a balloon loop. This is because an above-rail operator's costs would increase to the extent that utilisation of rollingstock is adversely affected by the longer loading time. Consequently, to the extent that a mine's haulage charge is increased by virtue of QR's lower investment in that mine's infrastructure, a corresponding reduction in access charges could be justified.

Empty train return - the Authority accepts that the reference train service can only operate in the context of a return journey. However, the Authority would be anxious to ensure that above-rail operators are not prevented from pursuing other arrangements that better satisfy end-customer demands. For example, it may be that an above-rail operator completes two cycles on different corridors. In such a case, it is proposed that the relevant incremental charges apply for the 'empty' trips with the allocative component of the tariff structure, being applied only to the 'loaded' portion of the journey.[31] This approach is the most consistent with the efficient utilisation of the infrastructure, since it does not distort the decisions of above-rail operators in the pursuit of the least cost haulage of coal for end customers.

Noise - the Authority's assessment of noise limitations is contained in Chapter 7. The Authority is yet to develop a method for addressing noise. However, it should be noted that the Authority does not consider it the responsibility of the above-rail operator who triggers the noise limit - the last operator, as the limit is cumulative - to pay the full cost of abatement to meet the restriction.

Operates within nominated transit times - this requirement involves an above-rail operator operating within transit times as an average over a monthly timeframe. It is designed to ensure that above-rail operators achieve a level of performance that does not undermine system efficiency. Whilst the Authority accepts the rationale for such a requirement, it is not prepared to endorse it until the penalties for transgressions are quantified.

The transit time that will be appropriate for the reference train service will depend upon the level of priority afforded to it. A higher level of priority than applies for the reference train service would be expected to consume more standard train paths than the reference train service. Accordingly, the Authority does not accept that a single level of priority be assigned to coal traffic. However, any alternative operational configuration, for example requiring a higher level of priority, would require analysis of the impacts on the system as a whole from that alteration. This assessment of priority is considered below.

[31] The allocative component of the access charge structure is discussed in section 10.3. It consists of a combination of net tonnes and net tonne kilometres.

The Authority has produced working paper 3 to elaborate and clarify its proposed approach in respect of assessing the additional costs associated with capacity consumption for reference tariff assessment. However, it is important also to recognise the limitations of this framework. For example, the capacity-related costs, in particular, will be sensitive to the nature of the operation and the volume of the traffic involved. The incremental capacity charges outlined in working paper 3 are principally designed for marginal changes in traffic. Consequently, a new mine requiring a capacity to haul a substantial volume of coal (for instance, 5 million tonnes per annum) may require independent analysis.[32] Nevertheless, even in such cases, the analysis contained in working paper 3 should assist in the determination of incremental capacity in such a case.

Again, the Authority considers it appropriate that, in an arbitration situation, the onus is on the party asserting that the cost component for capacity should depart from that calculated in accordance with working paper 3, endorsed as part of the Final Decision.

Not limit existing operator utilising its capacity entitlement - the Authority considers that this requirement is inappropriate it could allow QR to refuse to permit an above-rail operator's service to operate, despite having a contractual obligation to do so. Accordingly, the Authority considers that QR should be prevented from raising capacity related issues after the negotiation process has been completed.

A different issue arises where an above-rail operator seeks to utilise more paths than it is entitled to operate under its contract. In such a case, QR would be clearly entitled to limit an above-rail operator's capacity entitlement to that established under its contract if allowing it to consume more capacity inhibited QR's ability to meet its other contractual commitments.

The capacity modelling undertaken for the Authority suggests that it is highly unlikely that QR will become capacity constrained on its coal-carrying corridors in the next 5 years. If such a constraint did emerge, the Authority would expect the issue to be resolved during the negotiation phase. One option may be for the prospective above-rail operator to fund additional works and 'recover' that up-front amount through an effective 'holiday' on access charges until the net present value of the original contribution had been consumed.

Demonstration of reasonable expectation that the tonnage will be hauled - the Authority considers that this requirement is unnecessary as QR would not enter a contract unless there was a reasonable expectation of the tonnage being hauled. Consequently, the Authority is concerned that the application of such a requirement could become an inappropriate barrier to entry.

In practice, if a mine fails to haul expected tonnages, QR could ultimately resume the capacity. Before instigating such a process, it is likely that Network Access, the above-rail operator and the relevant mine will review haulage arrangements with a view to avoiding the instigation of resumption processes.

Availability for operation - QR proposes that the above-rail operator be available for operation 365 days a year. This provision is intended to set a usage pattern expectation against which alternative usage patterns can be assessed. However, the Authority considers that requiring availability 365 days per year is unrealistic for the mines – for example, the system currently shuts down on Christmas day. For planning purposes, a more realistic requirement might be 360 days a year availability which recognises unforeseen events.

[32] The analysis contained in the working paper assumes substantial growth over a 10-year horizon as part of the capacity modelling exercise.

It would also be desirable that the reference train service contains a clear definition of this requirement – that is, it should define exactly what is intended by 'be available for operation'. For example, availability for operation can only be comprehended in the context of a particular operator's negotiated capacity entitlement.

Even loadings - the Authority recognises the desirability of ensuring above-rail operators and, in turn, mines achieve constant loadings over time. This is because failure by mines and above-rail operators to adhere to such a requirement could create pressure for premature augmentation of the system, unnecessarily increasing the cost of haulage for all users.

However, the Authority considers that this requirement is unnecessary as QR's legitimate business interests could be addressed through the take or pay component of the reference tariffs.

Specification of number of trains per week - this issue is discussed in the context of the capacity entitlement below.

Compliance with scheduling and train control protocols - the Authority's assessment of the scheduling and train control procedures, to be used as part of QR's normal operations, is contained in Chapter 6. However, the definition of the reference train service should be underpinned by the normal scheduling arrangements that are adopted for the relevant corridor.

Conditions of Access

The reference train service assumes that the above-rail operator will enter into an access agreement that is consistent with the reference tariff schedule and:

- is consistent with the QR Standard Coal Access Agreement when it is developed, and in the mean time, the summary of principles that are contained in Schedule E;
- has a term of 10 years; and
- includes provision for access charges to be reviewed in accordance with reviews of the reference tariff.

These issues are considered in turn.

Consistency with terms of the access agreement - it is envisaged that QR, relevant stakeholders and the QCA will develop a standard form access agreement following release of a Final Decision. In the mean time, QR proposes that the principles that it has developed with above-rail operators, with input from the QMC, provide a basis for the reference tariffs. The QCA's views on these principles are contained in Chapter 8. Subject to the proposed amendments, the QCA accepts these principles.

Term of access agreement - QR also proposed that the access agreement have a term of 10 years. The QCA accepts that it is appropriate that a minimum term be established as part of the reference train schedule. The QCA also accepts that 10 years represents a reasonable basis for this term. However, in practice, the QCA considers that it is highly unlikely that a shorter (longer) term could attract a premium (discount) for an established mine. In an arbitration, the onus of demonstrating a higher or lower risk to QR, justifying a change in the reference tariff, would be on the party making that assertion.

In the case of a new mine, where QR funds track and associated works, the protection of QR's legitimate business interests requires that it be able to take steps to reduce its asset stranding risk. This might involve a higher charge or that a component of the access charge be paid up-front by the mine to Network Access either directly (in the case of an unbundled contract) or indirectly via an operator (for a bundled contract).

Review of reference tariffs - the reference tariff arrangements may change during the term of the Undertaking because the volume 'collar' QR has established is breached, or as a result of a future review of the Undertaking.

The QCA considers that there is merit in parties facing access charges as they apply at a point in time rather than having those charges 'locked in' for the entire term of a contract. This is because the emergence of third-party operators will induce different operational configurations that, in time, could place unforseen stresses on the infrastructure.

In such a case, the pricing signals that are appropriate could change, particularly in the context of incremental capacity charges. For example, if use of a corridor increases to the point where the incremental capacity charge was substantially higher in a future period than applied previously, it would be appropriate that every above-rail operator face this charge (and be capable of modifying their arrangements accordingly to minimise their exposure).[33] Such a situation would result in QR's overall below-rail revenue being the same with proportions of the various components of the reference tariff charging to reflect prevailing costs. Intra-period increases in reference tariffs are considered in section 16.6.

The Authority considers that it is fundamental to the third-party access arrangements, established under the QCA Act, that the Authority not impose requirements on the parties if they agree otherwise.[34] Accordingly, the QCA does not wish to limit the capacity of parties to negotiate and assign risks through the negotiation process.[35]

Capacity entitlements

Clause 6.1 of QR's Draft Undertaking defines several factors as being relevant to the assessment of a capacity entitlement. In the context of the reference train service, the following aspects may affect above-rail operator's capacity entitlements:

- transit times;
- allowable variation between cycles;
- priority.

[33] The Authority notes that one new user could itself cause a significant cost on the system that the existing users would not want to bear (for example, require an expensive capacity expansion that could otherwise be deferred indefinitely). Existing user's access charges will increase if the net present value of the additional costs a new mine imposes on a system exceeds the net present value of the revenues that mine is expected to generate through the payment of access charges. Such an outcome would suggest that the new user should be placed in a separate cluster. However, in other cases, increases in the incremental capacity cost are highly unlikely to rise to the point where the need for an allocative component of the access charge (discussed below) is removed altogether. Consequently, the Authority considers it appropriate that all operators pay the incremental capacity charge attributable to their operations based on the current incremental capacity charge.

[34] Subject to the hindering access provisions of the QCA Act.

[35] Moreover, in relation to the use of electrical overhead, which is being treated as a contestable service, it is likely that above-rail operators will wish to avoid the risk of significant changes in charges occurring over the life of their investment in electric locomotives. This is because once an electric locomotive is purchased, it becomes a captive user of QR's infrastructure. In such a case, it would be appropriate for parties to enter longer term arrangements without reference to rate reviews. This is especially likely to be the case where the parties agree on a formula based approach to pricing the use of QR's electrical overhead infrastructure.

Transit times - transit times are arguably the most important 'deliverable' provided by QR in its coal network for above-rail operators.[36] Transit time significantly influences an above-rail operator's utilisation of rollingstock and hence its capital requirements and operational efficiency. The longer the transit time for a origin to destination journey, the lower the volume of product that can be carried in a given period of time with a given rollingstock capability, or the greater the investment in rollingstock that is required to deliver a given volume of product.

The arrangements in relation to transit time however are very complex due to the interaction of different traffics and above-rail operators on QR's network. For example, an incident involving one operator can affect Network Access' ability to meet transit time commitments for a number of operators for hours or even days after the event. Consequently, the definition of transit time can only be provided in the context of an absence of fault and a commitment to keep healthy trains healthy (in the sense of the use of the terms in Chapter 6).

Accordingly, it is proposed that the reference tariffs apply for a particular transit time from critical nodes in the network for the reference train service. These transit times will then form the basis of contractual relations between QR Network Access and above-rail operators (or end customers). In the context of the Authority's review of QR's Draft Undertaking, Network Access can not be responsible for the behaviour of above-rail operators except to the extent that it commits to keep healthy trains healthy.[37] However, more sophisticated approaches may be refined as part of the assessment of future undertakings.

The Authority's capacity simulation modelling of QR's network has suggested average transit times - assuming no above-rail disturbances and the operator adheres to the sectional running times proposed for the reference train service - for a reference train service and a standard train path. These times are set out in working paper 3. However, given that any third-party operator's operational arrangements will affect proposed transit times, it is impossible to establish average transit times as part of the Undertaking. Moreover, the establishment of average transit times does not establish the level of variability around those times. In practice, this will require negotiations informed by the outcomes of QR's simulation analysis. Consequently, the Authority considers that the availability of these simulation analyses to above-rail operators will be critical to their legitimate business interests.

Variations to these transit times will occur as the probability of meeting trains travelling in the opposite direction increases.

Allowable variation between cycles - whilst it is appropriate that an indication be provided of the maximum and minimum times between train services, it is important that these intervals do not confer a competitive advantage to a particular above-rail operator. The best way in which this may be effected is to ensure that above-rail operators achieve similar cycle times, having regard to the location of the mines they serve.

[36] Although in the context of efficient port interfaces, 'in-line' or in sequence running may be the most important deliverable. However, the objectives are consistent with one another, subject to contractual arrangements allowing priority to be conferred on train required at the port as opposed to those that are not. This is because transit times may be made subject to the requirements for in sequence running.

[37] The Authority supports arrangements being contained in contracts to facilitate appropriate signals being sent in relation to above-rail conduct so long as any arrangements are uniformly applied to all operators. For example, it is anticipated that more sophisticated arrangements will emerge in the future to ensure that above-rail operators who do not comply with required operational arrangements could be forced to meet the full cost that those departures impose on the system as a whole. These may include explicit charging arrangements to apply to departures from sectional running times in the context of the treatment of congestion charging more generally. However, the Authority is aware of the concerns expressed by stakeholders as to the industry's readiness for arrangements of this type at this point in time.

It should be noted that despite the views expressed by some stakeholders, time slots will form an inevitable part of scheduling arrangements. The key distinction is that the third-party operator may not commit to a particular time slot initially but a slot emerges through the co-operative scheduling arrangements which is translated onto the daily train plan.

Priority - the negotiated transit time will define a level of priority for a train service. However, the Authority is concerned that the reference train service does not limit the capacity of third-party operators and Network Access to negotiate alternative priority arrangements. In assessing the costs associated with alternative arrangements, it is critical that the perspective is taken of the costs that alternative priority imposes on the network as a whole. The approach to assessing the number of standard train paths that a particular operation consumes provides an acceptable basis against which to assess levels of priority that depart from the reference train service. The approach to assessing this matter is set out in working paper 3.

QCA's Position

In assessing QR's reference tariffs, the Authority accepts QR's proposed arrangements, subject to:

- **the reference train not specifying gross train tonnages;**
- **capacity consumption being determined by reference to the standard train path for the corridor rather than the dominant train; and**
- **allowance being made for acceptable variations as itemised in the Authority's consideration.**

10.5 The geographic scope of reference train services

Pricing the use of any network involves establishing the number of price zones or nodes. A range of possible aggregations of mines is possible for the application of reference tariffs. At one extreme every possible origin and destination could represent a separate node for pricing purposes. Alternatively it is possible to simplify the pricing arrangements by limiting the number of price zones. There is some discretion in simplifying the pricing structure by virtue of there being a number of possible pricing combinations that comply with the combatorial or competitive pricing requirements.[38]

The adoption of a cost-reflective tariff structure suggests it is important to aggregate customers that exhibit relatively homogeneous characteristics in terms of the costs that they impose upon the network - for example, similar incremental capacity costs - and the service quality characteristics they are likely to wish to purchase.

[38] The discretion is created through the economies of density and scale exhibited by rail networks. This discretion is influenced by the nature of the tariff structure that is adopted. The interaction between the pricing structure and the price zones will assign the benefits from the economies of network usage to particular users. For instance, it is through the interaction of these two elements that a distance taper for more distant users is potentially created.

QR's Position

QR has proposed that a consistent access charge apply to all train services operating between a nominated 'cluster' of origins and destinations, where the clusters represent geographic proximity and current transport patterns.

QR originally identified seven origin–destination combinations or mine clusters, based on a number of characteristics, including their contribution to total net tonnes and traffic movements on the network, traffic stability and the fact that neighbouring mines will reasonably expect to be charged similar access charges. The seven mine clusters referred to in Schedule G of QR's Draft Undertaking and relate to the following corridors:

- Moura;
- West Moreton;
- Blackwater;
- Goonyella South;
- Goonyella North;
- Goonyella West; and
- Newlands;

However, in November 2000, QR proposed that the Blackwater cluster be separated as follows:

- a Stanwell cluster, applying to mines serving the Stanwell Power Station;
- a Central Blackwater cluster, applying to mines east of Burngrove travelling to destinations in the Gladstone region; and
- a Gregory cluster comprising mines north of Burngrove. These mines are distinguished by their approximately equivalent distance from both ports of Gladstone and Dalrymple Bay/Hay Point which creates a choice in the use of either the Goonyella system or the Blackwater system.

QR rejects the alternative approach to defining access charges, based on the actual line segments used by a train service, on the grounds that attribution of non-specific costs to line-sections would be a proxy for average cost pricing. QR's view is that this might result in some existing end users being forced off the network, increasing costs for other users and consequent adverse effects for economic development in Queensland.

Stakeholder Comments

Submissions expressed views in respect of the cluster arrangements proposed by QR.

Table 10.11: Geographic scope of the reference train service

Stanwell - QR's proposed zonal reference tariffs may involve too much subjectivity and potentially be contentious with respect to the determination of boundaries for the seven zones proposed by QR. The zonal system should not restrict third parties from negotiating more commercially oriented tariffs.

National Rail - the fees paid by the train operator should be regarded as compensation for the costs of providing, maintaining and operating the network. Costs will vary by line-section and by train attribute and these variations need to be reflected in the reference tariff structure. This implies that the tariff should be set for a particular section of the track rather than for a particular origin-destination. In this case, all traffic would be treated on an equal basis irrespective of its origin-destination and the treatment of cross-system traffic would no longer be an issue. However, the segmentation that is implicit in QR's proposed reference tariff system (if that system is adopted) reflects a reasonable partitioning of the network into physically distinct sub-systems.

FreightCorp - the provision of a large number of reference tariffs for the range of current and potential origin-destination pairs is unworkable. Instead, a fully 'formulaic' approach should be developed for the calculation of reference tariffs and QR should provide access seekers with the data and the formulae necessary to calculate the reference tariff for the particular origin-destination in which they are interested. Such a system is superior from a transparency and regulatory oversight perspective. With regard to the geographical scope of the reference train service groups, the nominated areas are generally in accord with current distribution of traffic. QR would need to justify clearly any variation in access charges between the seven proposed geographic zones.

QMC - reference tariffs should also be developed for the users of the Mt Isa line and for coalmines, such as, German Creek, Oaky Creek, Kestrel and Gregory, that have a genuine choice between two ports. The cluster approach is acceptable subject to, amongst other things, clarification of the manner in which costs would be allocated between clusters and within clusters. Reservations include:

- a single tariff may disguise actual cost differences due to distance and/or tonnage related factors among mines in a cluster;
- the potential for large, close in mines to subsidise smaller, more distant mines is greater the larger the cluster; and
- the appropriateness of the cluster approach can only be assessed once the cost allocation manual is published and draft reference tariffs are available.

QCA's Analysis

Assessment of proposed clusters

There are a number of potential ways to allocate costs to particular mines for the purpose of cost recovery. Each is arbitrary to varying degrees so long as minimum conditions are met.[39] However, the Authority notes that major users have accepted the cluster approach, subject to caveats, and accordingly the Authority accepts this approach.

The nature of the clusters and their significance also needs to be considered in the context of the proposed tariff arrangements. The effect of separately identifying and charging according to the causative factors (maintenance and incremental capacity) is that the clusters provide a means of aggregating mines that are relatively homogenous and a vehicle for Network Access to recover its non-causative costs. The most important factors for this purpose are:

[39] In theory, this will be the case so long as no user or group of users could benefit from 'opting out' of QR's arrangements and collectively duplicating QR's network. Whilst such an outcome is unlikely in practice, (especially for a rail network which is dispersed along a main line) it provides a theoretical benchmark against which excessive pricing can be assessed. This arbitrariness is further evidenced by the fact that the coal network evolves in response to mine developments and the current alignment may not be the optimal configuration for current mines. This alignment nevertheless dictates access charges for all mines served by the line.

- similar path costs – for example, working paper 3 highlights that the South Goonyella system faces different capacity expansion costs to the remainder of the Goonyella system. Failure to distinguish between the costs of expanding the differing sub-systems on the Goonyella network could cause premature augmentation to be required on capacity-constrained line-sections because above-rail operators on these parts of the network would not face their incremental capacity costs. This would have the effect of increasing haulage costs unnecessarily;

- choice - as pointed out by the QMC, several mines including Gregory/Crinum and Kestral are located in a zone where their coal could be feasibly transported on either the Blackwater system or the Goonyella system.[40] This distinguishes these mines from others on both the Blackwater and Goonyella corridors;

- assigning the benefit from the economies of density from network usage. These economies of density arise because increasing volumes travelling over a given track-section reduce average costs for those users. From an equity perspective, it could be argued that those contributing to this density should gain the benefit from the economies they create. This has important implications for the choice of the allocator through which non-causative costs are recovered;

- the public interest. The Authority considers the public interest is served by creating an access pricing framework that promotes the development of the state's resources, so long as doing so does not create an inappropriate wealth transfer from existing to new mines. An example of such an inappropriate transfer would be one which involves a cross-subsidy – such as where a new mine does not cover the costs it imposes on the system - or results in an existing mine's output being displaced by a new mine where that displacement is induced by more favourable access charge arrangements applying to the new mine.

The QCA notes the concerns expressed by stakeholders on the appropriate allocation of costs for the reference tariffs. This issue is considered in more detail in Chapter 12. However, in summary, the Authority's analysis concluded that there is relatively little 'jointness' in the allocation of costs to individual corridors, but considerable jointness in respect of the costs within a corridor. For example, it is relatively straightforward to attribute the costs to the Blackwater corridor, but impossible to attribute the majority of those costs to individual mines within that corridor. The issue becomes important for those systems for which QR proposed multiple clusters be created - in respect of the Goonyella and Blackwater corridors.

The clusters nominated by QR for the coal system are acceptable to the QCA. However, there is an important caveat to this approach. Where a system comprises several clusters, the clusters should not be considered as separate groupings for the application of take or pay arrangements. For example, mines railing to Stanwell should be considered in the context of the even-ness of the Blackwater-wide railings.

The interaction of the cost-reflective tariff structure and the choice of cluster arrangements creates a minor equity issue for the South Goonyella cluster. This is because the incremental cost per path for the South Goonyella cluster is marginally higher than that applying to the other clusters on the Goonyella system as it is relatively more capacity constrained. In order to maintain parity with the West Goonyella and North Goonyella corridors, a small reduction has been made to South Goonyella's $/net tonne charge.

[40] In practice, the choice of which corridor they use will depend on many factors such as port charges, take or pay obligations and marketing arrangements.

Cross-system traffic access charges – Gregory cluster

The Authority agrees that the mines along the Gregory branch should constitute a separate cluster. These mines, incorporating principally Kestral and Gregory/Crinum, but extending to Ensham, have a choice as to which port they export their coal from.

However, the Authority does not consider it appropriate that mines with a choice are penalised because that choice exists. Accordingly, even though Gregory/Crinum and Kestral currently export through Gladstone, and may well do so in the future, it is not appropriate that they pay a substantially higher reference tariff than applies to Oaky Creek or German Creek when travelling on the South Goonyella system without a cost justification.

Otherwise, a situation may emerge where the disparity between the mines currently on the Gregory branch and those to the north will grow as the Gregory mines (most notably Gregory/Crinum and Kestral) carry more coal on the Goonyella system.[41] The Authority does not consider it appropriate that such an approach apply unless QR provides an appropriate justification. Possible examples of such a justification include:

- charging the rates applying to South Goonyella mines to those forming the Gregory cluster could increase the access charge for the existing South Goonyella mines. This would occur, for example, where the net present value of expected revenue from access charges for the Gregory mines is less than the net present value of expected costs imposed on the system (for example, because of expansions); and

- charging the rates applying to South Goonyella mines to those forming the Gregory cluster could cause a socially undesirable allocation of resources. This might occur where the additional tonnages from the Gregory cluster require substantial investment being brought forward. This investment, whilst privately desirable for the mines involved (due to the economies of density), may be undesirable from a social perspective. It would be undesirable where it could be deferred by those mines continuing to use the Blackwater system if this use reduced the total cost of rail haulage (above and below-rail costs for both of the systems combined).

Accordingly, it is proposed that the reference tariff for the South Goonyella system apply to the mines forming the Gregory cluster, unless QR can justify it not doing so.[42]

The Authority is aware that this approach could create an asset stranding risk for QR.[43] There are several ways in which this risk may be ameliorated that do not distort efficient resource allocation. Possible options may include:

- assigning network-wide benefits in a way that is consistent with the preservation of system wide values;

- adjusting the reference tariff structure in a way that does not conflict with QR's pricing principles; or

[41] This would arise, for example, because Gregory/Crinum or Kestral were charged the same tariff on the Blackwater and Goonyella systems (which is higher than the South Goonyella reference tariff) and QR observed its pricing principles. This is because as these mines send more coal north, the South Goonyella reference tariff would reduce, but the charge applying to these mines would remain the same, increasing the disparity.

[42] Preventing QR from charging these mines more than the reference tariffs that apply on the South Goonyella cluster also potentially creates an asset stranding risk for the Blackwater system. There is no allowance for asset stranding risk in QR's current pricing arrangements. However, it does not of itself justify inducing another resource distortion to avoid it. The Authority considers a social perspective ought to be applied to resolve the issue rather than a private (QR or mine) perspective.

[43] Considerations associated with the possible optimisation of the Blackwater system are outlined in section 13.7.

- recovery of the shortfall on a non-distortionary basis.

The Authority notes that the system as a whole provides benefits to both users on the Goonyella and Blackwater systems. For example, the existence of a choice provides an option for users on the South Goonyella cluster to export coal through Gladstone on the Blackwater system. This could be useful for marketing purposes, or in instances where there are operational difficulties associated with the Goonyella system or at the ports of Hay Point or Dalrymple Bay.

In addition, there is a substantial benefit to existing users on the Goonyella system in deferring triplication of the Goonyella corridor at Black Mountain. The Authority considers it appropriate that Network Access be afforded the discretion to assign these network-wide benefits to particular users on the system in order to provide incentives for those mines to continue to operate in a way that is consistent with the preservation of these values. For example, this would justify Network Access reducing access charges for mines such as Gregory/Crinum or Kestral to continue to use the Blackwater system. However, the quantum of QR's assessed network-wide benefits would need to be transparent and be approved by the Authority.

Such an arrangement could not be used to justify cross-subsidisation - requiring other mines on the Central Blackwater cluster to pay more than the stand-alone costs of servicing those mines. In other words, the arrangements could not be applied in a way which would force mines on the Blackwater system to pay more than they would if traffic from the Gregory cluster used the Goonyella system exclusively. This would leave the mines on the Blackwater system no worse off.

It is also possible that an adjustment could be made to the way in which the non-causative costs are charged to the Gregory cluster. The QCA is aware of QR's commitment to the coal mining industry that access charges for mines more distant from destinations will not pay less on a $/tonne basis than those closer to that destination. This means that mines on the Gregory cluster should not pay less on a $/tonne basis than the rate applying to mines at the extremity of the Central Blackwater system.

However, it is possible that arrangements might be developed so that, for example, QR levies the allocated component of the access charge to the Gregory cluster on a $/net tonne basis exclusively. This approach would minimise QR's asset stranding risk whilst observing QR's commitment not to charge more distant mines a lower access charge on a $/net tonne basis.

In the QCA's proposed reference tariffs, the price per net tonne kilometre component for the Gregory cluster has been reduced to below the corresponding rate for the Central Blackwater system with the $/net tonne charge being the same as that applying to Central Blackwater. This was considered to be the least distortionary means of converting QR's intended reference tariff structure into the cost-reflective tariff environment proposed in this Draft Decision, whilst observing QR's commitment to the industry concerning the limited distance taper to access charges.

The Authority will also consider addressing any asset stranding risk induced by cross-system traffic by allowing QR to recover the shortfall on a non-distortionary basis across the combined Blackwater and Goonyella systems. This might be achieved, for example, by imposing a $/tonne charge across the combined system to recover the shortfall.

Stanwell cluster

QR has proposed that traffics to the Stanwell Power Station fall outside of the Blackwater cluster and comprise a separate cluster. The Authority notes that, as a user, it does not have similar characteristics to the remainder of the system. This is because the remainder of the Blackwater traffic terminates at the port located some 120 route kilometres (or approximately 200 track kilometres) beyond Stanwell.

However, the considerations that apply to the possible discounting of access charges for the mines on the Gregory cluster do not apply to coal railed to the Stanwell Power Station (or any other domestic user in the Gladstone region). The Stanwell reference tariff should apply to all railings irrespective of its origin.

The Authority accepts that coal railed to Stanwell should form a separate cluster on the Blackwater system. However, creating a separate cluster should not have adverse ramifications for the triggering of take or pay arrangements. Accordingly, the Authority considers that the Stanwell cluster should be considered in the context of the Blackwater system as a whole for take or pay purposes.

For assessing the access charges applicable to the Stanwell cluster, the Blackwater system was essentially broken into two systems – the system to Stanwell, and the system from Stanwell to Gladstone port. Reference tariffs for traffic terminating at Stanwell Power Station were calculated on a consistent basis to the other reference tariffs (that is, the unallocated costs attributable to the system up to Stanwell Power Station were evenly divided between $/NT and ¢/NTK as if all traffic terminated at Stanwell Power Station). The reference tariffs that were generated became the applicable rates for the Stanwell cluster.

The revenue thereby recovered from traffic terminating at Stanwell Power Station was then deducted from the revenue requirement for the remainder of the Blackwater system. Subject to the particular arrangements applying for the Gregory cluster, this revenue was then assigned to the Blackwater mines in the manner described above.

QCA's Position

In assessing QR's proposed reference tariffs, the QCA accepts QR's proposed clusters except that the take or pay component of the reference tariff should operate on the basis of system-wide activity levels.

10.6 Assigning new mines to clusters and deleting mines from existing clusters

The reference train arrangements that apply in relation to existing mines will also influence pricing arrangements for new mines. The issue therefore arises as to the circumstances when it will be appropriate to assign new mines to an existing cluster, or to establish a separate cluster for the mine. In addition, where mines do not satisfy the threshold test for entry into an existing cluster, the pricing arrangements that will apply for those new mines must be established.

There is also the issue of the circumstances (if any) in which an existing mine may be excised from a cluster and placed in another cluster. If a new cluster is to be created, then the rules to govern the pricing arrangements that would apply must also be established.

QR's Position

It is important that reference tariffs not only be published for train services to existing mines but also give operators and prospective end users guidance in relation to services to new mines. The Draft Undertaking currently proposes that the nominated clusters will automatically include any new mine with a loading facility or connection within 2 kilometres of the corridor used to link the existing cluster of mines. It also provides QR with the discretion to include a new mine, provided its inclusion does not result in an increase in the existing reference tariff.

QR noted that the existing arrangements do not provide adequate safeguards to existing users that QR could not assign a new mine to a cluster and not require that mine to contribute to the fixed costs attributable to that cluster. QR advised that they are considering a revised set of criteria to be applied in assessing whether a new mine should be permitted to enter an existing cluster. The fundamental principle is that a new mine should be permitted to enter an existing cluster provided that it would make at least a similar contribution to QR's fixed costs as the lowest contributor of the existing members of that cluster. In this regard, QR is seeking to identify a criterion for the entry of a new mine, based on identifiable factors that have a reasonable correlation with the amount of the resulting contribution to QR's fixed costs.

QR proposes that the primary factor relevant to the contribution to QR's fixed costs is the volume of traffic on the infrastructure. QR is considering a simple tonnage to distance (T/D) ratio as the entrance criterion. Should a mine fail to meet the entrance requirements, that is its T/D ratio is lower than the lowest in the cluster, the mine could only be admitted if all existing mines, QR and the new entrant agree to the inclusion.

QR further noted that, irrespective of the outcome of the entrance assessment, QR would not allow a new mine into an existing cluster if it caused an increase in the reference tariff.

In its submission of reference tariffs on 5 September, QR also proposed that a mine would not be allowed into a cluster if the cost per kilometre of providing rail infrastructure was more than 20% higher than the average replacement cost per kilometre of existing track serving that cluster.

Finally, QR reiterated that where a new mine enters an existing cluster, the reference tariff would be reviewed in the event that the volume review trigger is exceeded. Where the volume is insufficient to trigger a review, a full review would be undertaken in the normal course of events every 3 years to ensure that the volume-induced productivity gains are appropriately shared among the operators in the cluster.

QR also stated that an existing mine can only be deleted from a cluster when train services no longer operate to or from that mine. In terms of the review of reference tariffs following the deletion of the mine from the cluster, the normal review procedures would apply.

Stakeholder Comment

Stakeholders identified concerns with the manner in which new mines would be incorporated into the existing cluster arrangements.

Table 10.12: Future changes to the cluster arrangements

QMC - QR's stated objective of encouraging development of mines at the extremity of the network and the potential for new mines to be assigned to separate clusters and charged on a marginal cost basis with no contribution to the unattributable costs or the costs of the existing infrastructure are concerns.

FreightCorp - new mines should be assigned to the cluster with the most similar track usage in the same geographic area.

QCA's Analysis

The QCA recognises the concerns expressed by stakeholders in relation to:

- the addition of mines to existing clusters; and

- QR's capacity to create new clusters and to 'marginally' price access for those users conferring on those new mines a competitive advantage.

The main concern to arise from both of these issues is whether or not more distant mines gain an inappropriate advantage relative to existing mines, irrespective of whether or not they are included in a cluster. A countervailing concern is that it is strongly in the public interest that the development of mines at the extremity of the network not be discouraged through inappropriately high access charges being applied to prospective mines. Indeed, the Authority considers that the adoption of national competition policy in this State was driven by a desire to enhance the wellbeing of Queenslanders. This desire would be fulfilled by having access charges consistent with ensuring that the development of the industry is not inhibited by the access arrangements.

Normally, new mines that do not fall in a cluster would be expected to negotiate access charges with QR. Accordingly, it seems desirable that a simple test is included in the Undertaking to provide confidence to both existing and prospective mines that the negotiation of access charges will not proceed in a way that undermines the relative competitiveness of either during the term of an Undertaking.

The Authority considers that there are two critical tests that should ensure that the legitimate interests of existing users are recognised, without discouraging new developments in the State through inappropriate access charges. In order to achieve these objectives, the Authority proposes the following rules be applied:

- an absolute test be adopted so that with the exception of mines with a choice of corridor, a mine further away on a system cannot be arranged in a cluster, such that in absolute terms it pays less per tonne than mines closer to their destination, based on the reference train service; and

- the access charge levied on a new mine must not increase charges for existing users.

The exception to the absolute price test may arise in instances where existing mines form part of the Gregory cluster (although this does not form part of QR's current proposed reference tariffs). It is possible that QR can demonstrate system-wide benefits from the Gregory mines continuing to use the Blackwater system. If so, QR might be able to provide an incentive for these mines to continue to use the Blackwater system, so long as the remaining mines on the Blackwater system are not disadvantaged. The Central Blackwater mines would not be disadvantaged where they are not required to pay higher access charges than would apply if the Gregory mines used the Goonyella system exclusively. Subject to this exception, the absolute price test protects existing mines from being displaced by more distant new mines.

In addition to the constraints to be applied to pricing for new mines to prevent inappropriately low charges, charges for new mines must not be set at too high a level. For new mines that do not fall within clusters, the Authority expects that QR will set access charges in a manner that recovers all additional costs that the new mine imposes on QR.

However, subject to that requirement, the Authority considers that in principle more distant mines pay:

- the appropriate incremental charges, based on the same considerations that apply to the development of these charges for mines closer to the port. In other words, it is likely that these will be the same incremental charges that apply to mines on the corridor closer to port;

- in relation to the charge per tonne portion of the allocative component of the reference tariff structure, the same charge per tonne as applies to existing mines on the relevant corridor; and

- in relation to the charge per net tonne kilometre portion of the allocative component of the reference tariff structure, the same ¢/ntk component that existing mines with shorter journeys on the relevant corridor are levied.

Finally, where QR receives access charges up-front as part of a risk-sharing arrangement with a new mine, it is proposed that such revenue be amortised over the life of the proposed contract for the purpose of assessing future pricing arrangements. The discount rate for this amortisation would be the weighted average cost of capital applying at the time the up-front payment is made.[44]

The other concern raised by stakeholders involves the changes to the cluster arrangements during the term of the Undertaking. These changes could occur by establishing new clusters or excising mines from existing clusters. The Authority understands that changes of this type would require an amendment be made to the Undertaking. Accordingly, before any such change occurred, QR would be required to submit a draft amending undertaking which would be subject to consultation in the normal way.

QCA's Position

In assessing QR's proposed reference tariffs, the QCA considers that access charges for new mines (other than those on the Gregory branch):

- **should be subject to a test that a mine further away than existing mines on a system cannot be arranged in a cluster such that, in absolute terms, it pays less per tonne than those other mines, based on the reference train service; and**

- **should not cause new mines to pay a higher ¢/ntk component of the reference tariff than mines closer to their destination so long as this meets the first test and does not increase existing users' access charges.**

[44] The application of the weighted average cost of capital involves a margin of 2.7% above the Commonwealth bond rate, on the day of the contribution, for the period over which the amount is to be amortised, subject to evidence of a market perturbation.

CHAPTER 11. DEMAND FORECASTS

KEY ASPECTS

Demand forecast - for the purposes of the Draft Decision, QR's initial forecasts, which indicate maximum tonnages of 125 million tonnes over the 3-year regulatory period, have been accepted.

Review of forecasts - the Authority will review these forecasts during the consultation period.

Other traffic activity levels - activity levels for the other components of the tariff structure have been forecast, based on the dominant train service operating for the average haul length for each system.

11.1 Introduction

Forecast activity levels form an important component of the assessment of QR's reference tariffs. This is primarily because a rail network exhibits significant economies of density. This means that as traffic levels rise, total costs increase, but not in proportion to the increase in traffic levels.

Consequently, increasing activity levels allow prices to fall whilst still providing sufficient revenue for QR to earn a reasonable return on its asset base and recover its operating costs. The extent to which forecast volumes, which understate (overstate) actual traffic levels, result in QR exceeding (falling below) expected revenue levels depends on whether price or revenue caps are to be applied to QR. Revenue cap arrangements will ameliorate these impacts relative to price caps.

11.2 Forecast traffic volumes

Two sets of issues arise in assessing QR's forecasts:

- the estimated traffic levels over the period, and in particular, the treatment of new mines; and

- the parameters to be forecast.

The first issue concerns whether or not the QCA should accept QR's forecast traffic levels. The key concern is to ensure that unduly conservative forecasts are avoided to prevent windfall gains accruing to QR over the regulatory period.

The second issue concerns the parameters to be forecast. The assessment of the activity levels is complicated by the cost-reflective tariff structure the Authority proposes. This tariff structure, discussed in Chapter 10, provides for the following elements to influence the total access charges that an above-rail operator will be levied:

- the number of gross tonne kilometres that are carried, as this provides a cost driver for the level of maintenance costs imposed on the system by a train. The number of gross tonne kilometres for a train cycle can be calculated by summing the mass of the unloaded train multiplied by the kilometres of the 'empty' journey and the mass of the loaded train multiplied by the length of the journey;

- the number of train paths which provides a basis for charging for the capacity consumed by an above-rail operator. The calculation of the number of train paths consumed by a train is complex because it is necessary to take into account how a train interacts with existing traffic. Relevant considerations include sectional running times and assumed priority levels. Basically, the assessment involves estimating the number of standard train paths consumed by a train.[45] A train will normally consume at least one standard train path on each of the empty and loaded sectors of a cycle;

- net tonnes – the number of net tonnes is relevant to the recovery of costs that cannot be attributed to users on a causative basis; and

[45] The Authority's proposed approach to the assessment of capacity consumption is explained in working paper 3.

- net tonne kilometres – the number of net tonne kilometres that are carried is also relevant to the recovery of costs that cannot be attributed to users on a causative basis. The number of net tonne kilometres for a train cycle can be calculated by multiplying the payload by the length of the loaded sector of the cycle (for example from a mine to a port).

As each of these parameters will influence the total level of access revenue for QR's below-rail coal business, each needs to be separately forecast.

QR's Position

The traffic volume, used to assess the forecast costs and unit rates of the reference tariffs, should reflect the traffic task which is reasonably expected over the period. QR proposes that where changes in traffic task are the result of the commencement or discontinuation of a major project, increases in the traffic task shall be built into the forecast cost at the time of service commitment and decreases excluded from the forecast at the time of expected service termination: para 5.2.4(c).

In its initial reference tariff schedule submission to the Authority in June 2000,[46] QR indicated that forecast traffic is comprised of three categories:

- contracted tonnage;
- uncontracted tonnage resulting from an existing contract expiring, but where there is a reasonable expectation that the tonnage will continue to be produced; and
- uncontracted tonnage resulting from an expansion of production over current contracted levels.

For each of these categories, a different level of reliability can be placed on the forecasts. For the first two categories, there would be a high expectation that all, or nearly all, of the tonnages will, in fact be offered. There is however, a risk that offered tonnages will be lower than the contracted level. This may be due to production problems at a mine, such as recently occurred for Kestral (formerly Gordonstone) and Curragh, which both ceased production for significant lengths of time due to industrial issues. Alternatively, it may be due to changes in long-term mine plans, as has recently been the case with BHP's Northern Mines agreement, where current tonnes are several million tonnes lower than those BHP contracted for in 1997. This has also been the case at Cook Colliery where there have been questions raised as to the future viability of the mine. As a result, QR has based its forecast tonnages on 97.5% of contracted tonnages being offered.

There is significantly less certainty attached to the third category, with the level of certainty reducing as the forecasting period lengthens. Tonnage that falls into this category includes tonnages resulting from short term increases in production, mine expansions and new mine developments. For category three tonnages expected in the reference tariff period (that is, the next three years), QR has assigned a level of probability of 67%.

QR provided 10-year forecast coal traffic volumes to the QCA in May 2000. These figures were subsequently revised in August 2000 as QR reconsidered the likelihood of uncontracted tonnages. The two series, QR1 and QR2 respectively, are given below. Railings from the West Moreton system are excluded.

[46] Attachment 8 – Process for determining reference tariffs, pp. 4-5.

Table 11.1: QR's forecasted coal traffic task

	2000-01	2001-2	2002-3	2003-04	2004-05	2005-06	2006-07	2007-8	2008-09	2009-10
QR1 million GTK	47,842	49,711	50,128	50,233	50,362	50,362	50,362	50,362	50,362	50,362
QR1 million tonnes	117.88	123.03	124.41	125.05	125.47	125.47	125.47	125.47	125.47	125.47
QR2 million GTK	47,422	48,102	48,368	48,615	48,725	48,725	48,725	48,725	48,725	48,725
QR2 million tonnes[47]	117.92	120.13	121.03	122.09	122.42	122.42	122.42	122.42	122.42	122.42

Stakeholder Comments[48]

There was no consensus as to whether it is appropriate for QR to exempt revenue from traffics for new projects in the calculation of revenue limits.

Table 11.2: Revenue from new projects

Stanwell, AMC, Toll - it is not appropriate that QR exempt revenue from traffics from new projects in its calculations of revenue limits. Revenue limits should be set each year taking into account all existing and potential loads.

FreightCorp - it is appropriate that potential projects not be incorporated in the revenue limits due to the fact that they take years or even decades to eventuate, and many never come to fruition.

QMC - QR does not intend to exempt new projects from the calculation of revenue limits as QR has undertaken to review reference tariffs ahead of schedule if volumes increase/decrease outside forecast ranges. It is important that those forecasts are realistic and revisions are transparent.

Queensland Government - QR is only proposing to exempt uncommitted future traffics, which appears reasonable. If new traffics are committed, reference tariffs would need to be revised. Existing contracts based on original reference tariffs could stand subject to review of the terms of the individual agreements (clause 5.3.1(d) provides for this).

QCA's Analysis

AME Consulting Proprietary Limited (AME) and Barlow Jonker were contracted by the Authority to, amongst other things, undertake independent assessments to determine forecast freight tasks for Queensland coal to the year 2010. These numbers would be used to verify QR's forecasts.

As part of this exercise, the consultants indicated the competitive outlook for the Queensland coal industry, based on expected world demand and supply conditions. Generally, their views were reasonably consistent. On the basis of this outlook, AME and Barlow Jonker sought to project QR's future coal traffic task by assessing the costs of production in major competing domestic and overseas operations.

[47] The QCA has derived QR2 net tonne figures from the QR2 GTK numbers.
[48] Stakeholder comments are in response to the QCA's Request for Comments Paper, *Queensland Rail Draft Undertaking*.

World coal market prospects

Demand for internationally traded coal is expected to increase by approximately 30% in the 6 years to 2005. In output terms, this represents a rise from approximately 550 million tonnes (Mt) in 1999, to over 700 Mt in 2005.[49] During the early years of this period, economic prosperity in the East Asian region is forecast to maintain growth in annual demand for coal in excess of 5% per annum. This is expected to decline to around 4% between 2002-5, with long term growth prospects beyond this period a more modest 2-3.5% per annum.

There are two broad categories of coal.

- Metallurgical or coking coal is converted to coke for use in the production of iron and steel.

- Steaming or thermal coal is used in the production of heat, principally for the generation of electricity.

World prices for metallurgical coal are significantly higher than for steaming coal.

Metallurgical coal - internationally traded coking coal is expected to grow by only 2% per annum in the years to 2010. The large scale expansion of the Queensland metallurgical coal industry has led to excess capacity so that Queensland producers are well placed to meet unexpected increases in demand, should market conditions alter in the future.

Steaming coal - demand for internationally traded steaming coal is expected to grow strongly to 2005, at an average of approximately 4% per annum. This can be attributed to stronger demand for energy in Asia as economic growth levels recover from their decline in the late 1990s and the prospects of:

- the on-going construction of coal fired power stations. In most Asian countries, coal resources are lacking or are uneconomic to exploit, and consequently imported coal is the cheapest to burn;

- concerns in Japan over the safety of the nuclear power industry, which are likely to result in the scrapping of plans to build 20 nuclear power stations and consequent further expansion of the existing national coal-fired electricity generating system; and

- the high prices of oil and LNG.

This expansion in demand could potentially be limited by measures to reduce greenhouse gas emissions, which are already evident in Europe where the energy sector has witnessed a shift to alternative forms of energy production.

Coal supply - the international coal industry is undergoing profound changes as a response to the recent historical lows in coal prices. Restructuring and consolidation at the corporate level is accelerating with a select band of companies controlling an ever-larger share of the international market. This has coincided with major shifts in the average costs of production of the major coal exporting countries which in turn are yielding a substantial realignment in market share. In particular:

[49] These are AME's forecasts. ABARE is slightly less bullish, predicting only a 22% rise to 2005. See Graham P. and K. Schneider, Coal: Outlook to 2004-05 in ABARE (2000*), Outlook 2000, Proceedings of the National Outlook Conference*, vol. 3, pp. 171-79.

- United States and Canadian metallurgical exports are under pressure due to falling coal prices and uncompetitive FOB[50] costs;

- Indonesia and particularly China will become more competitive in the steaming coal market as infrastructure becomes more developed, foreign mining companies establish operations, and modern technology is applied. Their proximity to major markets in Japan, Korea and Taiwan gives them a significant competitive advantage on a CIF[51] basis; and

- cost cutting in the Australian coal industry is expected to ensure that it continues to be a dominant exporting force. This has strengthened the steaming coal industry with FOB costs only marginally above major competitors.

Queensland coal supply - Queensland, as the world's lowest cost producer of export hard coking coal, is forecast to continue to erode the market shares of its Northern American competitors, at the same time facing increasing competition from China.

The competitive position of Queensland's steaming coal exports is less secure due to expected fierce competition with low cost producers in Indonesia, South Africa and China over the longer term.

In the niche volatile pulverised coal injection (PCI) market, Queensland is expected to experience continued growth and can possibly capture market share from higher volatile PCI suppliers, including semi-soft coking coal exporters in the Hunter Valley.

AME and Barlow Jonker forecasts - the respective net tonnes forecasts from AME and Barlow Jonker, excluding railings from the West Moreton system, are given in the table below.

Table 11.3: AME and Barlow Jonker coal freight task forecasts

	2000-01	2001-2	2002-3	2003-04	2004-05	2005-06	2006-07	2007-8	2008-09	2009-10
AME million tonnes[52]	123.50	124.40	124.90	126.60	128.50	132.58	135.26	137.94	140.52	144.50
Barlow Jonker million tonnes[53]	119.40	122.25	125.10	127.95	130.80	132.48	134.16	135.84	137.52	139.20

[50] FOB stands for 'free on board'. In a FOB contract, the seller agrees to place goods on board a ship that is nominated by the buyer, at an agreed port of shipment. All charges and expenses incurred up to and including delivery of the goods on board the ship are borne by the seller whilst the buyer is liable for all subsequent charges including stowage, freight duties, consular fees and arrival charges.

[51] CIF stands for 'cost, insurance and freight'. In a CIF contract, the seller pays for these charges. Unlike the FOB contract, the seller undertakes to do more than simply transport the goods to the vessel nominated by the buyer.

[52] AME did not consider domestic demand for coal in their analysis. Consequently a constant value of approximately 9 million tonnes per annum, implied from Barlow Jonker's figures was used to assist in the determination of AME forecasts for the total coal freight task.

[53] Barlow Jonker only provided forecasts for 2000-1, 2004-5 and 2009-10. The remainder have been linearly interpolated.

Figure 11.1 compares the 10-year coal forecasts of QR, AME and Barlow Jonker.

Figure 11.1: Coal forecasts

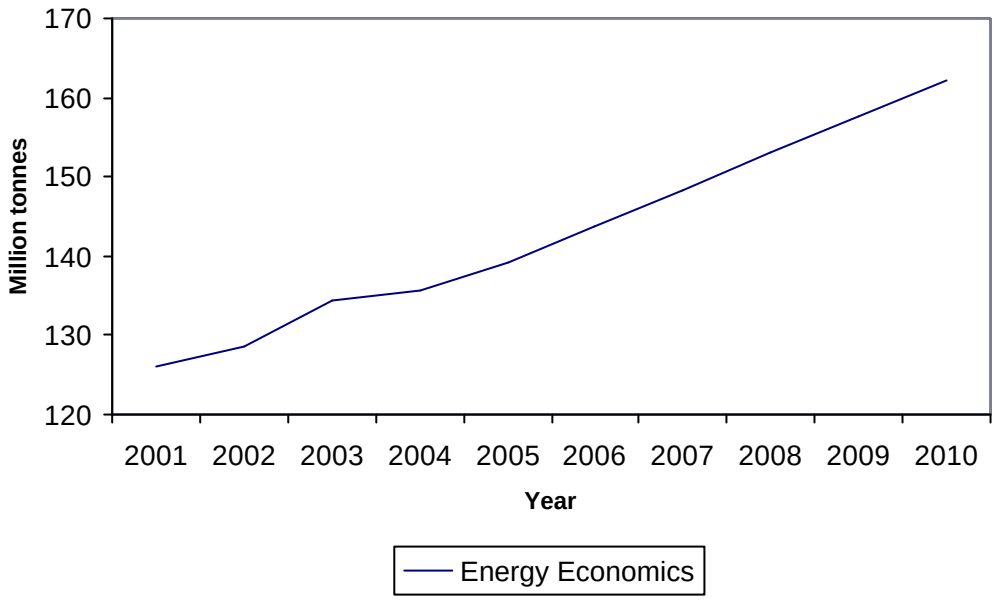
For much of the term of the regulatory period, there is little significant difference between the forecasts of the two consultants, and the series QR1. However, QR's revised forecasts, QR2, are considerably below these levels.

The Authority has adopted an approach where QR is afforded the benefit of a reasonable doubt in the assessment of reference tariffs. Consistent with this philosophy, it is proposed to provisionally accept the series QR1 for the purposes of assessing reference tariffs as part of the Draft Decision.

However, these forecasts were based on the then haulage rates continuing to apply. The Authority is aware of the enormous growth that the Queensland coal industry is currently experiencing. It is possible that the forecast annual volumes for the regulatory period could be exceeded in the current financial year.

Moreover, it is possible that the reduction in rail freights could induce substantial further output growth from the coal industry. Energy Economics provided forecasts for the coal freight task assuming a 30% reduction in haulage rates. These forecasts, excluding coal from the West Moreton system, are depicted in figure 11.2 below.

Figure 11.2: Forecasts - 30% freight rate reduction



Accordingly, the Authority recognises that it may become appropriate to adjust the QR1 forecasts during the consultation period as part of its Final Decision.

Estimation of other parameters

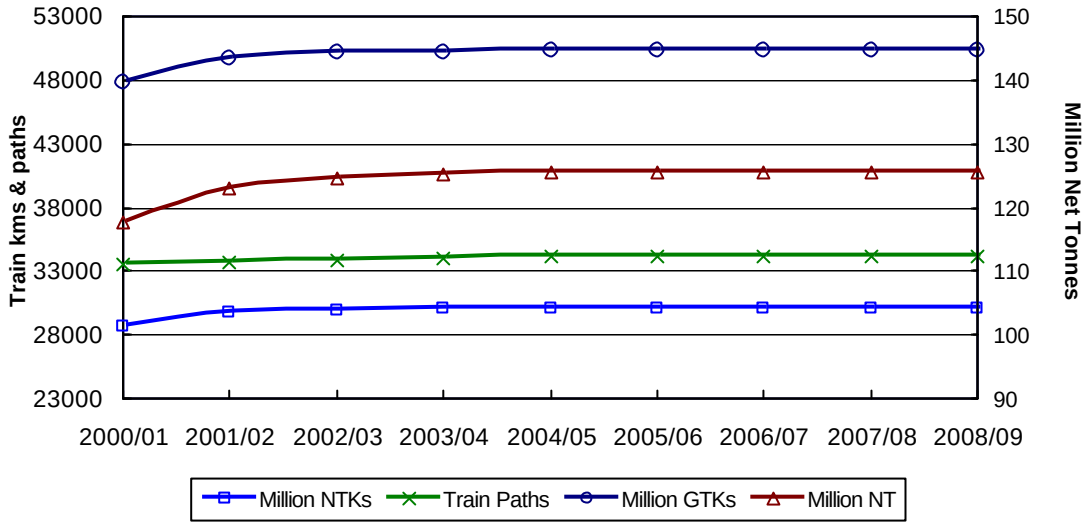
The key parameter for forecasting activity levels concerns the volume of coal that is railed. From this factor, it is possible to estimate the remaining parameters by assuming average haul lengths for each corridor and the nature of the train consists that are likely to be carrying the coal.

For the purposes of this initial review of reference tariffs, the Authority has assumed that the reference train service for each corridor will be operating so that the remaining variables from the tonnage forecasts can be estimated. In practice, this assumption is considered reasonable for the first review period. If trains other than the reference train service operate, it is likely to increase QR's total revenue, although only marginally.[54]

Figure 11.3 depicts these 4 distinct measures of traffic volume that correspond to QR1 that the QCA has adopted for the purposes of assessing QR's reference tariffs.

[54] However, the level of priority afforded to QR's reference train service on the Blackwater system involves the consumption of approximately 1.6 standard train paths when returning to the mine. At this stage, the Authority has assumed that QR's empty train consumes only one standard train path. This issue will be reviewed as part of the Authority's release of a Final Decision once QR has had an opportunity to respond to this Draft Decision.

Figure 11.3: Forecast traffic growth



QCA's Position

The QCA considers that QR's initial traffic task forecasts, QR1, are suitable to adopt for the purposes of assessing forecast costs and unit rates of the reference tariffs. The remaining parameters are to be calculated by assuming average haul lengths for each corridor and the operation of the reference train service.

CHAPTER 12. STAND-ALONE COSTS

KEY ASPECTS

Coal traffic charges - coal traffic on the four central Queensland coal systems will pay up to the stand-alone costs of the services they are provided.

Non-coal traffic charges - non-coal traffic will be responsible for the same incremental capacity charges that apply to the coal traffic.

Maintenance charges - maintenance charges have been estimated on the basis of the maintenance costs that would be incurred for meeting only coal system traffic.

Forecast maintenance costs - QR's forecast maintenance costs are estimated to exceed efficient levels by between $11-13 million per annum over the regulatory period.

Other operating costs - QR's remaining operating costs have been attributed to the coal traffics using a series of allocators. The costs are at the upper bound of a reasonable range of efficient stand-alone costs for these functions.

12.1 Introduction

The Central Queensland coal mines that transport their coal on QR's network currently have no effective alternative means of shipping their product to market. Consequently, they are tied to using QR's below-rail network, at least for the foreseeable future, notwithstanding their ability to choose their preferred above-rail operator.

QR proposes that this traffic pay access charges based on the stand-alone cost of QR providing access to its network. The stand-alone cost represents the maximum amount the owner of a natural monopoly can charge its users without providing those users (or someone else) with an incentive to replicate QR's network and offer an alternative service.

The theory underpinning the stand-alone cost approach is that this is the maximum amount that a below-rail service provider could charge in a competitive market. In theory, if QR sought to recover more than the efficient stand-alone cost of the below-rail services it provides, a hypothetical competitor would have an incentive to duplicate QR's network and offer a lower price to QR's existing customers. Whilst such an outcome is most unlikely in practice,[55] the approach provides a theoretical cap that can be applied for the purpose of regulating QR's access charges - that is, its reference tariffs.

QR's reference tariffs are based on the concept of stand-alone cost for each of the four Central Queensland corridors carrying coal traffic - the Blackwater, Goonyella, Moura and Newlands systems. In order to assess the appropriateness of the quantum of QR's proposed stand-alone costs for these corridors, it is necessary to break QR's approach down into three components:

- identifying the stand-alone costs of the coal network as a whole;
- identifying the directly attributable cost for each corridor and allocating the remainder of the stand-alone cost of the system to the four corridors comprising it; and
- for the Goonyella and Blackwater systems, providing a basis for allocating the corridor cost to the individual clusters.

In addition, it is necessary to identify whether there are any non-coal traffics that might be expected to be attractive for a hypothetical competitor. This is because if a hypothetical competitor were to bypass QR's network, it would not confine itself to the coal traffics – instead it would seek to attract any traffic that covered more than the incremental cost it imposed on the network. In other words, the limit on the revenue that could be earned from QR's coal traffic on these corridors is the difference between the stand-alone cost of these traffics and the net contribution (total revenue less incremental cost) received from non-coal traffics.

The assessment of stand-alone cost for the relevant parts of the network comprising the four corridors broadly includes three components:

- below-rail assets, being the assets required to provide the services on a stand-alone basis;
- the maintenance costs for the relevant track; and
- other expenditure, including train control and overheads.

[55] Indeed, if it were, there might not be a requirement for regulation.

The first two categories of expenditure are line-section specific assets and costs respectively, whilst the final category comprises regional and network-wide costs.

Finally, once a reasonable basis has been developed to determine the quantum of QR's current stand-alone costs, it is necessary to assess whether there is an efficiency gap that requires an adjustment to QR's allowed revenue stream.

In March 2000, the QCA released a Request for Comments Paper, *Queensland Rail's Draft Undertaking - Costing Manual*, inviting comments from interest parties. Unless otherwise noted, the views ascribed to QR and other stakeholders in this Chapter are in relation to the issues raised in the submissions to that paper.

12.2 Estimation of stand-alone cost

QR's Position

QR's methodology for assessing stand-alone costs involves assessing the stand-alone line-section specific costs, the stand-alone region-specific costs and the stand-alone network-wide costs, and totalling these to assess the stand-alone costs for the relevant traffic group. Assessment of stand-alone costs requires consideration of both stand-alone operating costs and stand-alone asset requirements.

Line-section specific costs

Coal represents the vast majority of traffic that operates on the Goonyella, Moura and Newlands systems. Therefore, stand-alone line-section specific costs were assessed as follows:

- stand-alone capital costs were assessed as the line-section specific capital costs for those systems. Given the small number of non-coal traffics on these systems, the incremental line-section specific capital costs for the non-coal traffics are assumed to be zero; and

- stand-alone operating costs were assessed by deducting the incremental operating costs for non-coal traffics from the total forecast operating costs for these systems. Incremental operating costs were assessed using the methodology set out in QR's draft Costing Manual.

For the Blackwater system, the non-coal traffic represents a greater proportion of the traffic on the system. In this case, stand-alone cost was assessed as follows:

- QR estimated the infrastructure that would be required to provide access for coal traffic on a stand-alone basis, in order to ensure that QR could meet the same service standard as currently provided - in terms of throughput, transit time and flexibility for instance. The result of this assessment is that, on a stand-alone basis, QR would not require a duplicated track between Raglan and Rocklands on the North Coast Line (a total of 48km). This section of track would be constructed as single line track with passing loops (assumed to be at the original passing loop locations). Stand-alone capital costs were assessed by adjusting the asset values for the Raglan to Rocklands section of the North Coast line to remove the appropriate proportion of track (including track and turnout), civil works (including earthworks and bridges), signalling and electrification assets;[56] and

[56] This approach was preferred to using a benchmark asset value for single line track elsewhere in the system (for example, west of Rocklands), as the terrain on the North Coast Line is significantly different to the terrain on other parts of the coal system (for example, greater requirement for cut/fill earthworks, more river/creek crossings, etc).

- stand-alone costs for below-rail operations were assessed for the line-sections west of Rocklands by deducting the incremental operating costs of non coal traffics from the total forecasted operating costs for these line-sections. Incremental operating costs were assessed using the methodology set out in QR's Costing Manual. For the line-sections south of Rocklands (where adjustments to the asset value have been made), stand-alone operating costs were assessed using line sections west of Rocklands with similar amounts of duplication as an appropriate benchmark, but having regard to the impact of the difference in terrain.

The approach to estimating stand-alone line-section specific costs for the coal region can also be used for estimating the stand-alone line-section specific costs for each coal system within that region.

Regional and network-wide costs for the coal region

Stand-alone regional and system-wide costs were estimated using appropriate allocators of total network-wide costs as determined by procedures outlined in the Costing Manual and QR's management accounting process.

QR estimated the stand-alone cost of service provision for the following specific items of expenditure:

- train control and infrastructure operations administration, which involves activities such as work trains, liaison with above-rail groups and capacity planning; and

- telecommunications (both asset values and operating costs) - QR did not consider that an allocation of these costs would necessarily provide a reasonable reflection of stand-alone cost for the coal region. Therefore, QR estimated the stand-alone costs of providing telecommunication services to each system in the Central Queensland coal region (both capital and operating costs).

QR put forward specific allocators and also calculated the stand-alone cost of service provision for specific items, including:

- infrastructure management (various combinations of direct maintenance, usage, net asset values and route kilometres);

- business management (based on a combination of gross tonne kilometres and net asset value);

- corporate costs and systems development (based on a combination of working expenses and net asset value); and

- other costs, including capital projects expensed and risk premiums, which were based on actual estimates for each corridor.

These allocators are described in more detail in the QCA Analysis section of this chapter.

The estimation of the stand-alone regional and system-wide costs for each of the four coal systems entailed the allocation of the total regional and system-wide coal region costs by applying the same allocators used to separate the coal region costs from the total network-wide costs. In the case of train control, the benchmark cost per train-kilometre was applied to arrive at a stand-alone cost for each system. QR proposed that other stand-alone costs should be estimated on a system-by-system basis.

Stand alone costs for individual clusters within systems

QR considered that the extent of shared infrastructure between the three clusters comprising the Goonyella system meant that there was no point in developing an estimate of the stand-alone cost of the individual clusters. QR believes that there would only be a risk of one cluster exceeding its stand-alone cost if there was a major variation in the proposed reference tariffs for the three clusters. QR's proposed reference tariffs for the three clusters are identical in $/'000 gross tonne kilometre terms. Therefore, QR is confident that the reference tariffs for the three clusters are consistent with QR's pricing principles.

Stakeholder Comments

Stakeholders expressed the following views in relation to the assessment of stand-alone costs.

Table 12.1: Estimation of stand-alone costs

Stanwell - QR's definition of stand-alone cost should not be used to determine the maximum access price for third-party users. QR's definition makes reference to the cost that 'QR would reasonably incur if the relevant train service….was the only train service…[that has been] provided access by QR…' rather than the usual economic definition which is given as the 'lowest possible cost at which a user could provide the service itself'. QR's definition would theoretically realise a lower maximum access charge because a new entrant would generally have higher costs since it would not typically be as vertically integrated, would not have the same level of experience or specialised skills as QR, and would need to gain industry contacts and 'learn the rules' of operating in what would be, for it, a new market. Therefore as the Costing Manual stands, QR holds all of the relevant information about the precise cost of providing any particular service. The users have none, and can only roughly 'guesstimate' QR's true costs of providing the service. Ultimately however, users do this by estimating what it would cost them to provide an alternative service – in which case, QR's definition of stand-alone cost as the maximum access price becomes the same as the economic definition.

ARTC - the optimisation process which seeks to identify whether existing assets are sufficient to meet additional train services. In particular:

- additional assets may be required when additional train services are added to existing services. The stock of stand-alone assets would include QR's existing assets plus those additional assets necessary to meet the requirements of the train services. It could be envisaged that a new operator would pay more for the same access service than existing operators. This would effectively discourage entry to a market where the required infrastructure was at or near capacity;
- QR's proposed optimisation process seems to leave significant discretion to QR in its application. In other jurisdictions, the optimisation of assets is conducted independently; and
- where a train service reflects all, or all but a small proportion of existing kilometres and GTKs on a section (or region or network), and requires the current standard of infrastructure, QR is proposing that the optimisation process will not need to exclude any existing assets (that is stand-alone assets will be existing assets). The rationale for this approach is unclear. Presumably prior over-investment (gold plating) or surplus assets due to reduced utilisation over time will be included. This is not in concert with the provision of an efficient service to operators.

ARTC - the regime does not adequately define what constitutes efficiency improvements. This is important because stand-alone operating costs will be assessed based on those costs that QR would be expected to incur in the provision of the necessary below-rail services, taking into account the reasonably expected improvements in efficiency that QR should achieve over the evaluation period. QR has too much discretion in this matter. The NSW regime does not specifically quantify what is an efficient operation (it may be different for different users of the infrastructure), but it requires RAC to demonstrate on a regular basis that costs are falling at a reasonable rate over time and the service quality is improving.

AMC, Stanwell - common costs should be related as specifically as possible, that is to sections of rail infrastructure, in the determination of the ceiling level for access charges.

Stanwell - common costs should incorporate head office costs allocated to the relative sections of infrastructure involved.

QMC - QR's overheads should not be excluded from the meaning of common costs. To the extent that they may be, as a result of the potential effect of restricting the definition of common costs to 'transport infrastructure', then that nexus should be broken. Also, common costs should be allocated on a genuine user-pays basis, that is, in accordance with users' relative demands wherever possible, and resort to crude measures like tonne or passenger kilometres should be minimised.

RTBU - QR's aggregated annual accounts are a sufficient basis on which to achieve a commercial outcome with respect to access negotiations.

QCA's Analysis

The assessment of stand-alone cost is complex, particularly for a railway such as QR's where certain corridors carry substantial volumes of non-coal traffic. In assessing the stand-alone costs associated with the below-rail coal services provided by QR's network, the Authority has adopted the following steps:

- identify any traffic that recovers more than the incremental cost it imposes on the system, and if so, assess its contribution;
- assess the appropriate level of stand-alone asset-related charges, having regard to existing traffic;
- assess the efficient stand-alone maintenance costs for the relevant traffics; and
- assess the efficient stand-alone cost of the remaining operating expenditure.

A further step is necessitated by virtue of the changes arising from the New Tax System. The Authority's approach to incorporating the effects of the GST are set out in section 16.3. The assessment of QR's operating costs was undertaken on the basis that all embedded sales taxes had been removed from the forecast costs.[57]

Traffics recovering greater than incremental costs

In assessing the stand-alone costs of the coal network, the first issue concerns whether there are any other traffics that cover more than the incremental cost that they impose on the system. This is because if one were to hypothetically bypass QR's coal network, that person would seek to attract *any* traffic that at least recovers its incremental cost.

Therefore, allowing QR to recover stand-alone costs of the coal network, if in fact other traffics using the network contribute greater than the incremental cost they impose on the network, potentially allows QR to earn an excessive return. In the extreme, it could allow QR to recover the stand-alone costs of providing the network several times over.

The Authority has assessed the non-coal traffics in each of the coal corridors and concluded that none of these traffics contribute more than their incremental cost. However, these non-coal traffics do materially affect capacity costs, which is considered in the context of the stand-alone assets below.

[57] The Authority engaged Arthur Andersen to confirm that the relevant sales taxes had been withdrawn from the analysis.

Stand alone assets

The assessment of the stand-alone assets can be approached in two ways:

- develop a hypothetical network that has sufficient capacity to accommodate only the traffic that is the subject of the test - that is, all coal traffic; or

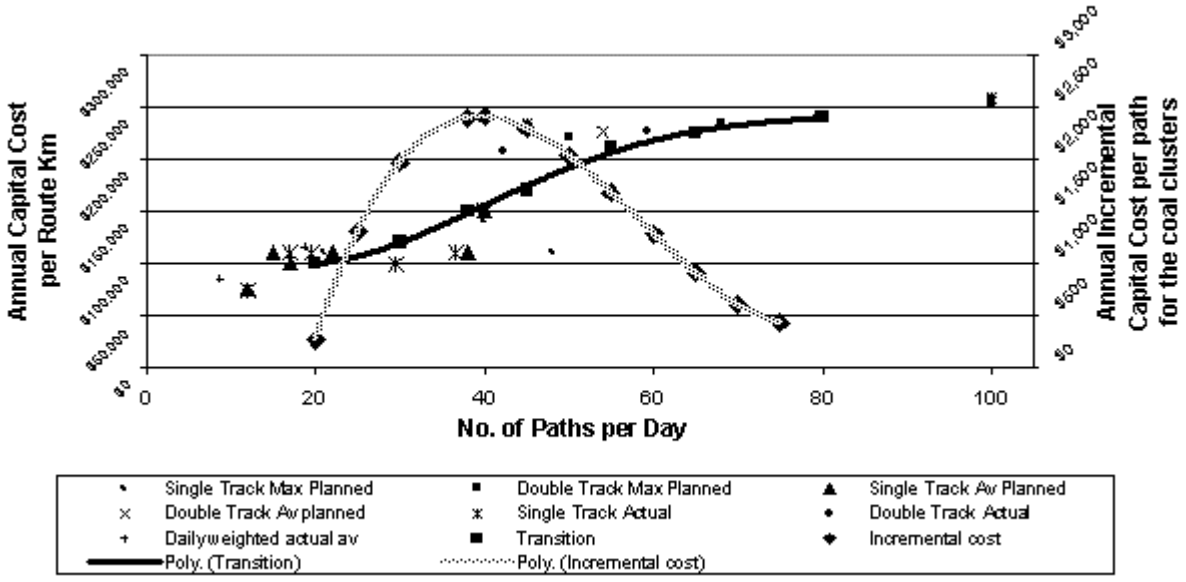
- analyse the cost of the incremental capacity that is consumed by non-coal traffic and impute that cost to those traffics by deducting non-coal capacity-related costs from the total cost of the system.

The key issue in assessing the stand-alone assets concerns the utilisation of available capacity. The nature of the rail capacity expansion process is described in working paper 3 and illustrated by Figure 12.1 below.

Basically, systems commence operating on a single line with passing loops added as the traffic grows. These passing loops add additional capacity at relatively low cost. As traffic grows, more and more passing loops are added until they are so close (perhaps 10 km apart) that the most cost effective means of creating additional capacity involves joining passing loops to duplicate the system in these areas.

Duplication represents a threshold in the sense that it provides considerably more capacity (roughly trebling available capacity relative to the system with passing loops), but at substantially higher cost. In other words, the incremental cost of additional paths is very high as the system is duplicated. Once duplicated, additional paths may be created at relatively low cost through signalling enhancements to reduce headways (the physical distance between trains).

Figure 12.1: Total and Marginal Capacity Costs



Accordingly, a duplicated system is fundamentally different to a single line track with passing loops. The first issue therefore concerns whether sections of duplicated track on QR's network would in fact be single track for a system carrying only coal. The only area where this arises is on the Rocklands to Callemondah section of the Blackwater System (between Rockhampton and Gladstone), where QR has suggested that a stand-alone system be adopted with approximately half the length of the current duplication between Rocklands and Callemondah. The QCA's own capacity modelling suggests that this is a reasonable approximation.

The next issue concerns assessing the stand-alone assets to impute to coal traffics on each of the corridors. QR indicated that its analysis suggests that, with the exception of the duplicated Rocklands to Callemondah section of the North Coast line, all other assets would be required to service the coal traffics. Further, QR has asserted that servicing only coal traffic on the existing system would not result in any change to existing elements of service quality, such as transit times.

This approach involves the creation of a hypothetical system that measures the stand-alone cost of serving only coal traffic, given the terrain over which it currently operates. The alternative approach would impute to non-coal traffic an estimated incremental capacity charge for each standard train path[58] that is consumed by that traffic. There would be no difference between a standard train path consumed by a coal or a non-coal train, the only criteria being the capacity (the number of standard train paths) that traffic consumes.

The difference between the two approaches is seen most clearly on the Blackwater System, west of Rockhampton, where non-coal traffic consumes approximately 20% of the total capacity. The effect of this traffic is to require additional passing loops to meet current traffic requirements and to bring forward any capacity expansions required to accommodate growth in demand. This is significant as the current system is approaching the stage where further selective duplication may be required in the future.

If QR's approach were to apply, the current system would either require fewer passing loops or deliver faster transit times than those that currently apply. Implementing QR's proposed approach would be very difficult in practice. Fewer passing loops would require an adjustment to asset values.[59] If the second approach were to apply, the difference in the transit times between the hypothetical system and those that are in fact delivered would require compensation. This would become very complex.

More importantly, neither approach would send price signals to current users of the system that properly reflected the costs that they impose on the system.[60] In particular, QR's proposed approach would lead to the curious situation where the cost per path is based on incremental capacity costs for infrastructure that already forms part of the network. This 'lag' could distort decision making and commercial activity and thereby imperil the least-cost expansion of the network.

[58] A standard train path is a hypothetical path required by a reference train operating with other reference trains on a network with the largest section being saturated by these trains. The term is explained further in working paper 3.
[59] See section 13.7.
[60] Unless, for example, the corridor had substantial excess capacity, in which case the costs imposed from additional traffic would be relatively insignificant.

From an economic perspective, the key point is to ensure that all users of the system face the costs associated with their activity. For example, each user who occupies a path on a system that may require capacity augmentation in the future should pay the incremental costs associated with that path. In other words, the charge per path should provide an estimate of the actual cost that occupation of the path imposes on the system as a whole. It also provides an estimate of the costs that would be avoided in the long run by the relevant train services not operating.[61]

The Authority considers that where non-coal traffics occupy capacity on the system, then the assessment of stand-alone assets needs to first address whether the existing system has fundamentally similar characteristics to a hypothetical system configured to carry only the coal traffic - that is, the traffic that is the subject of the stand-alone cost test.

If this is the case, then non-coal traffics ought to pay the incremental capacity cost for each standard train path that they consume, based on the approach used to assess the departures from the reference train service. If this is not the case, such as where the system is duplicated, then it will be necessary to create a hypothetical system to accommodate only coal traffic, and to assess the stand-alone assets necessary to accommodate this traffic.

Stand alone maintenance costs[62]

QR provided information on the scope and quantum of future maintenance activities for the coal region as a whole for each year of the forecasting period.

Table 12.2 and Figure 12.2 summarises QR's actual maintenance expenditure between 96/97 and 99/00 and contrasts this expenditure with forecast annual maintenance expenditure for the period 2000/01 to 2008/09 (in nominal dollars).

Table 12.2: Actual and forecast maintenance expenditure (nominal $m)

Year	**96/97**	**97/98**	**98/99**	**99/00**	**00/01**	**01/02**	**02/03**
Total	55.3	58.5	56.8	75.6	76.7	77.9	81.2

Year	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**	**08/09**
Total	88.1	86.5	97.4	96.5	104.1	100.9

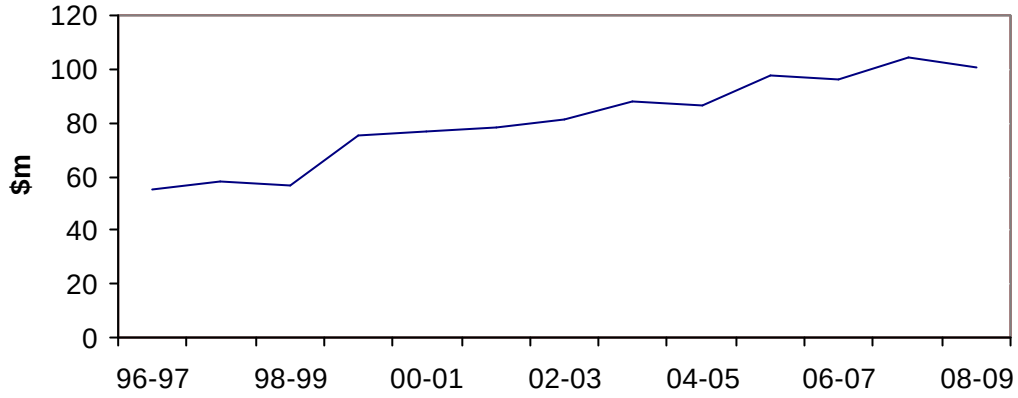
NOTES: Network Access has also estimated that a management fee of $10.1million is charged each year by the internal maintenance provider (ISG) to cover upper-level management of maintenance activities. Maintenance of marshalling yards assigned to NAG is included in these maintenance expenditure forecasts.

Actual maintenance expenditures were derived from QR's report 'Total below-rail operating costs by region 98/99' and modified by adding the 'ISG Management Fee' applicable and capital costs for track maintenance equipment.

[61] The cost of a path is distinct from the value an above-rail operator places on a path.

[62] In assessing QR's stand-alone maintenance costs, a distinction was drawn between the telecommunications maintenance costs and the maintenance costs incurred in the remainder of the network. QR's telecommunications network has been designed for the entirety of QR's rail network. This telecommunications network includes substantial capacity for commercial, rather than operational data and bears little resemblance to that which would be constructed for a stand-alone railway carrying only coal traffic. Similarly, QR's maintenance costs for its telecommunications network provides little guidance for the maintenance costs for a telecommunications network established exclusively for QR's coal traffic. Consequently, the QCA has assessed telecommunications maintenance costs on the basis of a hypothetical network configured to the requirements of a stand-alone coal railway. This involved a review of QR's stand-alone cost estimates and concluded that the approach provides a reasonable approximation. It results in telecommunications maintenance costs comprising less than 3% of total maintenance costs.

Figure 12.2: QR coal region actual and forecast maintenance expenditure



It is apparent that QR's forecast maintenance expenditure in the coal region represents a marked increase on historical levels. This forecast increase in maintenance expenditure is largely due to QR's proposed ballast cleaning program.

QR's proposed maintenance expenditure covers the entire operating region in which the coal traffic is carried and therefore includes some lines which carry no coal traffic as well as lines that carry mixed (coal and non-coal) traffic. The Authority's assessment of stand-alone maintenance costs therefore involves a four step process:[63]

- assessing whether QR has included costs in its maintenance plan that are inappropriate;
- isolating the maintenance costs attributable to parts of the regional network that do not carry any coal;
- estimating the extent to which non-coal traffic affects maintenance costs on those lines that carry mixed traffic; and
- assessing the difference between QR's maintenance costs and those that could reasonably be expected from contractors.

These issues are considered in turn.

Inappropriate Costs - QR's maintenance plan includes an allowance for QR's voluntary early retirement scheme (VERS). Whilst this scheme will no doubt assist QR in becoming more efficient, the Authority does not consider it appropriate that these costs be included in the assessment of reference tariffs.

This is because QR's VERS program represents its commercial decision as to how to most cost effectively improve the efficiency of its operations. It is like any other investment in the network. QR recovers this investment through its future savings.

[63] Working paper 2 contains a detailed assessment of the tasks that comprise a typical maintenance program.

Accordingly, allowing these transitional costs to be fully passed on to customers would effectively mean that customers pay twice as they 'paid' in the past for QR's inefficiency and would continue to pay during a transitional phase for the costs associated with addressing inefficiencies in QR's cost structure. Moreover, the incorporation of the X-factor into the proposed pricing arrangements (discussed in chapter 16) will result in customers contributing substantially towards these adjustment costs.

Non-coal lines - QR presented the QCA with a 10-year maintenance plan for the geographic region that contains the Central Queensland coal lines. This region includes significant track lengths that do not carry any coal. For example, the QR 10-year plan includes maintenance for the Monto branch, the Goolara branch, the Biloela branch, the Koorngoo branch, and sections of the North Coast where coal trains do not operate. The estimated lengths within the coal region that do not carry any coal are shown in table 12.3:

Table 12.3: Track length in the coal systems not carrying coal

System	Non-coal track sections
Moura	122 km
Blackwater	54 km
Goonyella	18 km
Newlands	3 km
Total	**197 km**

These lines are typically timber-sleepered track. Timber-sleepered track requires considerable re-sleepering and routine maintenance compared to the concrete-sleepered tracks carrying coal.

Non-coal traffic on coal lines - the next stage of the allocation process involves identifying the impact of non-coal traffic on the total maintenance expenditure for those lines on which non-coal and coal trains operate. Typically, maintenance costs increase as more traffic is carried on the system and therefore non-coal traffic would be expected to increase the total maintenance costs on these lines.

Table 12.4 highlights the extent to which non-coal traffic (in terms of gross tonne kilometres and train kilometres) operates on lines carrying coal:

Table 12.4: Proportion of non-coal trains on the coal system

Line Section & System	Non-coal proportion of gross tonne kilometres	Non-coal proportion of train kilometres
Moura coal system	4%	12%
Callemondah to Rocklands (Blackwater)	18%	59%
Rocklands to Blackwater & branches (Blackwater)	5%	23%
Goonyella coal system	2%	10%
Newlands coal system	2%	5%

Source: QR Operating Statistics 1989/99

QR's approach to assessing the incremental costs of non-coal traffic is to apply the rules set out in its Costing Manual. This approach essentially involves assessing the impact of non-coal trains on the maintenance task, assuming that these non-coal trains impose minimal additional requirements on the system. Using these rules, the cost is estimated to be approximately $1.2 million per annum, based on the approach outlined in working paper 2.

However, in practice, non-coal trains affect the level of maintenance in a number of ways, many of which are not immediately obvious and not captured by QR's approach. For example, the following factors are not addressed through this type of analysis:

- QR's approach assumes non-coal trains do not affect the standard to which infrastructure is maintained. However, in practice, track required to accommodate high speed passenger services such as the Tilt Train, needs to be maintained at a much higher standard than is the case for heavy-haul operations. The standard of track will significantly influence maintenance costs. Moreover, passenger and heavy haul operations are not complementary – the maintenance costs for a system operating both passenger and heavy-haul operations may be greater than the sum of the maintenance costs of two systems operating independently. Finally, the maintenance operations needed to achieve this outcome are inherently more expensive than would normally apply;[64]

- the mix of traffic will influence the nature of routine maintenance activities that are required. For example, some of the routine maintenance activities attributable to non-coal traffics, particularly passenger operations, distract maintenance focus sufficiently to reduce the overall efficiency of the workforce relative to a stand-alone system;

- a stand-alone coal network would actually require less track, less signalling and fewer passing loops. This is because more passing loops are required to accommodate both coal and non-coal trains relative to a system servicing only coal trains. In some cases, such as between Callemondah and Rocklands, a stand-alone railway would not comprise duplicated infrastructure that currently exists. Elsewhere, there would be less passing loops than currently exist (turnouts for passing loops are expensive to maintain relative to track); and

- coal system operations are not timetabled to a rigid pattern as the over-riding imperative is a train's cycle time. Inflexible scheduling requiring specific paths for services is a characteristic of passenger and some freight operations. The additional flexibility afforded by the scheduling for a stand-alone coal system could accommodate longer windows allowing improved utilisation of capital equipment required for maintenance tasks.

These factors suggest that QR's approach to deducting its assessment of incremental maintenance costs for non-coal traffic from total maintenance cost overstates stand-alone maintenance cost for coal traffic. However, in quantifying the other impacts of these non-coal traffics, it becomes difficult to separate pure efficiency effects from allocation effects (for example the regularity of maintenance possession windows). Accordingly, with the exception of the rule-based estimation of incremental costs of non-coal traffic addressed above, the Authority has included all other factors in an assessment of the cost effectiveness of QR's maintenance for the coal systems on a stand-alone basis.

[64] For example, to maintain track to a satisfactory standard for high speed passenger operations requires track geometry faults be corrected as soon as possible. This entails 'chase' resurfacing which requires that a tamping machine be available at relatively short notice and involves that machine travelling significant distances. These factors combine to result in 'chase' resurfacing being relatively expensive to perform. However, for heavy haul operations, track geometry is not as critical. Consequently, scheduled tamping is normally all that is required for a heavy haul operation. The key difference between the two is that 'chase' resurfacing, where the tamping machines 'follows' the passenger train, is considerably more expensive than scheduled tamping due to the poor equipment utilisation associated with the function. Consequently, resurfacing can be performed at a much lower unit cost on a heavy-haul railway than is the case for passenger operations.

Cost effectiveness assessment - the QCA engaged Rail Management Services Pty Ltd (RMS) to assess QR's forecast maintenance expenditure to determine the extent to which QR's current costs depart from those expected from the contract maintenance sector of the industry. This approach was adopted rather than a 'top down' approach[65] due mainly to data availability issues and the complexity of separating coal from non-coal costs, as required by the stand-alone cost analysis.

The RMS review involved two distinct phases. The first phase comprised on-site observation, interviews and analysis of QR's maintenance budget for the 1999/2000 year to establish any potential for improvements in work and management practices. This part of the review focussed on labour deployment, industrial awards and productivity of machinery. The second phase involved an investigation of the amount of work that was performed and what work is planned based on QR's 10-year maintenance plan. It considered whether the scope of activities in QR's maintenance program is reasonable for a stand-alone coal system having regard to the condition of the infrastructure and the required standard of service. The combination of both phases provided a basis for the assessment of how cost effectively the proposed maintenance activities are performed.

The major issue that arose in the assessment of the scope of activities undertaken related to the extent of ballast cleaning and replacement on the Goonyella system. Over the 10-year planning period, QR plans to ballast clean and replace ballast for 725km of track on this system. The system's full length of main line is 714 track kilometres - that is, more than the entirety of the network is forecast to be cleaned over the next 10 years. As some sections of the system have recently been ballast cleaned and some sections receive much lower tonnages than others, the plan implies sections will be ballast cleaned at a rate of approximately every 600 MGT. QR's own estimate[66] for the life of ballast between cleans is 1500 MGT. This figure matches estimates from elsewhere (Hunter Valley - 3000 MGT, BHP Iron Ore in WA - 1500 MGT).

The QCA accepts that this rate of ballast cleaning is due to the fouled state of the ballast from coal spillage (although there may be an issue as to whether the extent of the proposed task is warranted even allowing for the state of the infrastructure). No adjustment has been made to the maintenance plan on account of this work. The QCA instead proposes to address this matter by adjusting the initial asset valuation for the Goonyella system to take account of the difference between the works QR has foreshadowed and those that would be expected, given the age and expected life of the ballast.

[65] Examples of top down approaches include stochastic frontier analysis, data envelopment analysis and total factor productivity. There are substantial difficulties in applying a top down analysis to QR's below-rail coal infrastructure maintenance, including:

- data limitations – in practice data limitations restrict the scope of any study to US railways and RAC. However, there is no publicly available information that isolates the heavy haul component of these systems. Other vertically separated railways, such as ARTC and Railtrack in the UK are not good comparators because they service very different types of traffic;
- differing traffic mixes - QR's coal network services mixed traffic which imposes substantial additional maintenance requirements;
- differing track standards and infrastructure designs – there is a trade off between capital and operating (maintenance) costs in infrastructure design;
- differing traffic densities – as shown in working paper 2, traffic density significantly affects maintenance costs; and
- terrain and climate issues.

[66] Network Access correspondence with the QCA, 5th July 2000.

RMS reviewed QR's infrastructure maintenance and renewal activities in order to assess how cost effectively those activities are performed. The aim was to determine whether coal infrastructure maintenance costs were higher than appropriate and if so to identify operational or managerial factors that caused this outcome. RMS concluded that, despite the adoption of initiatives that will significantly improve the cost effectiveness of QR's maintenance activity, the transition is likely to be lengthy and that QR's costs are materially higher than those that would be incurred if QR were to contract out its maintenance task.

In conducting this assessment, RMS adopted a conservative approach on minor issues. For example, adjustments for the maintenance savings associated with the simpler track that might be required for a coal-only system (that is, one requiring less passing loops) were not made.[67]

In addition, the study indicated that, in some cases, it was difficult to distinguish 'efficiency' effects from allocation issues. The study therefore did not attempt to exhaustively separate cost differences between QR's costs and those of contractors into the effects of longer and more predictable maintenance windows afforded by stand-alone coal traffic as compared to 'pure efficiency' effects.

Consequently, the cost effectiveness assessment straddles both the efficiency review and aspects of the estimation of QR's stand-alone maintenance costs for the coal traffic. This means that the 'gap' identified by the assessment marginally overstates the efficiency margin that exists between QR's current maintenance operations and those of contractors.[68] However, it also overstates the appropriate allocation of cost to a stand-alone coal system.

It should also be noted that the review of these costs was undertaken recognising that due regard would be had to QR's engineering judgements concerning its maintenance requirements. The review did not attempt to highlight all possible scope adjustments that could arise from legitimate differences in engineering judgement.

RMS identified the following matters as affecting the cost effectiveness of QR's maintenance operations:

- higher than required manning levels - the staffing levels of routine maintenance resources have been slow to drop after the significant upgrading that has occurred across the Blackwater, Moura and Goonyella systems in recent years. There exists unwritten plans to adjust staffing levels to the upgraded infrastructure. However, these plans are not incorporated in the QR 10-year estimates, where no change in routine maintenance resources are shown. The RMS report assumed a track manpower ratio of 15km per man which is conservative in light of comparisons with heavy-haul operations elsewhere in Australia, some operating with ratios in excess of 20km per man for comparable tonnages;

- terms and conditions of employment, especially award conditions, that increase labour costs. QR's award conditions still contain many 'disability payments' that no longer exist in the competitive sectors of the track maintenance industry. Moreover, QR's industrial award structure promotes the stratification of the workforce, resulting in a very low degree of workforce deployment flexibility and multi-skilling. For example, contract rail grinders typically use machine operators for safeworking duties in contrast to QR's use of specialised safeworking staff. Similarly, track maintenance staff and signal technicians

[67] However, in the assessment of maintenance costs account was taken of the fact that the duplicated track between Rocklands to Callemondah would be single track in a stand-alone system.
[68] This has been addressed in the context of the X-factor to be applied to QR that is considered in Chapter 16.

assist in non-critical job swapping on BHP's iron ore railway in Western Australia, yet such changes are yet to be established within QR;

- poor equipment utilisation due to inflexible work practices - QR's practice of working only over one shift per day for many of its capital intensive maintenance activities does not maximise equipment utilisation. A two-shift operation will dramatically increase equipment utilisation and permit the scrapping of some of QR's older machines;

- management fees – QR's estimates allow for a 16.7% management fee mark-up for all maintenance operations. Whilst QR's allowance is reasonable for some activities, such as routine maintenance, it is clearly excessive for many others, particularly those that are capital intensive. Moreover, an allowance has been made for the costs associated with infrastructure management (relating to the management of maintenance contracts) in the stand-alone costs of Network Access. These costs have been estimated with reference to the costs incurred by other rail network providers in Australia. Therefore, where ISG contracts out these functions, there is little justification for any management fee to be included as the Network Access costs already incorporate an allowance for this function; and

- institutional factors - the infrastructure maintenance organisation of the coal systems was based to a large degree on the organisation of infrastructure maintenance through QR as a whole. This leads to several difficulties that increase maintenance costs:

  – a lack of forward planning. In a heavy-haul system, forward planning is integral to minimising long term expenditure. However, QR's long term maintenance plans had not been constructed until the QCA's review had commenced. RMS uncovered past maintenance works that would not have been undertaken at all in an environment of long term infrastructure maintenance planning (such as turnouts being partially replaced where uncertainty exists as to when they will be totally replaced);

  – an absence of competitive pressure to internal service providers. This is reflected in the fact that no productivity improvements are foreshadowed over the 10-year planning horizon; and

  – QR's budgeting methodology is largely resourced-based. The work programs are geared to ensure that the amount of maintenance worked performed matches the resource rather than demonstrated need.

RMS estimated the cost implications of these factors for each maintenance activity and derived an estimate of the 'efficient'[69] costs of stand-alone infrastructure maintenance for the coal system based on contract rates for similar tasks currently offered by maintenance contractors in Australia. RMS estimated that, on average, QR's infrastructure maintenance efficiency is around 15% more costly than it would have been had it been based on competitively determined contract rates for the maintenance activities that would be performed on a stand-alone coal system. The adjustment levels vary across maintenance activities due to different capital/labour intensiveness, usage of materials and variations in the difference between internal and external contract rates. As well, management fees are around twice efficient levels.

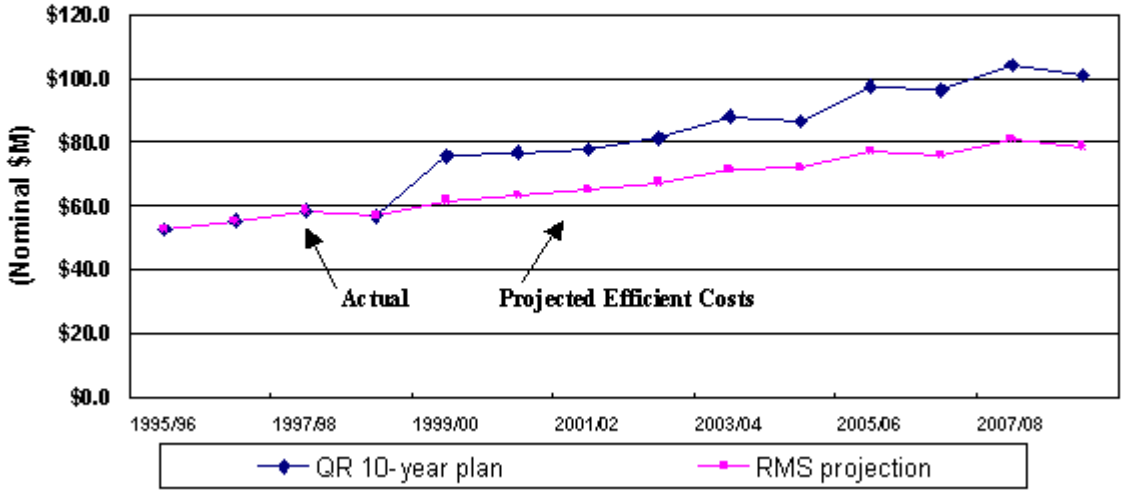
[69] Efficiency adjustments do not take into account scope changes to the work program, VERS and management fee adjustment except for major track maintenance.

To determine the appropriate level of direct maintenance expenditure to be used in the calculation of reference tariffs for the coal network, it is necessary to apply all of the adjustments discussed above, namely:

- removing costs associated with the VERS scheme from the maintenance plan;
- removing the maintenance costs attributable to parts of QR's network that do not carry any coal;
- adjusting for the impact of non-coal traffic on those lines that carry mixed traffic; and
- estimating the gap between QR's maintenance costs and those that could reasonably be expected from contractors.

Overall, RMS's estimate of maintenance requirement on an efficient basis is approximately $11.5 - $13 million per annum less than that of QR's during the regulatory period. Figure 12.3 illustrates the two estimates.

Figure 12.3: Actual[a] and projected[b] expenditure on infrastructure maintenance - Central Queensland coal systems



a – Actual expenditure in dollars of the day and includes estimated ISG management fee based on 1999/2000 ratio of management fee to direct costs used by QR plus depreciation and return for track maintenance equipment.
Base source: 'Total Below Rail Operating Costs by Region – QR' for each applicable year.
b – Projected expenditure includes direct costs plus management fee plus Voluntary Early Retirement Scheme (approximately $1.5m in 2000/01). Source "Network Maintenance Plan – June 2000 – QR'

Regional and system-wide costs

The QCA has undertaken a detailed analysis of the level of QR's regional and system-wide costs, which include the following:

- train control and operations administration;
- infrastructure management;
- business management;

- corporate costs;
- capital projects expense;
- systems development; and
- risk premium.

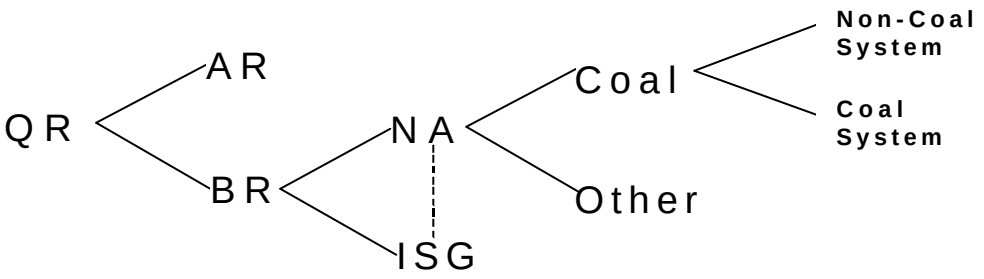
The Authority also considers that recognition of the opportunity costs associated with timing differences between cash inflows and outflows is appropriate.[70]

Whilst there are many possible approaches to estimating stand-alone cost for regional and system wide costs, the Authority has focussed on the following methods:

- an allocative approach where the stand-alone cost for the coal region is estimated by applying an allocator that reflects the underlying cost drivers for the relevant function to QR's existing costs; and
- a 'bottom-up' approach where the stand-alone cost is estimated by reference to the requirement for a hypothetical efficient below-rail service provider.

The allocative approach is depicted by Figure 12.4. In the first instance, total QR costs are separated into above and below-rail. Below-rail costs consist predominantly of corridor-specific costs and allocated corporate overhead costs attributed to NAG and ISG. This separation is discussed in Chapter 5. A large proportion of these ISG costs are then charged to NAG for the infrastructure maintenance services provided by ISG. Then, the total NAG cost (including the ISG component) must be assigned to the coal and other regions. Finally, the expenditure assigned to the coal region is separated into coal and non-coal traffics.

Figure 12.4: Cost allocation process



Basing an assessment of stand-alone cost on any allocative basis introduces an essentially arbitrary dimension to the process, involving an unavoidable element of judgement. Whilst the QCA accepts that an allocative approach can yield a reasonable proxy for stand-alone cost in appropriate circumstances, in reality it fails to capture all relevant information.

[70] Inventory holding costs have been recognised through inclusion of inventories in the asset valuation process.

For example, there is considerable complexity in the current operations of Network Access that would not be the case if in fact it were a stand-alone provider.[71] Indeed, a truly stand-alone below-rail provider for the coal industry would be a very focussed organisation with a clearly defined role. Much of the complexity of Network Access' current role could be avoided. It is impossible to objectively assess the 'costs' associated with this loss of focus.

A countervailing factor relates to assigning scale economies that may arise for particular functions, such as certain administrative functions, through the size of QR's network. Nevertheless, the breadth of QR's operations means that costs are incurred that would not be necessary for a stand-alone infrastructure provider (such as, the complexity of the management accounting process and the cost allocation exercise itself).

Another difficulty associated with the allocative approach is the potential for duplication of costs by allocation of the same cost more than once. Care has been taken to ensure that such duplication has been minimised in the process. The benchmarks used in the bottom-up approach have assisted in ensuring that such double counting of overhead costs is avoided.

In theory, a bottom-up approach is more desirable and could go some way to addressing the limitations of an allocative approach. However, there is the risk that the approach could underestimate the appropriate stand-alone cost for the service. In practice, a bottom-up approach is likely to involve similar drivers to those utilised for an allocative assessment, although greater regard is had to external benchmarks.

Accordingly, the Authority assessed, for each function, whether an allocative or bottom-up approach is more appropriate. Where an allocative approach has been applied, the result has been compared with the outcome of the stand-alone assessment as a reasonableness check. Once a stand-alone cost estimate has been developed for the coal system as a whole, it is necessary to apportion it to individual corridors by applying the same process.

The allocations ultimately proposed by QR in the allocative assessment are generally acceptable to the QCA and are summarised in table 12.5 below.[72] The main difference between the QCA and QR is that QR proposed the use of net or depreciated asset values for the allocation of costs relating to infrastructure management and corporate costs. The QCA considers gross asset values represent a more appropriate allocator for these costs. The ageing and use of the asset is responsible for the difference between gross and net asset values. Adopting net asset values as the allocator reduces the allocation of these costs to areas at the same time as the intensity of the management effort required for those assets increases.

[71] The below-rail coal business is in itself a substantial business and could operate more effectively if it were able to avoid the additional complexity arising from the passenger and general freight businesses.
[72] QR altered the allocators it initially proposed after discussions with the QCA.

Table 12.5: QR's proposed allocations

Cost component	QR's proposed allocator	QCA's proposed allocator
Train control and operations admin		
Direct train control	Sum of estimated actual cost for each coal system	Accept
Safeworking/yard control	Sum of estimated actual cost for each coal system	Accept
Train control support	Sum of estimated actual cost for each coal system	Accept
Operations management	Direct train control and safeworking costs	Accept
Infrastructure management		
Asset management, infrastructure (excl. telecoms), Network Access	50% direct maintenance, 20% usage and 30% net value of assets	50% direct maintenance, 20% usage and 30% gross asset value
TSG services, civil	50% direct maintenance and 50% net asset value	50% direct maintenance and 50% gross asset value
Electrical	Electrified track km	Accept
Signals	Signalled track km	Accept
Other	50% direct maintenance and 50% net asset value	50% direct maintenance and 50% gross asset value
Telecommunications	Route km	Accept
Safety	50% GTK and 50% train km	Accept
Property	Route km	Accept
Business management		
Business management	50% GTK and 50% train km	Accept
Additional compliance	50% GTK and 50% train km	Accept
Business planning	50% GTK and 50% train km	Accept
Corporate costs		
GGM, Executive Management, CE/Board, finance, employee relations, other corporate costs, DCE	50% direct maintenance and 50% net asset value	50% direct maintenance and 50% gross asset value
Capital projects expensed	Sum of estimated actual cost for each coal system	Accept
Systems development	50% direct maintenance and 50% net asset value	Sum of estimated actual cost for each coal system
Risk Premium	Sum of estimated actual cost for each coal system	Accept

A detailed assessment of the proposed approach for each major function is discussed below.

Direct train control and safeworking - the train control and safeworking function includes the performance and supervision of the train control function and the tasks undertaken by yard controllers at export terminals. Train controllers perform several functions including managing traffic flows on the network in real time, recording train running times, managing incidents and communicating with train drivers.

QR estimated the stand-alone direct control, safeworking and train control support costs for each of the coal corridors and added these amounts to obtain the total coal region cost.

The QCA's analysis of past train control costs in the coal region found significant uniformity in the traffic task to staff ratios across control centres. The degree of uniformity has been increased in recent years by the introduction of flexible screen-based systems that permit the territory controlled by each controller to be altered quickly in response to changes in traffic volumes. In estimating stand-alone cost, the Authority considers that train kilometres is the most relevant cost driver for train control operations.

As a result of this uniformity, it is feasible to use standard measures of train kilometres per staff per annum to estimate stand-alone train control costs for each system. Accordingly, QR's estimate for stand-alone train control costs was assessed against relevant benchmarks of one train controller per 200,000 train kilometres per annum for the Moura and Newlands systems and one train controller per 300,000 train kilometres per annum for the more densely trafficked Blackwater and Goonyella lines.

QR's estimate was very close to the Authority's estimate. Similar benchmarks were employed to estimate other components of train control and safeworking costs. These estimates were also close to QR's corridor and regional estimates. Consequently, the Authority has accepted QR's estimates of stand-alone train control and safeworking costs for the coal region.

These costs account for less than 2.5% of the revenue forecasted to be earned by QR's below-rail coal business.

Operations management - operations management involves the management of the scheduling and train control processes, including QR's Network Planning Centre. This function involves the preparation of master and daily train plans that are executed by train controllers in real time. It also incorporates capacity planning to better utilise existing capacity and plan for network expansion.

QR proposed that expenditure on direct train control and safeworking is an appropriate allocator for determining the operations management cost for the coal region. The Authority agrees with this approach. Clearly, if train control resource requirements are a function of activity levels, expenditure on direct train control will be closely related to expenditure on operations management.

However, it is likely that a stand-alone coal railway would involve a far more focused activity than currently exists on QR's mixed traffic system. The mix of traffics creates a level of complexity that is not present, for example, in the iron ore railways of Western Australia. Nevertheless, the Authority is aware that the complexity of capacity assessments will increase materially with the introduction of third-party access and hence has accepted QR's proposed resourcing estimate.

These costs constitute less than 0.5% of the assessed stand-alone cost of the coal network.

Infrastructure management - infrastructure management tasks include:

- monitoring the state of the infrastructure;
- developing maintenance plans and strategies for the infrastructure including securing relevant engineering advice for this task;
- developing investment strategies; and
- the negotiation, supervision and administration of maintenance contracts.

Infrastructure management therefore involves input from Network Access staff (for managing maintenance contracts and developing strategies), as well as technical advice from the Technical Services Group (TSG).

The costs associated with the management of infrastructure assets are typically a function of the total cost of maintenance contracts and the value of the assets - that is, high value, low maintenance assets will require management which is disproportionate to the cost of maintenance alone.

QR has proposed that for direct NAG infrastructure management, TSG civil infrastructure management and other TSG infrastructure management services, the net value of assets is the appropriate allocator to use in conjunction with other allocators including direct maintenance expenditure and, to a lesser extent, infrastructure usage (GTK or train kilometres).

The maintenance component of the allocator relates to the effort involved in negotiating and administering contracts. The level of activity is therefore likely to be driven by the amount of work that is to be performed. Accordingly, the QCA accepts that maintenance expenditure is an appropriate allocator.

However, in respect of the other tasks involved in infrastructure management, allocating on the basis of net asset value has the inverse effect that the allocation of this cost to systems decreases as the asset depreciates, whereas the extent of management effort required in developing maintenance strategies is likely to increase as assets depreciate. QR's approach could understate allocations to low-value high-maintenance parts of the network. To the extent that asset values influence these costs, the Authority therefore considers that the gross value of assets provides a more realistic allocator than net asset values as QR proposes. The Authority's approach results in approximately 30% of these costs being allocated to the coal region, compared with 37.5% proposed by QR.

Other components of infrastructure management, such as engineering advice from TSG on electrical and signalling assets, telecommunication assets management, safety and property management, were assessed as follows:

- technical services on electrical overhead infrastructure was allocated on the basis of electrified track kilometres. This allocator merely operates to apportion these costs on a uniform basis across the electrified network. The Authority accepts that this provides a reasonable approximation of the costs as they are likely to be incurred. These costs are recovered through charges for the use of the electrical overhead system rather than track;
- technical services on signals – the proposed allocator of signalled track kilometres represents a reasonable basis for assigning this expenditure between the coal region and the remainder of QR's network;

- telecommunications asset management costs were allocated on a route kilometre basis, except that telecommunications areas covered by the more sophisticated radio controlled signalling (RCS) communications system, which covers approximately 75% of QR's network, was assigned a three-to-one weighting relative to communications in 'dark territory' where radio communication does not exist. This reflects the far more intensive management required for the RCS network;

- safety-related costs, principally relate to the costs of establishing and auditing compliance with safety standards. These costs are partly related to volume/vehicle numbers and partly related to train movements. Consequently, the costs were allocated on an activity basis (GTK and train kilometre); and

- property management expenses relate to management of the corridor rather than the costs associated with the management of residences. QR proposed that these costs be allocated on the basis of route kilometres. This seems reasonable given that the property management costs are primarily associated with the management of the estate titles comprising the corridor that, in turn, is broadly correlated with the length of the network.

The complementary bottom-up analysis estimated asset management costs by reference to observed asset management staff to contract value ratios. An analysis of other bulk commodity railways in Australia and overseas suggested that a ratio of about 1 staff member per $3-5 million of contract maintenance expenditure represents a reasonable allowance for this function. On the basis of an all-up cost per staff member of $130,000 (including on-costs and travel) being required for each $3 million of contract expenditure, a total cost of 4.3% of contract expenditure was derived.

While the allocative approach proposed by the Authority results in a higher cost for asset management than the bottom-up approach, the Authority considers that the resultant cost is within a reasonable range albeit towards the upper bound.

The bottom-up approach to safety employed an approach similar to that used for asset management and related safety staff requirements to total expenditure of the below-rail operator. Rail infrastructure authorities in Australia have safety and standards functions ranging from 5-15% of total headcount. For an integrated railway, a ratio of around 0.5% of total operating costs would be usual. In the case of access-only stand-alone coal systems, it is debatable whether they would need to develop their own standards and a safety compliance and auditing staff of about 5% of the headcount would probably be sufficient. These staff would be relatively senior and would spend much of their time in the field. Allowing an all-up cost per staff member of $150,000 (including travel administrative support and accommodation) produced similar cost estimates to QR's proposed allocation for safety.

Infrastructure management costs in total represent less than 2% of the revenue forecasted to be earned by QR's below-rail coal business.

Business management - business management costs are primarily incurred in relation to third-party access and the negotiation of CSO arrangements with Queensland Transport. Whilst coal is undoubtedly a prime concern, there are other actual and potential operators that have been shown interest in other parts of the network, such as Kuranda.

The allocator employed by QR and accepted by the Authority for all components of business management and planning costs is intended to reflect separate elements of infrastructure usage, namely the frequency of train movements (train kilometres) and intensity of infrastructure usage (GTK). These indicators are closely related to management activity, particularly in the coal region where third-party access activity is expected to require greatest management attention in the future. QR's proposed allocator results in approximately 40% of these costs being assigned to the coal region.

Again, the bottom-up analysis considered that business management costs are a function of the overall scale of activities undertaken by the below-rail operator and that the complexity of the track access agreements will determine the volume of business management activity. Consequently, business management costs are expected to vary from one below-rail provider to the next. For example, an authority with a 'posted tariff' (set price) policy will have a significantly reduced business management task compared to one with a negotiated tariff policy.

The coal system is likely to attract a relatively large number of enquiries concerning access and, although some of these may only be for tactical purposes in negotiating with their existing carrier, they will nevertheless generate a significant business management workload. To reflect this, an allowance of 1% of total expenditure has been made for this function.

The allocative approach and the bottom-up approach give similar results, with the allocative approach giving a slightly higher cost estimate.

Additional compliance costs include those costs incurred as a result of the need to comply with the requirements of regulatory bodies not encountered in a pre-access environment. These include economic, environmental and safety regulators. QR sought $1 million per annum for this function but at no stage provided detailed evidence of its requirements. The QCA recognises that additional compliance costs will arise from the regulatory arrangements and has allowed one half of QR's claim in its assessment of reference tariffs. These costs are to be allocated to the coal system on the same basis as the other business management costs.

In total QR's allocated business management costs account for less than 0.5% of the forecast revenue to be earned by QR's below-rail coal business.

Corporate overhead - these costs involve the provision of services such as finance, employee relations, information technology and the activities of the Deputy Chief Executive (DCE). The DCE activities include employee-related costs such as payroll, training, personnel records and counsellors, computer rental and servicing, legal services and some property, telecommunications and corporate finance costs.

QR's proposed approach, which allocates these costs on the basis of maintenance costs and asset values, results in the coal region bearing almost 40% of corporate overhead costs. The QCA proposes a similar allocator to that employed for infrastructure management - utilising the gross value of assets in lieu of net values as proposed by QR. This results in 30% of these costs being allocated to the coal region which is consistent with the allocation of Network Access costs to the coal system generally.

The bottom-up approach involved a separate assessment of the main corporate functions of a stand-alone access provider, namely human resources, finance and IT. The analysis considered total expenditure, as a proxy for the level of business activity, to be the main determinant of corporate costs. It found that the ratio of the cost of corporate functions to total expenditure varies markedly over industries, with transport organisations typically falling between 4-8%, at the low end of the range.[73] Integrated railways have typically been in the 6-8% range but access authorities are essentially wholesalers, with less need for extensive corporate functions. For instance, the ratio of corporate costs to total expenditure for one of the Australian access authorities is well below 4%.

The approaches used for each of the main corporate functions are discussed below.

Human Resources - the proportion of human resource staff to total headcount for a variety of private sector companies varies from under 1% to as much as 3-4%. The most 'efficient' HR groups are typically under 1% of the total headcount, with the ratio being a function of the number and complexity of the industrial agreements and pay arrangements in place in any given industry.

Historically, railways experienced both of these drawbacks and personnel costs were typically about 2% of total payroll. However, industrial awards have been greatly simplified in recent years and the personnel arrangements for a largely white-collar workforce (which most closely resembles Network Access) will be towards the bottom of the range. An allowance of 0.2% of total expenditure was adopted.

Finance - finance staff typically range from 1.5% - 6% of the total workforce, although some companies have reported up to 10%. The most 'efficient' finance functions (which includes Railtrack, the UK access authority) have, on average, 2-3% of their total workforce dedicated to this function. A major private bulk railway in Australia has a ratio of 1%, but this is exceptionally low and a ratio of 3% has been adopted. This equates to an allowance of 0.4% of total expenditure.

Information Systems - the heaviest concentrations of IT staff are found in the banking, insurance and finance industries, where over 10% of staff are associated with IT, compared with figures of 1-3% more typically found in manufacturing industry. This reflects a clear differentiation between those industries where information systems are used to automate and increase the efficiency of production functions compared to those (such as banking) which provide the company with a strategic competitive advantage. However, comparisons need to be done with care to take into account the substantial scope for out-sourcing in this area.

A more complete view can be found by comparing expenditure on IT (operations and capital combined) to total expenditure. Most companies spend from 1% – 4% of their expenditure on IT, generally clustered around 2%. Railtrack lies towards the upper limit of expenditure, spending about 4%. By contrast, one Australian access provider spends no more than about 1%. The IT requirements for a stand-alone authority should be comparatively modest and 2.2% has been adopted for this cost. This includes an allowance for systems development and external IT costs.

Table 12.6 summarises the efficiency benchmarks for the various components of corporate overhead costs applied in the bottom-up estimation of stand-alone costs.

[73] The overhead ratio increases sharply as the industry becomes more dependent on retail sales (10-20%) and more service-oriented (20-30%).

Table 12.6: Corporate overhead cost benchmarks

Cost component	Percent of total NAG expenditure
Corporate costs:	
Personnel	0.2%
Finance	0.4%
IT	2.2%
General expenses	1.2%
Total	**4.0%**

The bottom-up approach results in an estimate of corporate overhead cost of 4% of Network Access' total expenditure, including capital charges and maintenance costs. In contrast, QR's corporate overhead costs are closer to 6% of total expenditure, excluding capital charges and maintenance costs.[74] This represents less than 0.5% of total revenue. For the purposes of this initial regulatory review, the Authority is prepared to accept that these costs fall at the upper bound of a reasonable range.

Capital projects expensed - capital projects expensed represents the design and planning costs incurred in projects that do not proceed (and hence are written off) and the net costs associated with projects that ultimately become the property of third parties such as road and power realignments for which no payment is received. QR proposed approximately $0.5 million per annum be allocated to the coal system, which is consistent with historical expenditure patterns. Accordingly, the QCA proposes to accept this figure.

Systems development - the Authority considers that the use of an allocator to determine costs such as system development costs for the coal region is inappropriate. The Authority has therefore estimated an appropriate allowance for systems development for each of the four coal systems to arrive at a stand-alone cost for the coal region. In the bottom-up analysis, systems development costs are included with the IT component of corporate costs.

Risk premium - QR has developed an insurance program to manage its major unique risk factors. The major components of this insurance program are 'public liability' and 'industrial special risks' which incorporates material damage, business interruption and rollingstock damage. As part of this program, QR's risk manager has estimated a risk premium for QR's below-rail coal system based on an analysis of QR's historical performance in respect of the number and value of incidents attributable to below-rail causes.

The insurance cover typically provides for a certain level of 'deductibles' which represent the maximum amount that QR pays in relation to each insurable incident prior to calling on the insurance. The higher the deductible, the lower the insurance premium. Therefore, the total cost of risk for QR in providing rail infrastructure is the sum of the estimated cost of an insurance program in relation to QR's below-rail activities, plus the estimated amount that QR is likely to pay in deductibles.

The cost of risk is estimated taking account of two key parameters:

- the likelihood of an incident occurring; and
- the consequence of an incident occurring.

[74] This figure rises to approximately 8% once an allowance is made for systems development, which is discussed below.

With the exception of natural events, these two parameters are essentially the result of the standard of the rail infrastructure and the type of traffic carried on that infrastructure. For example, in respect of many of the branch lines, the standard of the infrastructure is low, therefore there is a high likelihood of incidents occurring. However, the trains would generally not be travelling at high speeds, and typically are not constituted from expensive rollingstock. Therefore the consequence of an incident is low. In contrast, on the Central Queensland coal network, the standard of the infrastructure is high, which lowers the likelihood of an incident occurring. However, any incidents that occur are likely to have far greater consequences, as the trains are heavier, travelling at higher speeds, and consist of more expensive rollingstock.

Another critical issue impacting on the consequence of an incident is the type of goods that are carried on the train. The risks associated with a train carrying acid are far greater than the risks of a similar train carrying coal, as acid has the potential to cause substantial environmental damage. Similarly, the risks associated with passenger trains are higher, given the potential public liability issues associated with an incident.

Since 1 July 2000, QR has had a 'captive' insurance company that insures the individual businesses, charging premiums based on historical data. Over the six years to 1998, QR incurred $35 million in damage to rollingstock and injury and also paid $27 million in compensation for personal injuries, an average of $10 million per annum ($1995s). However, in this analysis, rollingstock write-offs were based on historic rather than replacement costs (for example, coal wagons valued at $45,000 rather than the current $120,000) and the assessed cost of risk for the whole of QR for 2000 is $25 million. This is the net cost of insurance premiums, excesses, and uninsured losses less recoveries. Some 40% of this cost is associated with Citytrain and 40% with Network Access.

The Network Access component is distributed among the various users on the basis of their perceived risk, with the coal network being allocated $2 million or 20% of the total Network Access cost. However, a stand-alone system would incur a larger premium, as the risk of a catastrophic accident cannot be spread over a wider network. QR has undertaken simulation studies to estimate the annual cost of infrastructure-related accidents, based on the potential for a range of accident types. Catastrophes for example, with a total cost of $30-50 million, are only likely to occur once every 100 years or so, while medium incidents costing $2-3 million (such as a serious derailment) could be expected to occur every 3 years. A larger number of smaller incidents can be expected annually. Based on this detailed analysis, the annual risk premium for the coal network has been assessed at $3.2 million.

Working capital

Working capital[75] represents the capital required to provide for timing differences between cash inflows (revenues) and cash outflows (expenses) over the short term operating cycle of the entity. The cash inflows include cash, marketable securities, prepaid expenses, inventories (as they are expected to be consumed in current production and realise revenue) and accounts receivable. Typically the cash outflows include wages, accounts payable, short-term bank loans and accrued expenses.

[75] Working capital is typically measured as net working capital that represents the excess of current assets over current liabilities. A working capital deficiency occurs if current assets are less than current liabilities. If current assets exceed current liabilities, there is a working capital surplus. Working capital therefore provides an important measure of an entity's liquidity and solvency.

The only Australian regulators to report a position with respect to working capital are ORG and IPART. ORG[76] reported that arguments for including a return on working capital pointed to a mismatch between the timing of revenues and costs over an operating cycle which left the entity with a shortfall in revenues. ORG undertook an analysis assuming a set of simplifying assumptions regarding the billing and receipt cycle and concluded:

- if attention focussed only on the revenue required to meet operating expenditure, there would be a shortfall in revenue to the electricity distributors;
- if all revenues and costs were considered, distributors were more likely to receive a revenue surplus under the revenue cap formula applied relative to that required; and
- no working capital adjustment was necessary.

In contrast IPART[77] considered that any business must maintain an investment in working capital to allow it to manage the lag between payments to suppliers and the receipts from customers. Similarly, many businesses also maintain an investment in inventory. IPART noted that to simply apply working capital as current assets less current liabilities would lead to a number of one-off distortions due to the effects of prepaid expenses and accruals. Instead IPART adopted a formula to identify the level of working capital which reflected the billing cycle for receipts and payments and allowed for inventory.

The Authority agrees that working capital is required to conduct a business characterised by significant cash flow timing differences, and therefore QR should be allowed to earn a return in a manner similar to investment in physical assets.

This return should reflect the difference between average revenues outstanding over the billing cycle and average operating plus capital expenditure over a similar period as proposed by IPART. The Authority has estimated QR's working capital requirement as approximately 0.3% of total revenue.

With respect to asset inventories, the Authority agrees that a return on the average value of inventories is a legitimate cost for a large infrastructure provider like QR. This return has been achieved by including appropriate levels of asset spares in the value of QR's assets, particularly in the signalling and electrical overhead infrastructure.

Overall assessment

The QCA's proposed allocation of QR's existing costs yields an outcome that lies in the upper end of the range of estimates derived from the bottom-up estimate of efficient costs for the coal region as a whole. For its initial assessment of reference tariffs, the QCA has applied the stand-alone costs generated by the allocative approach with the adjustments outlined above. However, the QCA intends to more fully investigate the efficient costs associated with these functions in the first scheduled review of reference tariffs in 3 years time.

[76] ORG (2000b), 2001 Electricity Distribution Price Review: Determination, September.
[77] IPART (1999), Regulation of New South Wales Electricity Distribution Networks – Determination and Rules Under the National Electricity Code, December.

QCA's Position

In assessing reference tariffs, the Authority has:

- **assigned to non-coal traffics the incremental capacity costs associated with the paths those trains consume;**
- **assessed stand-alone maintenance costs on the basis of the costs that would be incurred by the railway assuming it only carried coal traffic;**
- **assessed the current level of inefficiency in the maintenance of QR's coal corridors at approximately 15%; and**
- **estimated the system-wide and regional cost components of stand-alone cost on the basis of an allocation of QR's costs as set out in Table 12.5.**

CHAPTER 13. ASSET VALUATION & DEPRECIATION

KEY ASPECTS

DORC - the Authority has valued QR's coal network in accordance with the depreciated optimised replacement cost approach.

Adjustments to DORC - adjustments to this value were made to allow for financing costs during construction and for the additional cost in relocating infrastructure based on the historical development of the network.

Depreciation - assets were depreciated on a straight line basis assuming that the life of the resource served by QR's coal network will exceed the physical life of the network (so that depreciation is to be based on the assumed physical life of the network).

Ballast adjustment - an adjustment was made to the opening value of the Goonyella system on account of the fouled state of the ballast.

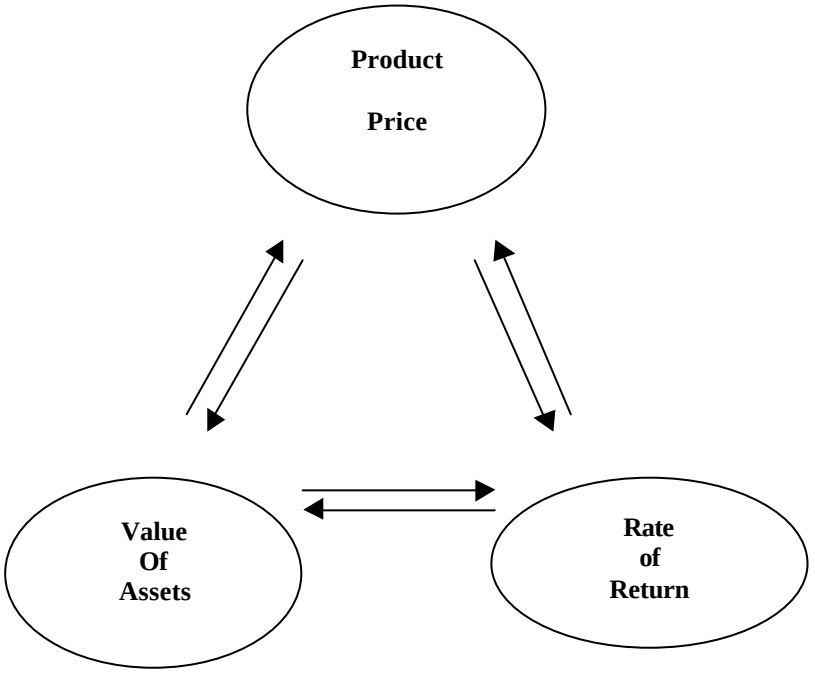
Brownfields optimisation - a limited optimisation was undertaken which resulted in approximately 50km of duplicated track on the Blackwater system between Rockhampton and Gladstone being removed from QR's asset base for the assessment of reference tariffs.

13.1 Introduction

Asset valuation refers to the process of assigning a valuation to a regulated entity's assets for the purpose of setting prices. A regulated entity's assets will normally be responsible for a major proportion of a regulated entity's assessed revenue allowance.

Figure 9.1 illustrates the interdependency between product price, asset value and rate of return. For example, if prices increase (decrease) whilst the asset value (rate of return) is held constant, then the rate of return (asset value) will correspondingly increase (decrease) and vice versa. Consequently, the asset value, along with the rate of return which is addressed in Chapter 15, substantially affects maximum prices in a regulated environment.

Figure 9.1: Circularity of prices, rate of return and asset value



As a result, in monopoly markets there is a need to adopt a method that calculates both the value of assets and the rate of return independently of the prices that are set through the process. There are a number of approaches to both valuing physical assets and quantifying the rate of return. Each of these approaches is likely to provide different outcomes and, consequently, different prices and incentives.

In May 1999, the QCA released an Issues Paper, *Queensland Rail – Draft Undertaking Asset Valuation, Depreciation and Rate of Return*, inviting comments from interest parties. Unless otherwise noted, the views ascribed to QR and other stakeholders in this Chapter are in relation to the issues raised in the submissions to that paper.

13.2 Asset valuation approach

Accurate asset valuation and capital cost allowances are central to generating appropriate prices which encourage efficient network usage in the short-term and efficient investment in the medium to long term. An inappropriate asset valuation of QR's rail transport infrastructure will tend to:

- distort prices to end users of commodities delivered via the network (for example, excessive prices will tend to undermine the competitiveness of Queensland industry in both domestic and international markets);
- distort competition between different transport modes; and
- alter the patterns of upstream and downstream development.

Where valuation is divorced from the competitive market, there is no necessarily correct procedure for valuing assets. Numerous methods of asset valuation are available, and are widely used in differing circumstances by both the private and public sectors for different reasons. However, for determining the value of the underlying regulatory asset base, these methods can be categorised under two main approaches, *cost- based* and *value-based*.

Cost-based approaches relate the value of an asset to the cost of purchasing the asset or the service potential embodied in the asset, either at the original cost (historic cost) or the current cost (reproduction or replacement cost). These approaches may also account for the asset to be optimised to reflect a variety of factors such as over-capacity or obsolescence.

Value-based approaches determine the value of an asset largely from its cash generating capacity. This can be measured by the net present value of future cash flows or the cash generated by selling the asset (that is, its economic value).

A third hybrid approach considers both value and cost-based approaches to arrive at an asset value.

QR's Position

QR proposes that the depreciated optimised replacement cost (DORC) valuation method provides the most appropriate initial capital base for calculating revenue limits on the condition that the optimisation process is conducted in an appropriate manner. QR is also of the view that the DORC methodology should be applied to the entire rail network and to all classes of assets, including corridor land, within the network.

Stakeholder Comments

While some stakeholders proposed that the optimised deprival value approach to asset valuation should be adopted, the majority of submissions supported the use of the depreciated optimised replacement cost (DORC) methodology. In many cases however, support for DORC was conditional on the approach taken with respect to various aspects of valuation.

Table 13.1: Approaches to asset valuation

Queensland Government, MIM, FreightCorp, ARTC, QMC – DORC is the most appropriate asset valuation method.

Stanwell, Greenwood Kendalls - the optimised deprival value approach should be adopted since on some parts of QR's network (for example, on non-coal corridors where rail is in direct competition with road transport) the economic value may well be lower than the DORC value and this should be provided for in the asset valuation methodology to be applied. However, the DORC approach does represent an appropriate approach to arrive at an asset value for determining ceiling prices.

FreightCorp, QMC, MIM - capital costs should be based on efficient construction practices and not on values obtained via non-competitive processes.

QMC, MIM - the complexity of estimating DORC values and the potential for this to introduce a degree of arbitrariness into the valuation process could detract from the transparency of the price determination process.

Easton Business Consultants - the valuation of infrastructure assets should be on the basis of historical cost. The use of any current cost (that is, DORC) or economic value (that is, deprival value) based approaches to valuing long lived assets is inappropriate on the grounds that the estimation of future economic benefits is characterised by a number of difficulties including circularity and estimation errors. Current replacement cost should only be used where the actual or prospective replacement of assets is scheduled to occur within a reasonable timeframe and that this is not a realistic scenario for much of the coal network.

Two views were expressed on the valuation of corridor land.

Table 13.2: Valuation of the land corridor

FreightCorp - the existing corridor formation, that is land, cuttings and embankments, should be valued at zero.

Queensland Government, Greenwood Kendalls - with respect to corridor land the value in QR's asset base should reflect the full opportunity cost to the community of its current use, that is on the same basis as other corridor assets.

QCA's Analysis

There are three broad asset valuation approaches:

- cost-based approaches;
- value-based approaches; and
- hybrid approaches.

The appropriateness of each approach for setting maximum prices for the use of QR's network will be discussed below.

Cost-based approaches

Cost-based approaches focus on the actual cost of the asset, whether measured in historical or current terms.

Historical or actual cost - uses the actual dollar cost of acquiring the asset, including the relevant financing cost during construction and installation, as the value of the asset.

Depreciated actual cost (DAC) - represents the original cost of acquiring the asset reduced by the proportion of the asset service which has expired (which recognises that an asset's remaining service life may be less than the life which would normally be expected from a new asset).

DAC and historical cost have been widely accepted methods for public reporting purposes amongst competitive industries and the private sector.

Inflation adjusted actual cost – a variant of the historical cost approach that attempts to adjust the asset value for inflation. This can be done by revaluing assets according to some broad indicator of the price level such as the CPI.

Reproduction costs - those costs required to reproduce the existing plant in substantially its present form using the production technology and specifications of the original asset. This approach is most relevant where a similar asset is available and the existing asset still represents significantly unchanged technology.

Replacement cost – the replacement cost of an asset is an estimate of the current cost of replacing the asset with similar assets, which can provide equivalent services and capacity to the asset being valued. That is, it measures what it would cost today to provide an asset to deliver the same service potential as the asset being valued.

Depreciated replacement cost - this approach adjusts replacement cost to account for asset consumption, that is, through depreciation. This method therefore estimates the net current cost of replacing the asset in its current (partly worn out) state with an asset that has a similar service potential. Asset replacement costs need to be depreciated where the existing asset's remaining service life is less than the life that would normally be expected from a new asset. The depreciation effectively recognises the limited remaining life.

Depreciated optimised replacement cost - assets may exhibit obsolescence, excess capacity, be over-engineered, be sub-optimally designed or be poorly located. Consequently, a valuation system may incorporate an optimisation process to evaluate whether physical assets are in excess of current requirements.

The process of optimisation is about identifying the most efficient facilities necessary to produce a specified level of services. By removing excess capacity and redundant services through the valuation process, and reconfiguring the network to remove any poor locational decisions, values are set based on the most efficient configuration of assets that could be used to deliver the service. DORC therefore measures the cost of replicating the service potential in the most efficient way possible, from an engineering perspective, while allowing for asset consumption through depreciation.

DORC effectively sets a maximum value that can be placed on assets because any valuations higher than DORC would provide an incentive for a hypothetical competitor to duplicate the network or some part of it.

The application of DORC involves the following steps:

- optimising the network;
- calculating the optimised replacement cost of the asset base; and
- determining asset depreciation.

Value-based approaches

Value-based approaches comprise the net present value and net realisable value methods.

Net present value or discounted cash flow – this approach values an asset as the present value of the predicted cash flows generated from the use of the asset. It involves estimating the future income generated by an asset and then discounting that income stream at a discount rate which reflects the risks involved in owning the asset. The present value of the predicted future income stream then becomes the current value of the asset. This method is widely used in valuation for investment purposes.

Net realisable or fair market value – this is simply the price at which an asset will sell in a competitive open market, where both the buyer and seller are 'willing but not anxious'. It reflects the value of an asset in its next best alternative use.

This method is often cited as an alternative value-based approach to that of net present value. However, in practice, the two approaches are merely variations on a common theme and therefore generally result in the same values.

Hybrid Approaches

Hybrid approaches include the deprival value and optimised deprival value methods.

Deprival value – this is defined as the loss that might be expected if the entity was deprived of the future economic benefits of an asset. Consequently, assets are valued at an amount that represents the loss of the service potential flowing from the asset.

Optimised deprival value (ODV) – this is measured by the lesser of DORC and the economic value (EV) of the asset, where the latter is the maximum of the asset's net present value or net realisable value. A strict application of the ODV approach would require a comparison of DORC and EV for each part of a network.

Selection of an asset valuation methodology

The issue of circularity with respect to product price, rate of return and asset value when applied to monopoly markets effectively rules out the use of net present value or economic value approaches to asset valuation.

Historical cost valuation has a number of advantages for pricing purposes including:

- it is relatively inexpensive to establish and simple to administer as long as asset registers are complete and data is comparable across assets and time;
- it reduces the risk of technological change for asset owners. When an investment is made, the schedule of allowed returns under historical cost depends solely on the depreciation schedule set by the price setting body. In contrast, the allowed returns under current cost methodologies will vary whenever relevant input prices or technology changes;
- for assets with a relatively brief useful life, historical cost provides the advantage that it is consistent with a real measure of current cost and also represents the basis on which the owner assessed the potential returns and expended capital; and
- it avoids the costs and subjectivity associated with determining current asset values.

However, there are significant problems associated with this approach which diminishes its ability to provide relevant information for current and future economic decision making, including:

- historical cost values, especially in the case of long-lived assets, have little or no relationship with market values or replacement costs. For example, persistent inflation causes historical capital costs to be underestimated relative to current values. Conversely, historical cost takes no account of the service potential of an asset or technological obsolescence. Consequently, historical cost provides little meaningful guidance as to the opportunity cost of the resources embodied in the asset or group of assets under review;

- historical data from asset registers may be incomplete or non-existent, and there may be difficulties associated with the different accounting standards on capitalisation and rates of depreciation when considering very long periods of time; and

- valuations on historical cost would make tariffs dependent on asset age and could lead to price shocks when assets are replaced.

Inflation-adjusted actual cost, which attempts to adjust the asset value for inflation, suffers from the fact that inflation-adjusted estimates still fail to capture the impacts of technological change in the market for infrastructure. For example, asset replacement costs typically fall in real terms over time.

As Optimised Deprival Value (ODV) applies either EV or DORC, it is subject to similar benefits and criticism as these methods. In particular, the circularity of EV effectively rules its application out unless it is below the valuation derived by applying the DORC approach.

The major advantage of replacement cost (and reproduction cost)[78] is that it addresses a significant problem of historical cost valuation, namely, the incompatibility between historical values of capital assets (and capital costs) and current values for other expenses and revenues.

Replacement (or reproduction) cost also more closely approximates the actual cost of a new entrant in the market, thereby more closely replicating the outcomes that might be expected from a competitive market.

The main disadvantage of this approach is that the asset is replaced with an asset that can provide equivalent services and capacity to the asset being valued. That is, it measures what it would cost today to provide an asset to deliver the same service potential as the asset being valued, even though that service potential may not be needed.

The service potential issue is addressed with DORC. The advantages of DORC include:

- the optimisation process ensures that obsolete, poorly sized or poorly located assets are not included in the capital base and consequently are not paid for by users;

- it allows for technological change (that is assets can be valued in a way that reflects current technology rather than outdated technology);

- it addresses a major problem of DAC, namely, the incompatibility in relating historical values for capital assets and capital costs with current values for other expenses and revenues; and

[78] The replacement and reproduction costs will diverge where the asset is affected by technological obsolescence.

- it establishes asset values that will minimise incentives for 'inefficient' by-pass of the network.

The disadvantages of this approach include:

- examination and assessment procedures are costly and more subjective judgement is required in determining the optimal network configuration and the degree of excess capacity deemed to be 'efficient'; and

- the complexity of the process may be magnified by the asymmetry of information between the price-setting body and the network owner.

The Authority considers that the DORC method presents the most appropriate theoretical approach for asset valuation. The disadvantages attached to DORC can be largely overcome by ensuring appropriate technical experts are involved in the process and ensuring the asset valuation exercise itself is conducted in as transparent a manner as possible. With this in mind, the Authority agrees with the majority of stakeholders, including QR, that a DORC approach to asset valuation should be adopted.

QR's Assets

QR's assets fall into two categories:

- those that will need to be replaced in the future, such as the track; and

- those that are unlikely to ever require replacement, such as land and earthworks.

For the purposes of the analysis, it is proposed to consider these categories in turn.

Assets requiring replacement - the QCA considered a number of asset valuation methodologies, including both value and cost-based approaches.

The application of alternative historic cost valuation methods has been found to be inappropriate in the valuation of the coal network for the purposes of determining revenue limits and reference tariffs. Many of the references cited by supporters of this approach did not, on further analysis, adequately support the use of historic cost valuation for the pricing of access services.[79] Most importantly, historical costs generally do not provide relevant information concerning the opportunity cost of the resources directed to the provision of a service.

The overwhelming support for the DORC approach by stakeholders, QR and regulators in other jurisdictions across a range of industries[80] is consistent with the QCA's analysis. The primary rationale for using DORC to value assets, in preference to other valuation systems, is based on the principle that it provides a better indication of the opportunity cost to the owner (and to the economy) of the assets devoted to a particular activity.

[79] In particular, suggestions that the 1987 Report of the US Railroad Accounting Principles Board supported the use of historical cost valuation procedures are unfounded. The Board recommended that assets shall be valued at either the value of the resources foregone by the entity to acquire the assets or at the current market value, depending on the regulatory application. The Board further noted that in terms of maximum rate reasonableness (that is the regulation of monopoly prices as detailed in the Coal Rate Guidelines) the current market valuation of assets with similar productive capacity and remaining lives be applied. With respect to competitive or third-party access, asset values should reflect current market values which represent the opportunity cost of assets which must be recovered by the owner to encourage their continued provision. This is a clear recommendation for adopting a DORC-type approach to asset valuation.

The Authority is conscious that applying a DORC-based valuation approach is likely to be consistent with an assessment of stand-alone cost, that is the costs that would be incurred by existing users if they were to reconstruct the existing QR network. It is therefore likely that a DORC-based valuation is appropriate to estimate a ceiling to the revenue that QR could earn, if in fact, its below-rail services were provided in a competitive market and, in turn, the value that would be ascribed to the assets in such a market.

Nevertheless, the Authority acknowledges that there is a risk that the adoption of a DORC-based valuation could detract from the transparency of the process. Accordingly, the Authority published and sought submissions on the proposed unit rates to be applied in the asset valuation process discussed in section 13.4. In addition, the Authority has set out in detail its analysis of the issues that have arisen on asset valuation issues.

Assets not requiring renewal - the assets not requiring renewal fall into the following categories:

- land;
- transaction costs associated with land acquisition, including injurious affection compensation payments, legal fees etc; and
- earthworks, such as creating cuttings and embankments.

In one view, land and associated works represent sunk and irreversible investments and should be excluded from the asset valuation. For example, this has been the approach adopted in New South Wales for similar assets in the Hunter Valley. However, the QCA does not consider it appropriate to ignore costs legitimately incurred in the provision of the below-rail service, and which necessarily would be incurred if QR or someone else were to provide that service today. To deny recognition for such assets in QR's asset base could jeopardise future investment in the network. With this principle in mind, it is proposed to consider the particular issues raised for the various classes of asset.

QR does not own the land corridors comprising the coal systems. The land is leased from the Queensland Government, typically for a period of 100 years (with an option for a further 100 years) for a nominal rental. However, QR did incur acquisition costs (and other transaction costs which are discussed below) when initially securing the corridor.

An assessment of the market value of the land currently used in QR's network provides the most appropriate indicator of the opportunity cost associated with dedicating the subject land to a corridor for below-rail coal traffic. Historical cost assessments clearly do not provide information that is relevant to that opportunity cost today, particularly as some of the land that comprises QR's current network was acquired over a century ago.

The opportunity cost of the relevant rail corridors is driven by the next best alternative use of the land, which for much of QR's network is grazing activity. The Department of Natural Resources (DNR) has provided the Authority with land valuations for these corridors, which, as part of the DORC methodology, can be considered the value of the land in an alternative use.

[80] For instance, IPART in its Final Report on Aspects of the NSW Rail Access Regime, recommends that DORC is the most appropriate initial capital base for calculating the ceiling test. The National Gas Access Code determines asset valuations with respect to boundaries imposed by DAC and DORC.

However, there is a concern that arises in the context of the land in and around the Gladstone area, whose value has increased over time by virtue of the development afforded by, amongst other things, the economic activity induced by the Queensland coal mining sector. If QR owned the land that formed the corridor, this increase in land value would merely form part of the return on the asset base in the regulatory period. In other words, QR's return in any period would be comprised of two components - a cash return (free cash flows generated from access charges) and a non-cash return (increase in asset value).

However, the nature of QR's property right is significant – whilst QR gains the use of the corridor for the term of the lease (and the option) for nominal rental, QR is unable to appropriate any of the increase in the underlying land value that accrues over this time. Consequently, one might expect that the market value of the lease will be less than the market value of the land by an amount equal to the net present value of the expected increase in value of the land over the term of the lease. It is proposed that this be applied to the valuation of the lease that QR has been granted.

Of greater significance in the valuation process is the other transaction costs that QR incurred when initially securing the corridor. Depending upon when this was done, the costs included land resumption, injurious compensation payments, environmental assessment and community consultation. These costs are conventionally incorporated as part of the land asset and may be considered costs associated with QR's 'right-of-passage' through the corridors. Many of the transaction costs necessary to secure a corridor have increased substantially since they were incurred with the increasing complexity of the legislative environment (for example the costs associated with securing a corridor have increased with the recognition of native title).[81]

The Authority proposes a pragmatic approach to land issues involving:

- land values for corridor land to be based on current market values, adjusted to reflect the fact that QR is not in a position to benefit from increases in the value of land over the lease;

- acquisition costs be amortised over the period between the time the land was acquired and the life of the lease (assuming that the option is not exercised). Land acquisition costs that would be incurred if the land was acquired today, but were not at the time the land was in fact acquired by QR, have not been recognised for the purposes of the asset valuation exercise. Instead an estimate has been made of the historical costs of acquiring the corridor, at the time it was secured, in current dollars; and

- the market value of the land not be amortised over the life of the lease. This is because the loss incurred by QR associated with forfeiting title to corridor land occurred in 1995 as part of the corporatisation process. It would therefore be inappropriate that current and future users face higher access charges on account of the change in tenure.

QR has undertaken considerable earthworks throughout its corridors to prepare the terrain for the construction of the track and the associated infrastructure. The QCA proposes to adopt a DORC approach for earthworks by assessing the costs that would be incurred today by an efficient operator for the earthworks required for QR's network.

[81] In theory, this increase in regulatory costs justifies a higher asset value by virtue of a hypothetical competitor being required to meet these costs before duplicating QR's network. These cost increases would in a sense form part of the non-cash return received by the incumbent during the period.

The Authority also proposes to value perpetual structures such as bridges on a DORC basis as it represents the costs that would have to be incurred for an efficient operator to replicate QR's network.

> ***QCA's Position***
>
> **In assessing QR's reference tariffs, the QCA has valued all assets in the coal network, including land, on a DORC basis.**

13.3 Determination of the replacement cost of assets

The adoption of the DORC approach for asset valuation requires that principles be resolved to guide the assessment of replacement cost. The matters that require principles to be developed concern:

- whether the valuation is undertaken on a brownfields basis (which assumes that the asset is constructed around existing development) or a greenfields basis (which assumes that the asset is constructed on land free from any economic and social development);
- whether the financing costs incurred during construction should be incorporated into the asset base;
- the treatment of stranded assets – the upgrading of an asset results in a replacement value of the upgraded asset that is less than the sum of the pre-existing asset value plus the amount of the investment. The issue arises as to whether this 'loss of value' ought to be recognised in the asset value; and
- staged development – whether the asset value should recognise the additional costs attributable to the fact that incremental development of the infrastructure is more expensive than the 'all-at-once' replacement of an asset.

QR's Position

QR proposed that the calculation of the current replacement cost of the coal network should be based on a number of principles.

Brownfields valuation

QR maintains that the valuation should reflect the current costs associated with constructing the assets, taking account of the current state of land use and development, that is a brownfields valuation. This method of construction would entail additional costs associated with the costs of relocation and restoring existing infrastructure such as roads and pipelines. In order to incorporate the additional cost associated with the brownfields valuation, QR has calculated the additional costs (in 2000 $s) that have been incurred to date on the relocation of roadways, the construction of bridges and the treatment of water pipelines, that is either diversion or construction of overbridges. QR estimated that the total costs of these works for each system are as follows.

Table 13.3: Additional costs by system

System	Total cost ($m)	Percent of total civil* costs (%)
Goonyella	8.6	2.5
Blackwater	12.4	3.7
Moura	5.3	3.2
Newlands	0.7	0.7

* Civil costs include earthworks and civil structures including access roads, culverts, bridges, etc.

QR has not included the cost of relocating power lines in their estimates and has only included infrastructure alterations that they have actually performed on behalf of other infrastructure owners and for which they have not been compensated.

Financing costs

Financing costs during construction should also be taken into account wherein interest during construction and other financing costs are calculated having regard to the 'capitalisation period' and an appropriate interest rate. QR has estimated that a financing cost of 9.0% of the replacement cost of all asset classes be applied. QR's estimate of financing cost has been based on an average construction period (that is in addition to a design phase) of 30 months and an interest rate of 9%. The pattern of expenditure during the construction period was based on the performance of recent spur line construction contracts in the coal region.

Stranded assets

Significant amounts of past investment in infrastructure upgrades, particularly in the coal network, have been carried out on assets with significant remaining useful lives. QR proposes that the remaining value of those retired assets should be included in the regulatory asset base as this would ensure that the access charge better reflected the costs associated with meeting the operator's demands.

Similarly, for future investments, QR considers that in order to encourage investment in rail infrastructure which benefits operators/users, there must be a process by which QR can recover the value of retired assets as part of the commercial pricing negotiations associated with the upgrade.

In order to provide an incentive to upgrade the infrastructure to meet higher operator requirements, it will be necessary to allow upgrade costs to be recovered as well as the residual value of the original track. QR proposes that, to ensure that there is sufficient incentive to invest in the rail infrastructure in response to operator requirements, the following principles be applied:

- initially value the assets used in the provision of rail infrastructure services in accordance with the DORC methodology, in the manner outlined in QR's submission;
- depreciate the assets in accordance with the approach to depreciation discussed in QR's submission; and
- following the initial valuation, increase the asset valuation in accordance with the actual cost of new investment in the infrastructure, provided that such investment is reasonable in light of the requirements for replacement of the infrastructure or upgrade of the infrastructure in order to meet customer demand.

Staged development

The value of the modern engineering equivalent replacement asset (MEERA) recognises the staged development which has occurred during the development of the network in response to increasing demand for coal haulage services. QR maintains that the staged development approach has been the most cost effective solution to the incremental nature of demand on the coal network. QR also argued that a DORC valuation is intended to remove over-capacity and over-engineering. It is intended to impose an industry best practice cost-basis on the rate of return calculation. It would appear to be unsustainable to impose a construction approach (that is the one-off replacement of the entire network) and cost basis that an infrastructure developer acting in a commercial and prudent manner would be unlikely to adopt.

QR submitted that this staged development adds significantly to the construction cost of various parts of the network and has proposed that earthworks associated with duplicated sections of the network be adjusted to reflect this additional cost. QR has estimated that, on average, the cost of the earthworks required to duplicate a section of existing track is 40% higher (per cubic metre) than the cost of the original earthworks. Overall, QR estimates that for a duplicated section of track, which comprise 22% of the Central Queensland coal network, the total cost of earthworks would be 10% higher than for a single section of track.

Stakeholder Comments

Few submissions were received in regard to the principles to be employed in the calculation of the replacement cost of assets.

Table 13.4: Replacement cost of assets

Queensland Government - it may be impractical to adopt only a greenfields or brownfields asset valuation. A more flexible approach incorporating elements of both approaches and a reasonable amount of judgement may need to be applied.

FreightCorp, Queensland Government - a comprehensive review of asset values should be undertaken at least every five years with annual adjustments to include capital expenditure and asset depreciation.[82]

QCA's Analysis

The QCA employed engineering consultants Gutteridge Haskins and Davey Pty Ltd (GHD) to undertake an independent valuation of QR's coal network. The terms of reference for that consultancy required GHD to 'to estimate the current replacement cost of the identified rail infrastructure applicable to the coal task commensurate with current day practices'. The valuation undertaken by GHD did not take account of factors such as incremental network development, the additional cost associated with a brownfields development and the financing costs associated with the construction phase of the project.

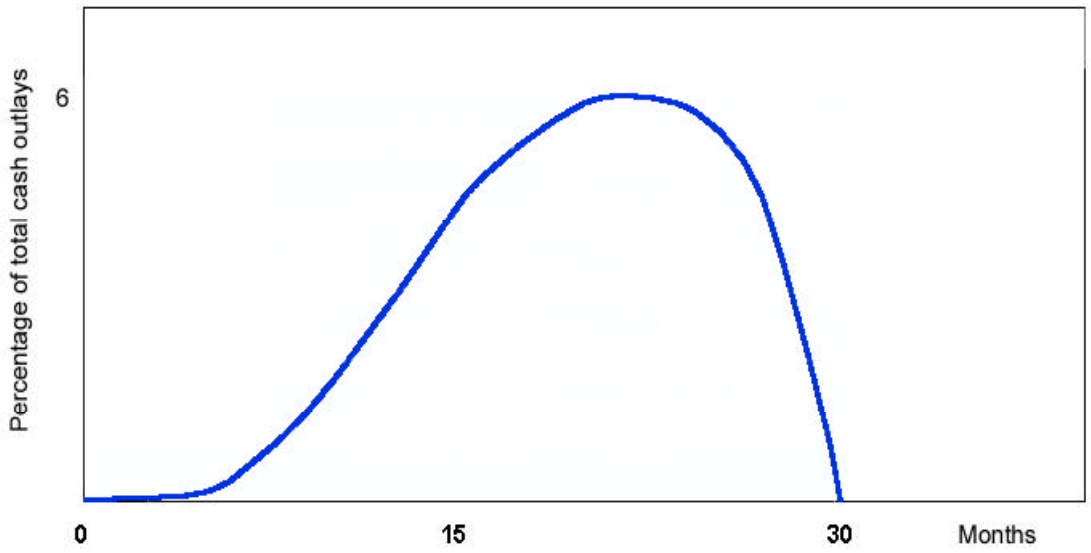
Financing costs

The QCA accepts that the costs associated with financing the construction of QR's network should be included in its asset base for the purpose of assessing reference tariffs.

[82] Queensland Government, FreightCorp

It is proposed that these costs be calculated on a corridor by-corridor-basis, on the assumption that each corridor would be constructed as a separate exercise. Accordingly, whilst the precise allowance will vary from corridor to corridor, the QCA has determined that the time of construction would, on average, include a 12-15 month design phase that would account for up to 15% of total project costs. The latter stages of the design phase would occur in parallel with a 12-18 month construction phase suggesting a total project time, on average, of 30 months. The overwhelming bulk of the expenditure would be incurred during this second phase. This pattern of cash flows is depicted below in Figure 13.2

Figure 13.2: Pattern of cash flows



Applying an interest rate equivalent to the imputed weighted average cost of capital for QR's below-rail coal business, the QCA has estimated that a financing charge of 7.0% would be appropriate on average for the construction of its coal network.

Brownfields valuation

The construction of QR's below-rail coal network required adjustments be made to existing infrastructure such as roads and water pipelines. These costs potentially affect the assessment of replacement cost for a network such as QR's.

A replacement cost asset valuation could be done on either a greenfields or brownfields basis. The former derives an asset value which assumes that the network has been constructed across undeveloped territory, with the consequence that no adjustment would be necessary to account for these infrastructure adjustments.

In contrast, a replacement cost valuation undertaken on a brownfields basis assumes that the development occurs around all existing infrastructure. Such an approach therefore potentially involves considerable infrastructure relocation.

The Authority has concerns with the application of both approaches. It is considered unreasonable to adopt a greenfields approach given that QR has already incurred additional expenditure in the construction of its network.

A brownfields valuation is consistent with the costs that would need to be incurred to reconstruct QR's network. However, this overlooks the fact that much of the infrastructure that must be accommodated has come into existence directly or indirectly from the economic development afforded by the Queensland coal mining industry. QR has implicitly acknowledged this by only seeking recognition for the original infrastructure alterations for which it was not compensated.

IPART[83] notes that a brownfields approach is more widely used with DORC valuations. The QCA accepts that a brownfields valuation should be undertaken to account for the need to accommodate infrastructure.

However, in applying a brownfields valuation approach, the QCA agrees with QR that only the original infrastructure alterations for which QR was not compensated should be included in the additional costs associated with a brownfields development. This approach compensates QR for the current cost of the alterations it was actually required to perform throughout the course of the development of its network where there was no compensation paid by the relevant owner of the infrastructure. It avoids any windfall accruing to QR on the basis of development that has occurred since the construction of the track.

The Authority has incorporated an allowance for the actual costs incurred in the brownfields development of the network, totalling approximately $27 million.

Allowances for asset upgrades

QR's network has evolved over time to provide for the transportation of increasing volumes of coal. This has necessitated infrastructure upgrades to enable heavier trains to operate at higher speeds. Whilst the investment injected into the network for an upgrade has resulted in higher replacement costs, those increases have not generally been commensurate with the quantum of the investment.

QR has argued that where infrastructure upgrades are justified financially on the basis of benefits accruing to above-rail operators, such incremental investments should form part of the asset base, while the residual value of the retired assets should also be retained to ensure sufficient incentives exist for QR to invest in cost reducing infrastructure. QR proposes that this approach should be adhered to for both past and future incremental investments of this type. QR's justification is based on the provision of investment incentives.

In identifying those assets to include in the asset base for valuation purposes, there are two competing interests. On the one hand, the asset base should reflect stand-alone cost – those assets required to provide a given service today, rather than those that might have been destroyed in the process of enhancing the capacity of the network over time to provide a given service today. Under such an approach, the replacement cost should be confined to the assets as they are currently exist (subject to optimisation concerns).

On the other hand, the process should provide incentives for future decision-making that are consistent with socially desirable investments being undertaken. The risk of asset stranding may lead to a reluctance on QR's part to invest further in the network. The reluctance of QR to invest in the network could, over time, be expected to impose a higher cost on the economy than excessive pricing.

[83] See IPART's Final Report on Aspects of the NSW Rail Access Regime, April 1999.

In forming a view on the appropriate approach to determine allowances for past asset upgrades, the Authority is conscious that it could not sensibly assess QR's proposal without regard to the contracts and contributed assets that underpinned these investments in infrastructure upgrades.

In addition, the Authority is mindful of the normal application of stand-alone cost tests which only allow the incumbent a return commensurate with that that could be expected if it were operating in a competitive market. In competitive markets, asset owners are not normally compensated for the loss suffered by an asset upgrade beyond the value of the new (upgraded) asset. Therefore, the market value of an asset in a competitive market would not have regard to the way in which the asset evolved over time.[84]

Furthermore, recognising an asset value that was essentially destroyed through past investment activity could raise difficult issues associated with the imposition of costs incurred for one set of users on another set of users. This is because the appropriate treatment of asset value lost in an upgrade is to depreciate the asset to the extent of the 'loss' at the time it is incurred. However, recognising such value for the current exercise would effectively 'shift' that cost onto current users of the network. In other words, the QCA has assumed that past upgrades occurred in an environment where QR received compensation for the depreciation that arose with that investment through its contractual arrangements and capital contributions at the time.

Accordingly, while the QCA accepts QR's approach for future incremental investment (so long as it is efficient), it believes that it has little relevance to past investment decisions. The Authority's asset valuation will assess the replacement cost of the asset that currently exists without adjusting for the 'value' lost through past asset upgrades.

In recognising future investment, depreciation would be recognised to the extent that a future upgrade led to a reduction in asset value, based on the difference between the sum of the investment and the asset value before the investment and the replacement cost of the asset after the investment. QR's future contracts and future network investments will be undertaken in a regulatory environment that recognises the additional costs associated with the depreciation of existing infrastructure caused by asset upgrades. The QCA's financial model assesses the terminal value of assets on the same basis as the assessment of the original replacement cost. [85]

Indeed, the best way for this risk to be managed in the regulatory environment is for upgrades to be explicitly incorporated in contractual arrangements that are entered. Users seeking a higher standard of service are free to negotiate with QR to fund necessary investment in a way that does not compromise QR's legitimate business interests. However, such arrangements will apply on a forward-looking basis with current users making informed choices, rather than QR recovering access charges that are in excess of stand-alone cost, as effectively it is proposing.[86]

[84] Moreover, it is not clear whether QR has always made optimal upgrades, with some potentially being undertaken prematurely and others possibly being influenced by the needs of other parts of the network (such as the North Coast line).

[85] Similarly, section 13.5 recognises that the replacement cost of the asset is likely to fall over time and this fact is taken into account when estimating the terminal value of the asset.

[86] The QCA suggested to a working group meeting that it should automatically endorse QR's future investments for assessing reference tariffs where those investments have been endorsed by affected users as part of a transparent consultation process. The Authority was motivated to put forward this proposal by a desire to minimise the risk that socially desirable investments are not pursued due to the risk and transaction costs arising from the regulatory framework. However, none of the affected parties, including QR, wanted to pursue such an approach at that time. Nevertheless, the QCA remains receptive to proposals of this type that may evolve from QR and system users in the future.

Staged Development

Staged development raises similar issues to asset upgrades. The replacement cost of an asset, as adopted in the DORC valuation methodology, is an estimate of the current cost of replacing the asset with similar assets (not necessarily the same) which can provide equivalent services and capacity to the asset being valued. In other words, it measures what it would cost today to provide an asset to deliver the same service potential as the asset being valued.

As the network has developed incrementally, the Authority acknowledges that additional staging costs have been incurred. The key issue is whether QR should be compensated for the additional costs associated with foregone scale economies from staged development.

In competitive markets, asset owners are not normally compensated for the additional costs associated with staging. For example, if one were to extend a house, the fact that it is considerably more expensive to do so after the house has been constructed would not be reflected in its market value. The market value of a 3-bedroom house that has recently been extended to a 4-bedroom house would be based on the value of the 4-bedroom house – irrespective of the additional costs associated with undertaking the extension.[87]

Similarly, if QR's network were to be replaced today, the person replacing the network could take advantage of all available economies of scale in construction, even though this does not reflect the historical development of QR's network. Accordingly, the Authority does not consider that staging costs should be permitted as part of the replacement cost of the network.

It is recognised that this approach could be interpreted as discouraging QR from investing in future network upgrades. However, the Authority accepts that the additional costs of future upgrades should be recognised irrespective of whether or not they are to form part of QR's asset base.

The 'cost' of the expansion is therefore measured by the difference between the asset value after the expansion and the sum of the asset value before the expansion and the investment in the expansion. The key issue for the purposes of asset valuation reflects the period of time over which this difference, which is in fact part of the depreciation charge for the period, is recognised. The Authority accepts that it is legitimate to 'smooth' the recovery of this depreciation over a period, rather than in the year it is incurred. In practice, this is achieved via the terminal value of QR's coal network assets in the financial model. In this way, depreciation is considered in the context of all of the changes to QR's business that occur over this time.

In reaching this conclusion, the Authority notes that in any regulatory exercise, judgements must be made concerning the approach to be taken to historical events. Just as the Authority has not proposed to review past contracts, it is not appropriate to adjust asset values in the way QR proposes as the staging costs formed part of the cost of providing the service that was (or should have been) recovered in the contemporaneous contracts. QR's future contracts, and future network investments will be undertaken in a regulatory environment that recognises the additional costs associated with staging.

[87] Of course, in competitive markets, such decisions would not be made unless it was expected to result in a net benefit to the owner. However, that is a different issue to the change in market value that arises from the investment.

QCA's Position

In assessing reference tariffs, the QCA considers that the current replacement cost of the network should be:

- **adjusted to allow for costs associated with financing construction; and**
- **undertaken on a brownfields basis so as to recognise costs of altering infrastructure from the original track construction.**

13.4 Unit rates and quantities

Determining the replacement cost of infrastructure basically involves multiplying the quantities of each component that comprise the infrastructure by the replacement cost for that component. Assessing the unit rates for each of the relevant components of the infrastructure can be highly contentious amongst the interested parties.

Consequently, in March 2000, the Authority released for comment a draft report, prepared by GHD. This report set out the principles and assumptions used to develop the unit rates that were applied in the derivation of a value of QR's rail infrastructure assets are used in the transportation of coal. These principles included both those of a generic nature (that is, that impact across all unit rates) and those that are particular to specific asset types.

QR's Position

In response to the QCA's publication of GHD's unit rates, QR submitted a confidential report commenting on the derivation of specific unit rates. In regard to specific unit rates, QR provided comment on the unit rates used to value track, sleepers, ballast and turnouts as well as bridges, culverts and other crossings. With respect to electric traction assets, signalling and communications, different unitisation meant that QR was not able to comment directly on the unit rates used by GHD. However, discussions were held with the QCA and GHD to provide more detailed comment and to attempt to resolve significant differences in the gross valuations of these classes of assets on a corridor by corridor basis.

Stakeholder Comments

Only 2 submissions were received in respect of issues contained in GHD's draft report on unit rates.

Table 13.5: Unit rates

QMC - with respect to track, unit rates are generally within the expected range.

FreightCorp - some unit rates for earthworks appear to be excessive as far as:

- the blanket adoption of the top 600 specification which should only be applied on a site specific basis. A modern alternative would save at least half the costs of providing this layer, that is $12.50 per cubic metre, rather than $25 per cubic metre;
- the provision of track car and machine take offs which should not be required on a railway built along the MEERA principles as they form no part of a modern track maintenance regime; and
- the provision of an access road for the length of the mainline is not required with modern high reliability infrastructure.

QMC - rates for civil structures are generally acceptable.

FreightCorp - bridge costs are acceptable for single line but overstated for dual track.

QMC, FreightCorp - signalling costs appear to be overstated given the reduction in signalling costs that has occurred in recent years.

FreightCorp - the rates for electric traction appear to be reasonable.

QMC - the unit rates for electric traction, signalling and communications included insufficient detail to enable a thorough assessment.

QCA's Analysis

The QCA contracted GHD to determine the unit rates to be employed in the valuation of QR's below-rail coal infrastructure. The consultant's report was made available for comment, and submissions received by stakeholders, including QR, were made available to GHD.

GHD has given due consideration to the comments provided by stakeholders and has revised its unit rates where it was considered appropriate to do so. Final unit rates are summarised below and reported in GHD's asset valuation report contained in working paper 5.

Table 13.6 Summary of unit rates used in asset valuation

Asset component	Unit	Unit rate
Track (inc. sleepers, ballast, laying & prelims)	$/km	$449,095
Turnouts:		
1:16 mainline turnout	$/turnout	$114,000
1:25 high speed mainline turnout	$/turnout	$173,000
Earthworks:		
strip	$/m^3	$4
cut to fill	$/m^3	$5
borrow to fill	$/m^3	$5
Bridges over seasonal water	$/mt	$10,000
Fencing	$/km	$1,100
Overhead conductor & catenary	$/km	$32,600
Overhead masts	$/mast	$4,500
Auto-transformers	$/unit	$200,000

However, a different approach was adopted for telecommunications assets. QR's telecommunications network has been designed for the entirety of QR's rail network. Consequently, QR's existing telecommunications assets and maintenance costs bear little resemblance to that required for a stand-alone railway carrying coal traffic.

Therefore the approach that was adopted involved QR estimating the telecommunications assets it believed would be required for a stand-alone coal network. The QCA then reviewed QR's estimate, which it assessed as providing a reasonable approximation. It resulted in a value for telecommunications assets of less than 2% of total assets.

QCA's Position

The QCA accepts that the unit rates developed by GHD are appropriate to use for asset valuation purposes.

13.5 Depreciation Method for Below Rail Infrastructure

Depreciation seeks to ensure that revenues generated in a period are matched against the resources needed to generate those revenues. Depreciation is therefore an asset-related cost referring to the consumption of, or reduction in, the service potential embodied in an asset over a period of time.

Inappropriate depreciation of QR's rail transport infrastructure will therefore tend to produce similar effects to those that emerge from inappropriate asset valuations. In this sense, depreciation takes on significant importance because it will form part of the assessment of asset valuation at different points in time. For example, in the financial modelling undertaken for QR, depreciation arises in the context of both the opening asset value and the terminal asset value (the asset value at the end of the 10-year modelling horizon).

In addition, inappropriate depreciation approaches may distort decisions relating to the maintenance and replacement of infrastructure. This is because the regulatory approach to depreciation will affect the manner in which the maintenance and replacement of assets is reflected in the entity's asset base, and, in turn its prices. Consequently, it is important that the depreciation approach is consistent with providing the regulated entity with an incentive to maintain and replace assets in a way that minimises the total cost of providing the service.

Different methods can be applied to estimate depreciation. These methods produce differing opening (and terminal) asset values and have differing implications for the regulated entity's incentive to replace or maintain the asset, and, in turn, the least cost provision of the service. In addition, differing depreciation methods have implications for the timing of the recovery of capital which could have equity implications for different groups of users who use the coal network at different times and ultimately, QR.

QR's Position

QR proposed, in its submission to the QCA's Issues Paper *QR – Draft Undertaking Asset Valuation, Depreciation and Rate of Return* that a renewals annuity approach is not the appropriate method to value asset consumption in relation to its rail infrastructure because the economic life of the coal rail network in Central Queensland is dependent upon the finite, economic life of the coal reserves in the region. As the renewals annuity approach is more applicable to assets whose services are demanded in perpetuity, such an approach is not appropriate for much of QR's rail infrastructure. Consequently, QR favours the use of the depreciation charge approach for estimating the return of capital for its rail infrastructure.

QR's preferred method of calculating depreciation is referred to as 'competition depreciation' by the ACCC.[88] This approach is made up of two elements:

- the smoothing of revenue paths via an annuity approach; and
- adjustments to reflect the impact of future potential stranding of identified assets.

Effectively, it is based on the application of an annuity formula to the opening value of an asset. The resultant annuity amortises the asset value over the period of the annuity and is comparable to a credit foncier loan repayment schedule. Under a credit foncier loan arrangement, each equal annual repayment comprises varying contributions of interest payment (interest or return on assets) and principal repayment (depreciation or return of assets). Over the assumed period of the annuity, the interest component declines while the depreciation component increases.

QR is of the view that the depreciation profile provided by such an approach is more reflective of the level of asset consumption and change in asset values over the life of its rail infrastructure. The other justification for applying an annuity approach to calculating the capital charge is that it avoids the price shocks associated with other depreciation methods (that is, it smooths the revenue requirement over time) and also the price distortions associated with pricing two geographically separated assets with different lives.

Stakeholder Comments

Most submissions favoured the application of a depreciation charge over a renewals annuity approach.

Table 13.7: Depreciation charge or renewals annuity

ARTC - for assets like the coal corridors, a depreciation charge approach may be more appropriate than a renewals annuity, although the latter would be more suited to a line with an unlimited life.

Greenwood Kendalls - the necessary and sufficient conditions for the use of the renewals annuity approach to the recognition of asset consumption are not present in the rail industry, particularly in the mining sector.

Queensland Government, MIM - a depreciation charge should be applied.

QMC - there is a need to avoid the incidence of double counting via the capitalisation of major periodic maintenance which is both depreciated over time and which is expensed in the period in which it is incurred. QR intends to distinguish between maintenance expenditure that will be expensed and capital renewal that will be capitalised and written off over time. On this basis, the use of a depreciation charge for QR coal rail infrastructure is recommended.

Stakeholders generally argued that depreciation should be calculated on a straight line basis.

Table 13.8: Depreciation method

FreightCorp - a straight line depreciation approach allows for better price stability and is more transparent.

QMC, ARTC - IPART has recommended the use of the straight line depreciation method for coal infrastructure in the Hunter Valley. QR's approach should be consistent with this.

[88] Draft Decision - Assessment of Telstra's Undertaking for Domestic PSTN Originating and Terminating Access.

> **Greenwood Kendalls** - the most appropriate depreciation approach is that which most closely reflects the profile of asset consumption and, as such, the recommended approach will vary from one asset category to another. The use of an accelerated depreciation method is not recommended unless it accurately reflects asset consumption patterns.

QCA's Analysis

Treatment of asset consumption

For most assets, service potential diminishes over time, primarily as a result of ageing, use and obsolescence. As this potential declines, so too will the price an investor will be prepared to pay for the asset. In addition, the value of a service changes over time reflecting the reduction in the cost of replacing the relevant assets.

There are two methods to deal with asset consumption:

- renewals annuity; and
- depreciation.

Renewals annuity - under a renewals annuity approach, assets are treated as if their collective service potential is to be maintained in perpetuity, rather than as a collection of individual assets each with their own asset life and maintenance requirements.

The approach assumes that, through regularly planned maintenance programs, the group of assets as a whole does not lose service potential and therefore does not need to be depreciated. An essential element of the renewals annuity approach is an asset management plan which attempts to determine the expenditure needed to maintain the service potential of the system over the period of the plan.

In principle, the asset management plan should cover the full life of the assets. Obviously, given the assumption of an infinite life, this is not possible. Typically though, asset management plans have a 25-year or more time horizon, with the limiting factor being the capacity to make realistic engineering and financial estimates into the future.

The renewals annuity approach is generally considered to be valid only for infrastructure assets satisfying the following characteristics:

- the asset system is renewable rather than replaceable. In other words, the components of the system will be replaced according to their own useful lives, but the operating capacity of the system as a whole will be maintained; and
- for the foreseeable future, demand is such as to warrant continual renewal of the asset system so that the assumption of an infinite asset life is warranted.

Depreciation - a periodic depreciation charge can be allocated to assets. This approach only provides an estimate of depreciation for the term of the regulatory period, with depreciation then recalculated at the commencement of each subsequent regulatory period. Consequently, it measures depreciation as the difference in asset values between the beginning and end of the regulatory period, with no direct reference to the asset's useful life.

QR and the majority of the respondents support the use of the depreciation charge approach, providing that a clear distinction is drawn between future expenditure that is capitalised (and hence later depreciated) and that which is expensed during the period in which it occurs. The QCA agrees that the application of a depreciation charge is preferable to a renewals annuity approach as the latter does not provide a basis for assessing asset values at a point in time.

Unlike renewals annuities, a depreciation charge assists in establishing the opening asset value which is consistent with the Authority's preferred DORC-based asset valuation approach.

Depreciation is inextricably linked with asset valuation, the treatment of maintenance expenditure and the allowed return on an entity's asset base.[89] This is acknowledged by QR in its Draft Undertaking, where it is proposed that its revenue limit over an evaluation period be based upon, amongst other things, a depreciated asset value at the beginning and end of the period.

The approach to assessing depreciation for the initial valuation and the way in which a terminal value has been assessed are considered in turn.

Depreciation for initial valuation

The initial value for the asset base is a major input into the financial modelling exercise. At the commencement of the regulatory review, it is likely that the opening asset value will be different to the cost price of the asset which will have been acquired some time before. The Authority seeks to establish an opening asset value as close as possible to the market value of the rail asset at the beginning of the regulatory period. The initial depreciation charge can assist in this endeavour.

Once the QCA can establish the most appropriate market value proxy, it will have some discretion in accepting a depreciation method, as long as the approach permits QR to recover all of its justifiable investment.[90]

In a regulatory process, an organisation's DORC represents the net present value of its future earnings. It is in this context that depreciation must be considered, which is in a sense, to make the owner of the asset indifferent between the ownership of a new asset and the asset to which the regulatory environment is to be applied.

Depreciation can be analysed from both accounting and economic perspectives. The difference between the two definitions hinges on the distinction that the former relates to allocation, while the latter is a process of valuation. Accounting depreciation involves allocating the cost of a fixed asset over the period of that asset's useful life. In contrast, economic depreciation reflects the periodic change in the market value of an asset. While they measure two different things, the values derived from the two approaches will tend to converge where an asset's market value reflects its remaining service potential.

The DORC environment requires an economic approach be adopted for depreciation to proxy the market value of the asset. Market value is equivalent to the present value of the income stream that an asset is expected to generate over its remaining useful life, and is the price that a rational investor is prepared to pay for the asset in a secondary market.

However, as is the case for asset valuation, determining depreciation on the basis of income flows is circular. Indeed, the very purpose of the estimation of a (depreciated) replacement cost of an organisation's assets is to provide a basis to avoid this circularity. This reasoning applies equally to depreciation.

[89] It is related to the rate of return as, in a given period, depreciation provides a return of capital, whereas the rate of return relates to the undepreciated value of the asset (ie that part of the value of the asset that has not already been returned to the customer through depreciation charges).

[90] In a working group meeting between QR and stakeholders, the QCA proposed a process where QR could engage users in detailed consultation regarding investment proposals to minimise the possibility of asset stranding risk. There was no consensus as to how investment risk should be assigned effectively among the various parties. However, there was agreement in there being little to be gained in seeking to avoid the QCA having to play a role in the ex-post assessment of QR investment as part of future regulatory reviews.

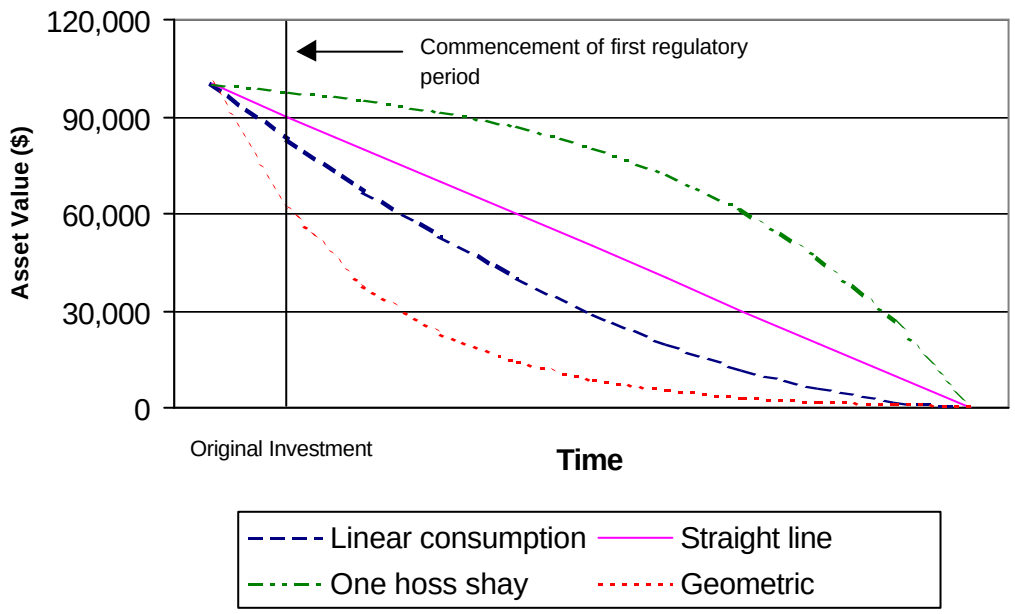
In the context of the rail industry, the price of track, comprising ballast, sleepers and other infrastructure should be a reflection of the service potential that the asset is able to deliver. As an asset is 'used up', economic depreciation reflects an erosion of that asset's productive capacity.

Perhaps the best known patterns of the erosion of productive capacity over time are:[91]

- constant efficiency or 'one-hoss shay' – assets maintain full productive capacity until they reach the end of their useful life, like a light bulb for instance. There is no requirement for additional input (maintenance) to sustain this level of output;
- linear consumption – productive capacity declines in a linear fashion (equal increments) until the asset expires, necessitating a constant (non-trivial) level of maintenance to sustain output; and
- geometric – productive capacity declines at a constant rate, like radioactive decay, for instance 25% per year. Maintenance must grow at an increasing rate to sustain output.

Asset valuation patterns for an equivalent asset under each of these alternatives are illustrated in Figure 13.3.

Figure 13.3: Depreciation profiles



[91] For example, Fraumeni, B.M. (1999), *Productive Highway Capital Stock Measures*, prepared for the Federal Highway Administration, Department of Transport, United States of America.

The Authority accepts the view, emphasised by stakeholders, of the need to adopt a depreciation method that closely reflects the characteristics of the underlying assets in the coal corridors.[92] The applicable pattern depends upon the particular degenerative characteristics of the asset. QR's assets fall broadly into two categories:

- those that never need to be replaced, or at least have a very long useful life and maintain their productive capacity with very low maintenance, such as land and earthworks; and

- those that need to be maintained to retain productive capacity over time, such as track.

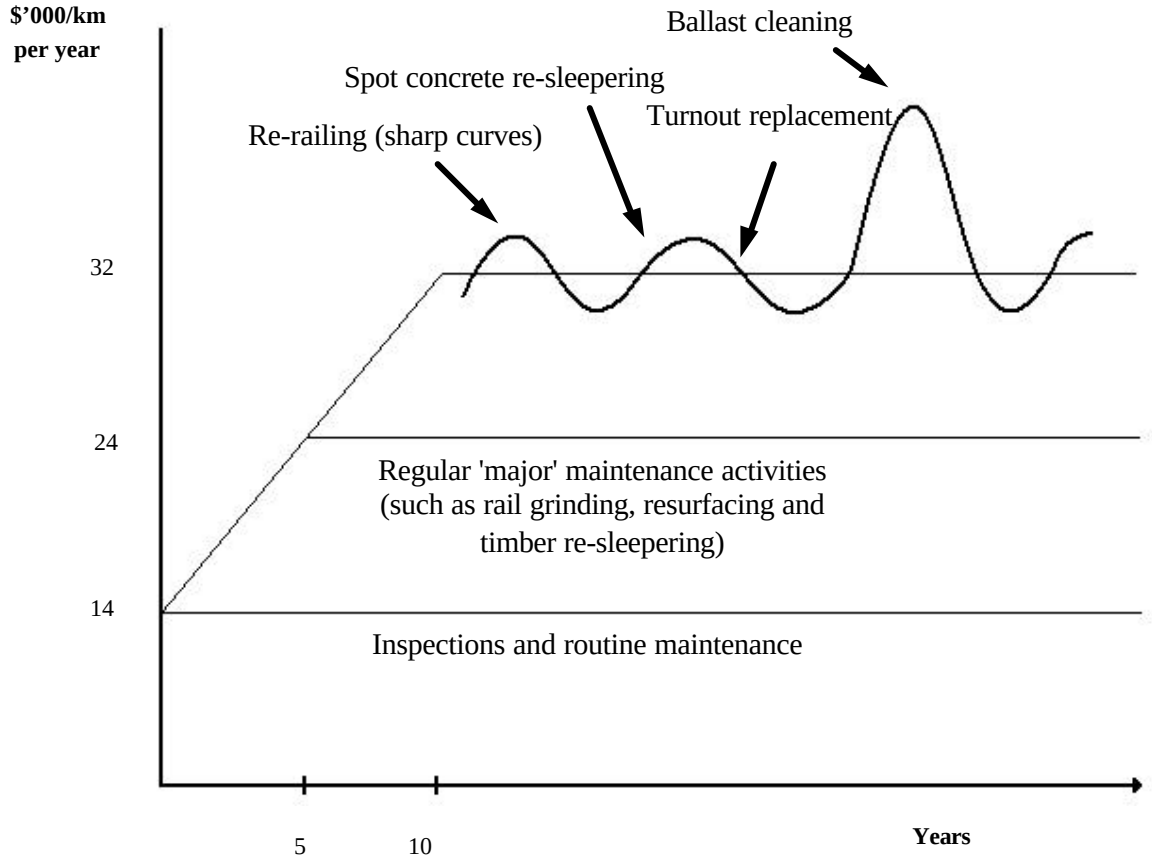
Earthworks and associated assets, generally have very long lives requiring trivial maintenance, thus maintaining their productive capacity. As a result, the valuation of these assets will be best represented by a constant efficiency depreciation profile.

On the other hand, for track assets, declining productive efficiency is common place. In this instance, productive capacity declines over time as these assets age and approach expiry. They will become less valuable to the enterprise since they progressively contribute less to production or alternatively require greater maintenance to sustain a given level of output or service. Assets that need maintenance and replacement fall into this category.

The time profile of maintenance activity over the life of a railway track has three distinct phases and is represented in Figure 13.4 below. The actual dollar expenditure for each phase varies across the systems, depending on the level of usage.

[92] See also NERA (National Economic Research Associates) (1996), *The Methodology to Calculate Long Run Incremental Costs*, prepared for the Office of Telecommunications (OFTEL), London

Figure 13.4: Time profile of maintenance activity



The first phase commences immediately after construction when all system components are new. In this phase, the major tasks include inspections and routine maintenance. No replacement of rail components (such as re-railing on sharp curves) occurs. However the need for activities that will remain over the balance of the life of the asset, such as rail grinding and resurfacing, begin to be identified.

This phase logically represents the period of highest asset consumption as the asset delivers services with minimal maintenance input. In other words, in an economic sense, higher levels of depreciation occur during this time than would be implied from the application of a straight line approach.

In the second phase, commencing after approximately 5 years, regular maintenance activities such as rail grinding and resurfacing begin to be undertaken. Inspections and more routine tasks continue. Similarly, relatively high asset consumption occurs during this phase because there continues to be only moderate levels of input being required to deliver services from the asset.

In the third phase, which begins after about 10 years, components begin to wear out and ballast becomes contaminated. Consequently, previous on-going maintenance activities are supplemented by other more extensive periodic maintenance requirements such as re-railing, re-sleepering (in the case of timber sleepers) and ballast cleaning. Some of these replacements will be more expensive than others, so that a degree of 'peakiness' occurs in the expenditure profile, rather than a constant level or plateau which reflects average expenditures.

The higher (absolute) deterioration of asset efficiency, in the early years of asset is consistent with empirical evidence.[93]

QR is proposing to adopt a non-linear or annuity-based approach to depreciation referred to as 'competition depreciation'.[94] It is a measure which jointly accounts for the level of asset consumption and the opportunity cost of the asset over a given period. This is conceptually equivalent to the composition of repayments on a credit foncier loan, such as a home loan, each of which has a principal and interest (the opportunity cost of capital) component.

This approach results in an asset valuation profile that reflects a relatively low proportion of depreciation occurring in the early portion of an asset's life and a relatively large proportion of depreciation occurring towards the end of the asset's life. It is consistent with a one-hoss shay efficiency pattern in which constant efficiency is maintained throughout the life of the asset without the requirement for maintenance over the period. Clearly this does not represent the efficiency pattern of track infrastructure.

For most of their useful lives, equivalent assets are valued more highly under the annuity approach than if straight line depreciation were applied. This point is significant, particularly in respect of deriving the opening asset value at the commencement of the regulatory review. Assuming that the review period begins at a point in time subsequent to the construction or acquisition of the asset, there is a positive differential between the asset valuations revealed by the two approaches. This differential widens over time, before narrowing to converge to zero (or the salvage value) at the expiry date. The Authority remains concerned with this differential and the subsequent implications that it could have for the appropriate depreciation method employed.

The majority of stakeholders, however, have proposed an alternative straight line method for calculating depreciation. Under this approach, the capital consumption charge for each period is obtained by dividing the cost of the asset (less its expected salvage value) by its expected life. The method therefore allocates an equal amount of depreciation each year until the asset has been written down to its expected salvage value at expiry.

To the extent QR's asset condition is commensurate with age and use, QR's assets reflect varying asset consumption patterns – earthworks most closely resemble a one-hoss shay efficiency pattern and track, signalling and electrification exhibit linear consumption or possibly geometric asset consumption patterns (that is, higher depreciation levels than implied by straight line). In addition, it is also clear that the condition of certain QR assets is not reflective of age, in which case particular adjustments may be required.

[93] These studies reject the one-hoss shay pattern of depreciation in favour of a pattern that is closer to geometric depreciation. See for example Hulten, C. and F. Wykoff (1996), 'Issues in the Measurement of Economic Depreciation: Introductory Remarks', *Economic Inquiry*, 34, pp. 10-23; Koumanakos, P. and J.C. Hwang (1988), 'The Forms and Rates of Economic Depreciation: The Canadian Experience', presented to the 50th anniversary meeting of the Conference on Research in Income and Wealth, Washington DC.

[94] While this approach was initially advocated by the ACCC with regard to the regulation of transmission revenues, the ACCC has since adopted a straight line approach to depreciation.

Reflecting the fact that the infrastructure comprises an amalgam of asset types, the QCA believes that a straight line method of depreciation provides a reasonable approximation to the actual asset valuation-time profile of the collective rail asset[95] as:

- asset lives for track assets are uncertain – the assumed life of track has been significantly influenced by the estimated life of concrete sleepers, yet this estimate may be conservative given that the true life of concrete sleepers is unknown at this time;

- output from QR's system is expected to grow substantially over the next 40 years – whilst QR has forecast its traffic levels will plateau at 121-125 million tonnes per annum for the purposes of assessing reference tariffs, this traffic level is unrealistic for the life of the asset; and

- straight line depreciation is simple, transparent and supported by all stakeholders other than QR, including above-rail operators and end users.

However, in instances where an asset's condition is not consistent with its age, a specific adjustment will need to be made to that asset's valuation. This irregularity could be identified by comparing the forward-looking asset maintenance or replacement plan (a measure of the decline in service potential or the actual level of accrued depreciation) with the level of maintenance or extent of replacement expected given the asset's remaining useful life. Where proposed expenditure is in excess of that expected, it is likely to indicate the need for an asset write-down.

This is the case in the Goonyella system, where fouled ballast has necessitated the acceleration of the ballast cleaning cycle. Consequently, the depreciation estimated for this system has been increased to a level commensurate with the net present value of the additional expenditure QR has indicated is required by virtue of the state of the ballast. The additional expenditure was assessed relative to the level of expenditure expected for the actual age of the ballast, based on QR's own estimates of ballast life. This reduced the asset valuation on the Goonyella system by $34 million.

The opening asset values, used in the calculation of reference tariffs, were $1.69 billion for below-rail assets (including track signals & earthworks) and $350 million for electric traction assets - $2.04 billion in total, expressed in dollars of the day (1 July, 2001).

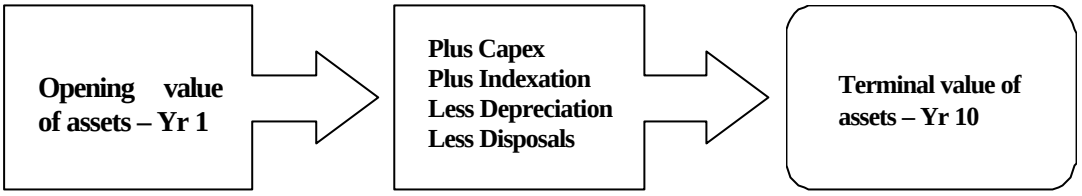
Terminal value

The model proposed by QR (and accepted by the QCA) for the determination of reference tariffs necessitates the calculation of the value of QR's asset base at the end of the modelling period. This value has been calculated by rolling forward the opening DORC value of the assets taking into account capital expenditure and maintenance[96] during the period, estimated depreciation (applying the same method used to arrive at the DORC value) and asset price movements during the period. The roll-forward of asset values is explained graphically in Figure 13.5.

[95] The effect of this assumption is to increase QR's asset base relative to that based on a linear consumption economic depreciation approach. The value of track assets, which is the most significant asset in QR's asset base, would be between 65%-70% of replacement cost under this form of economic depreciation as opposed to approximately 75% under straight line depreciation.

[96] The assumed asset life for track contemplates that maintenance be applied to the asset in order to achieve this asset life.

Figure 13.5: Roll forward of assets



Estimation of terminal values involves the same process as was undertaken for the initial DORC, based on the financial information that underpinned the analysis. This approach avoids the double counting of maintenance and capital expenditure during the horizon of the financial modelling exercise, as asset replacement during this time (for example re-railing) is capitalised in the financial model.

A review of QR's capital works program was undertaken to ensure the relevance of the projects identified in the program. There were three issues that influenced the final capital program relevant to the coal system analysis.

First, QR's tonnage forecasts underpinning the assessment of reference tariffs were characterised by moderate expansion over the first five years and then a plateau thereafter. Some of the capital projects identified in the QR capital program relate to system expansion to accommodate growth above that plateau. Accordingly, these projects, whilst justifiable under more favourable growth scenarios, have been excised from QR's proposed capital expenditure program to maintain consistency with QR's traffic forecasts.

Second, some capital projects relate to above-rail activities or activities that are non-coal related. These projects are to be undertaken on behalf of specific above-rail operators and, whilst infrastructure in nature, will not become part of the common infrastructure used by all operators.

Third, some capital projects relate to specific expenditure for the Infrastructure Services Group (ISG) and the Technical Services Group (TSG). However, these investments are effectively recovered through internal trading or service delivery arrangements with Network Access.

Apart from these issues, the entire QR capital works program was adopted without modification.

Finally, the assumed terminal value was adjusted to reflect estimated price movements over the period. The unit rates for the replacement cost of assets in the terminal value were reduced by 5% to allow for technological improvements in railway infrastructure construction during the period of analysis. There has been a long term decline in rail construction costs of approximately 0.5% per annum and it is reasonable to expect that this trend will continue.

The forecast terminal values, used in the calculation of reference tariffs, are $1.8 billion for below-rail assets and $472 million for electric traction assets - $2.28 billion in total, expressed in dollars of the day (30 June, 2009).

QCA's Position

In assessing QR's reference tariffs, the QCA proposes that asset consumption should be recognised through depreciation charges and that a straight line pattern of depreciation should be adopted. In those instances where an asset's condition is inconsistent with its age, the asset valuation should be adjusted accordingly.

13.6 Determination of Asset Lives for Below Rail Infrastructure

There are two perspectives to the determination of asset lives:

- determining the physical life of the asset, that is the period after which the deterioration of the asset from use and ageing is such that it typically requires replacement; and
- whether the life of the resource served by the asset (that is, the life of the coal mines that are served by QR's network – often referred to as the economic life of the asset) will be exhausted prior to the deterioration of the asset from use and ageing.

QR's Position

QR believes that depreciation should be based on the shorter of the physical life of the assets or the useful economic life of the mining resources (in the case of coal haulage services). This recognises that coal haulage services will only be required whilst there are sufficient coal resources for the mining industry to maintain production. When the mining industry does cease activity in the region, the majority of the rail network servicing these mines is also expected to cease operation.

QR further proposes that where the physical life of an asset extends beyond its economic use, the asset be depreciated to a residual value consistent with the asset's value in its next best use. In most cases the residual value is likely to be the salvage value of the asset. However, in some cases, elements of the rail infrastructure such as rail and turnouts may be able to be cascaded to another system.

QR contracted consultant Ian Coddington to assess the forecast tonnage of product coal that could be produced from the coal resources available in Queensland. These forecasts, to the year 2040, are given below.

Table 13.9: Forecast coal tonnage

	2000	2005	2010	2020	2030	2040
Million tonnes	105.1	112.8	113.8	117.0	96.7	55.8

QR has utilised forecast mine production data to develop estimates of the average economic lives of each of its four coal carrying rail systems. The use of an average economic life is in recognition of the fact that system utilisation will fall gradually over time and that some elements of the system will have a shorter than average life while others may have a longer than average economic life. If the maximum economic life was employed it would result in an inequitable depreciation charge particularly for future users.

According to QR, the average remaining economic life of each of the four Central Queensland coal systems is:

- Newlands System 28 years
- Goonyella System 40 years
- Blackwater System 50 years
- Moura System 40 years

QR proposes that these estimates provide an upper limit on the lives of rail infrastructure assets within those systems. In particular, those assets with a physical life greater than the estimated economic life (for example, earthworks, corridor land, and civil infrastructure such as bridges) will be depreciated over the relevant average economic life taking into account the estimated remaining economic life of the corridor as shown above.

The recommended life of each asset group is provided in Table 13.10.

Table 13.10: QR's asset lives

Asset group	Asset life (years)
Culverts, earthworks, embankments, concrete pipes, steel bridges, road overbridges	100
Track (composite), steel pipes, timber bridges, yard drainage, traction power distribution	40
Field signal equipment	15 – 30
Traction power system equipment, track turnouts, fences and noise barriers	20
Control and monitoring systems	15 – 25
Traction power system control	15

QR also proposes that the estimates of system lives be reviewed periodically (for example, every 5 years) as additional information becomes available and that the depreciation profile for these assets would be adjusted accordingly.

The physical life of assets can be generally expressed in terms of years, however QR acknowledged that in some cases other measures may be more closely correlated with asset age. For all the major asset categories identified by QR it is recommended that the age of assets should be expressed in years or at least converted to a time basis using some usage factor, such as the number of trains per year.

Stakeholder Comments

The majority of stakeholders considers that the expected life of the mine(s) is the appropriate basis for determining depreciation charges.

Table 13.11: Asset life for depreciation purposes

FreightCorp - where rail infrastructure serves specific customers, such as coal mines, and where the infrastructure will have little or no use once the activity is exhausted, such assets should be deemed to end their economic life at that point. An independent body should undertake the estimation of the remaining economic life of Queensland coal mines.

ARTC - it reasonable that, for the coal network, depreciation should be related to the life of the relevant mine(s).

Greenwood Kendalls - assets should be written-off over the life of the mines as this represents the expected useful life of the infrastructure.

Queensland Government - the relevant life over which assets should be depreciated should be considered on a case-by-case basis and it would be appropriate to have regard to both the physical engineering life and the economic life of the asset. This economic life could well be determined by the life of the mines that the infrastructure services.

FreightCorp - for assets whose physical life may extend beyond the expected life of the mine, a nominal life of 100 years be assigned to the track.

MIM, QMC - estimation of the most appropriate remaining life to be applied to Queensland coal miners is fraught with difficulty due to the extreme variability that could result from unpredicted future mine developments and closures.

QMC - the physical life of the infrastructure should be the relevant period for depreciation calculations.

QCA's Analysis

Establishing the useful life of QR's network assets is essential for the calculation of depreciation. There are two main methods available for determining this period:

- the useful physical life of the rail transport infrastructure, determined primarily by engineering factors; and
- the remaining life of the existing and expected coal mineral resource that is served by the network, often referred to as the economic life of the infrastructure.

Conventionally, the shorter of the physical or economic life of the assets is adopted.

As part of its asset valuation exercise, the QCA requested GHD to:

- determine the age profile of assets in each sub-category; and
- set out the estimated lives of assets in each major asset category and assess the appropriateness of QR's current practice in relation to standard asset lives.

GHD's asset valuation report forms working paper 5. The report outlines the method used to determine the asset lives assessed by GHD to be applied in calculating the depreciated replacement cost of QR's coal infrastructure. The asset lives are provided in the following table.

Table 13.12: GHD's asset lives

Asset group	Asset life (years)
Culverts, earthworks, embankments, concrete pipes, steel bridges, road overbridges, retaining walls	100
Track – composite life	40
Steel pipes, timber bridges, yard drainage, access roads	50
Traction power distribution	40 – 50
Field signal equipment	10 – 35
Traction power system equipment, track turnouts, buildings	25
Traction power system control, fences and noise barriers	15

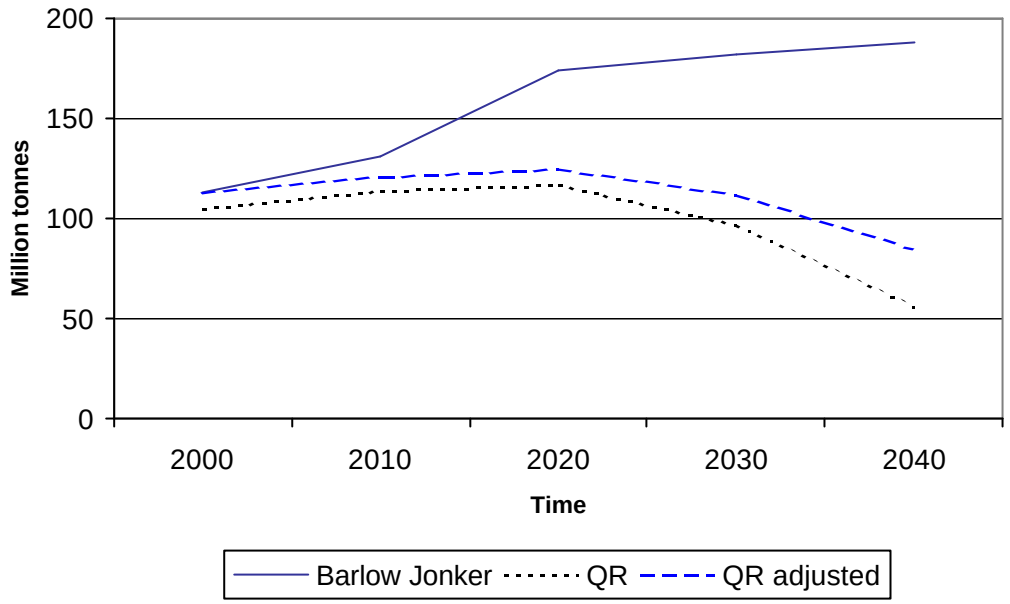
With respect to the remaining economic life of QR's coal infrastructure, no consensus amongst stakeholders emerged as to the most appropriate life to be applied to coal mines in Queensland. As a measure of comparison, IPART[97] recommended a life of 40 years be applied to RAC's Hunter Valley coal assets. However, it should be noted that New South Wales and Queensland coal fields reflect a totally different geological structure and contain different levels of reserves.

The Queensland industry is continuing to experience significant growth. Research conducted on behalf of the QCA by coal industry consultants Barlow Jonker indicates that coal exports from Queensland are likely to continue to experience strong growth over the next forty years, albeit at a lower rate that historical levels.

Barlow Jonker's forecast mine output capacity for the Queensland coal industry is illustrated in figure 13.6.[98]

[97] Aspects of the NSW Rail Regime, Final Report, April 1999, p. 45.
[98] Coal industry consultant AME Consulting was contracted by the QCA to audit Barlow Jonker's long term forecasts. AME supported the general trends shown in the Barlow Jonker report.

Figure 13.6: Comparison of coal forecasts



These forecasts take into account production from existing mines over their expected lives and output from projects anticipated to commence production before 2040, including the development of the Surat Basin reserves.

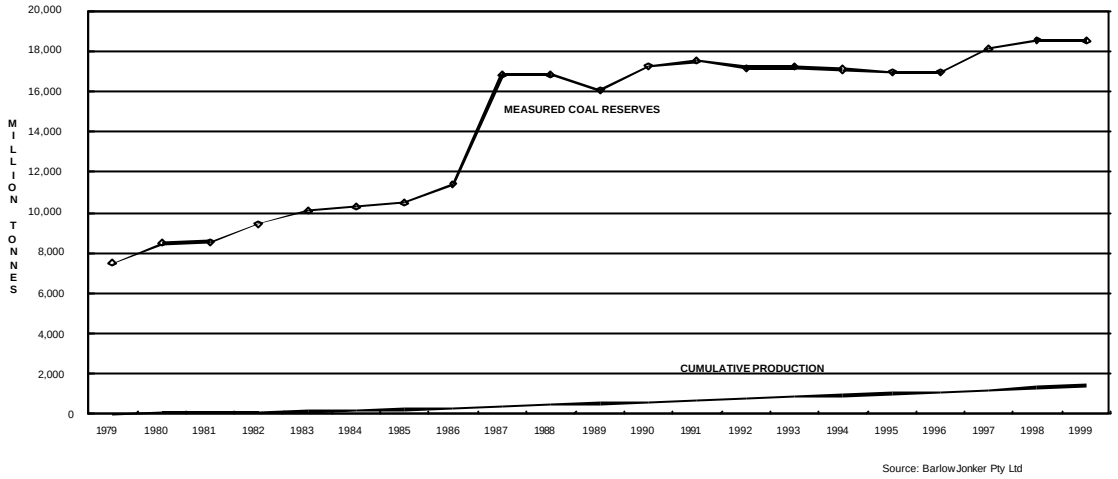
QR's output capacity forecasts are also presented in Figure 13.6. The series indicates a marked discrepancy with the Barlow Jonker's estimates, which widens towards the end of the forecast horizon. Barlow Jonker believes that QR's estimates do not incorporate coal railed to domestic power stations and smelters and have not considered coal railed from the proposed development of the Surat Basin. For comparative purposes, QR's figures have been adjusted to reflect these quantities. However, a large divergence still remains.

Barlow Jonker considers that this divergence can be explained by the fundamentally different approaches taken by the two consultants. Coddington has concluded that over the ensuing 40 years, the major constraint on coal transported will be the available economic resource. On the other hand, Barlow Jonker has assessed that these resources will in fact be available, and the ultimate constraint on railed tonnages will be demand in the marketplace.[99]

Barlow Jonker supports its position with respect to the future availability of economic reserves by comparing cumulative coal production in Queensland with the Queensland Department of Mines and Energy's estimate of measured coal resources. The comparison is shown in Figure 13.7 below and indicates the magnitude of the current gap between coal production and the amount of coal reserves in Queensland.

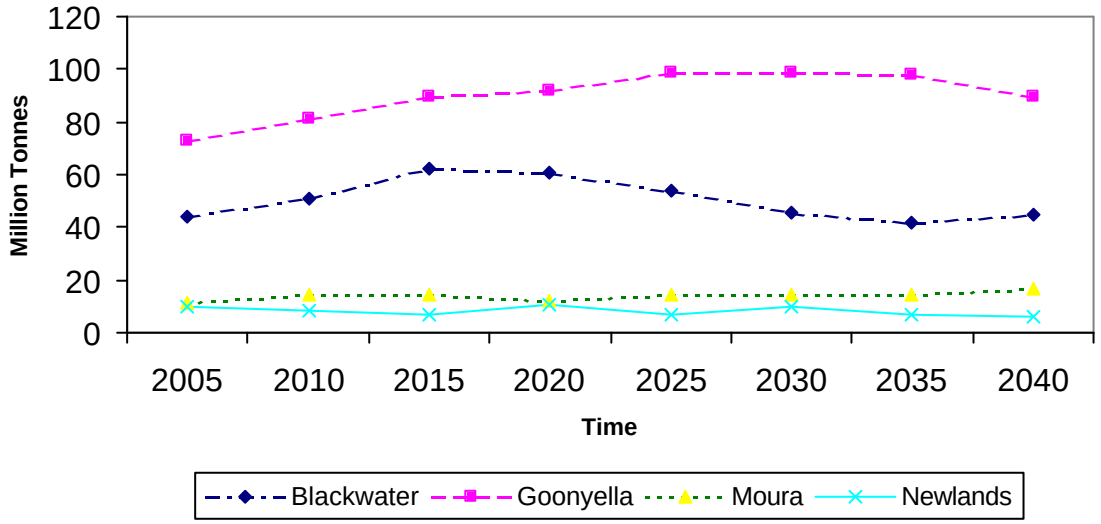
[99] It is however recognised that the exploitation of resources elsewhere in the world (including Indonesia, China and South Africa) will ensure intense competitive pressures remain for the Queensland coal industry.

Figure 13.7: Cumulative production v. measured coal



Barlow Jonker's forecasted potential output from mines in the existing corridors, in millions of tonnes, are illustrated in Figure 13.8.

Figure 13.8: Potential output from existing corridors



It is clear that, apart from Newlands where growth is relatively small in the interim and output is expected to subsequently decline over time, the systems can expect to, at the least, sustain their existing throughput to 2040. Growth in the Blackwater and Goonyella corridors is expected to be particularly strong until 2020-2025.

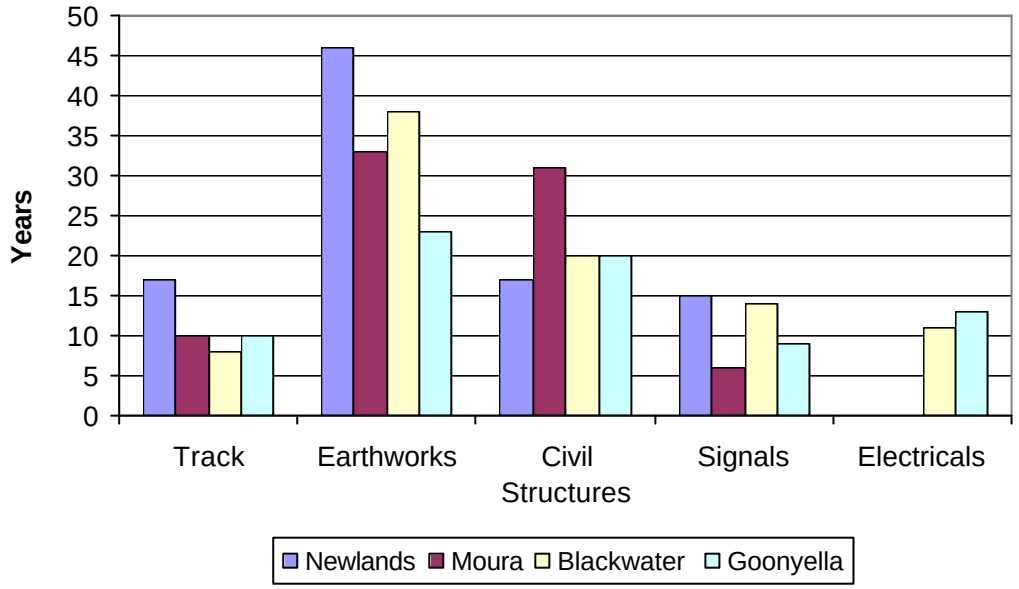
These long-term forecasts demonstrate that the Queensland coal industry is expected to continue its expansion, albeit at a slower rate, well into the twenty-first century and this in turn supports a somewhat longer economic life of QR's existing coal network than that proposed by QR. This would suggest that the economic life of the rail assets is not a factor that will constrain their operational lives.

Accordingly, the QCA believes that asset lives should be measured in terms of their physical lives, which will be shorter than the projected life of Queensland's coal industry given the underlying level of its reserves.

Assumed Asset Ages

The QCA estimated the following physical ages from information contained in QR's asset register and other information provided by QR with respect to acquisition dates and timing of asset renewal. These expired lives are set out in Figure 13.9.

Figure 13.9: Expired asset lives



QCA's Position

In assessing QR's reference tariffs, the QCA considers that asset lives should be measured in terms of their physical lives.

13.7 Optimisation of Below Rail Infrastructure

The DORC asset valuation methodology requires a valuation to be based on the replacement cost of an optimised system, adjusted for depreciation.

Optimisation can be undertaken from two perspectives. A greenfields optimisation refers to an approach which seeks to identify the optimal characteristics of a hypothetical network, constructed in an area free from any economic and social development. It consequently assumes that all operational parameters are variable. In other words, any potential rail network between mine and port passes through territory that has no existing infrastructure. The greenfields optimisation approach is thereby unconstrained in the specification of particular network characteristics (for example gauge) or the interfaces with other links in the coal chain (such as port unloading facilities).

Alternatively, a brownfields optimisation recognises that network construction occurs around existing community and industrial infrastructure (for example, above-rail, mine and port interfaces). Accordingly given these constraints, the approach seeks to optimise on the basis of only a limited array of operational parameters, such as excess capacity and inappropriate standards, a subset of those considered in a greenfields analysis.

QR's Position

QR has submitted that the optimisation process should be based on an acceptance of the existing demands on the rail network within the overall transportation system and not be undertaken in a broader context which would involve a valuation of the rail network within an optimised total transport system. In other words, the rail network should be optimised on the basis that the structure of all other components of the transport system is given. QR identified the following elements that should be taken into account in performing the optimisation exercise:

- optimisation should be undertaken in a reasonably objective manner;
- the scope of the optimisation framework must be practical; and
- the resultant valuation must be sufficient to support the continued operation of the infrastructure.

QR further submitted that the following elements should be included in the optimisation framework:

- infrastructure standards - primarily addresses whether the design standard of the infrastructure is appropriate for current requirements. This would encompass issues such as whether the required axle loads, train speeds, etc fully utilise the design standard of the infrastructure or whether they could be met with a lesser standard; and
- infrastructure capacity - primarily addresses whether the quantum of assets currently in place is appropriate to meet the current requirements of the operator. This would identify whether there is any excess capacity or redundant assets incorporated in the current set of rail infrastructure.

Also, in QR's view the following elements should not be included in the optimisation framework.

- infrastructure alignment - in Central Queensland, the alignment of the infrastructure is reflective of the manner in which the coal industry has developed over time. QR maintains that it has responded to such developments by changes in infrastructure alignment where it was cost effective. While QR recognises that alignment optimisation could be considered within its proposed scope of optimisation, it is QR's view that any optimisation needs to recognise the historical context in which the infrastructure has been developed. On this basis, QR considers that alignment of the infrastructure should not be considered in the optimisation framework;
- rail gauge and wagon capacity - the inclusion of rail gauge in the optimisation framework would take the process beyond QR's proposed scope of optimisation. A change in gauge would represent a major change in the trade-off between above and below-rail costs. Further, attempting to optimise for gauge denies recognition of the historical context in which the railway was developed. Similarly, optimisation for wagon capacity is considered outside the scope of QR's optimisation framework and is considered to be an issue for above-rail operators and not relevant for infrastructure optimisation; and

- alternative transport modes - QR's proposed general scope for optimisation is focussed on determining the optimal assets required to meet the existing needs of rail operators. Hence, inclusion of alternative transport modes is clearly outside this general scope.

Stakeholder Comments

There was a considerable divergence of views expressed by stakeholders with respect to the scope and depth of optimisation that should be undertaken. A number of submissions recommended that the infrastructure be optimised in relation to all facets of track configuration. Others were of the view that optimisation should be restricted to the removal of genuine excess capacity and redundant assets and considered that alignment, gauge and alternative modes of transport should not form part of the optimisation framework.

Table 13.13: Extent of optimisation

FreightCorp - optimisation should occur in relation to:

- track configuration and associated systems (for example signals);
- corporate overheads; and
- other elements that are specific to rail infrastructure providers.

Greenwood Kendalls - asset values should be adjusted for:

- inefficient network configuration;
- excess capacity which is unlikely to provide services in the medium term, for example up to 10 years;
- over-designed or poorly constructed infrastructure; and
- lower consumer value.

Queensland Government - it is unpractical and unnecessary to optimise from the perspective of the entire coal transportation chain. In particular, it is inappropriate to optimise on the basis of alternative modes of transport, alternative alignments or railway gauge.

QMC - a narrow gauge should be assumed in any greenfields DORC valuation.

A number of submissions expressed views on general principles to be applied in an optimisation exercise.

Table 13.14: Principles for optimisation

QMC - a set of guidelines for the optimisation process that draws on work undertaken by the ACCC and IPART may be appropriate. These principles include:

- optimisation should be conducted on both a brownfields and greenfields basis as neither approach is appropriate in all circumstances and both should be carried out to enable the range of possible values to be identified;
- the valuation process needs to be forward looking and allow for expected demand growth; and
- optimisation must assume a continuation of the improvement in capacity utilisation that as resulted from greater co-operation in the area of train control and scheduling in the coal and minerals network.

MIM - the optimisation process should result in reference prices that cannot exceed competitive benchmark pricing. Adherence to this approach would require optimisation on a greenfields basis.

FreightCorp, Greenwood Kendalls, QMC - the impact on reference tariffs of any proposed asset valuation needs to be taken into account before a decision is taken on the ultimate valuation to be applied.

QCA's Analysis

The diversity of views expressed by stakeholders and the general uncertainty regarding the relative impact on coal haulage charges of different degrees of optimisation provided limited direction for the Authority with respect to the most appropriate approach to infrastructure optimisation for the coal network.

The Authority, with the assistance of RMS, undertook a greenfields assessment of a range of possible below-rail parameters and the principles underlying their inclusion in an optimisation framework.

Introduction

A railway, like any industrial organisation, can be analysed in terms of the nature of its business, the manner in which services are provided and the necessary infrastructure that supports those activities.

The output of the rail industry is multi-dimensional. Railways produce different types of transportation services for different users at different origins and destinations, at different times, and at different levels of quality. In support of this business, a distinction should be drawn between above and below-rail operations.

The revenue earned by an integrated railway is primarily related to the amount of freight shipped from origin to destination. However, given the mix of haulage services required and shipment characteristics, the impact on costs incurred can be substantial.

For heavy-haul operations, such as QR's coal business:

- above-rail operations, which are largely variable cost, account for approximately 50-60% of the total cost of rail operations. These costs include expenses for crewing, fuel and maintenance. Major above-rail capital costs are for rollingstock and locomotives; and

- below-rail elements, including capital infrastructure and maintenance, account for the remaining 40-50% of total costs. The maintenance component is overwhelmingly variable whilst the capital component is fixed in the short run.

The dynamic nature of rail operations can be attributed to an array of factors, both physical and technical, that contribute to the extent of system-wide efficiency. Within the broad context of the overarching operational objectives and boundary conditions, these parameters should be closely considered in the process of determining the features of an optimised network.

Objectives

Broadly, rail operations comprise three consistent and inter-related objectives.

Maximise payload - the revenue that rail operators receive from the provision of rail haulage services is based principally on freight volumes. Consequently, to maximise income, rail operators would seek to transport the greatest possible quantity of product.

There are economies of scale that arise from the use of certain wagons and locomotives. For instance, a larger capacity wagon entails a smaller capital outlay per tonne payload and requires less below-rail capacity to transport a given quantity of product. In addition, there are operational savings to be realised, including lower fuel costs, less crew and a reduction in maintenance per tonne.

Payload can also be increased through the minimisation of tare.

Minimise tare - tare refers to the weight of that part of the train that is not the payload, which includes the wagons and the locomotives. Reduction of a train's tare will realise a number of benefits including:

- for the unloaded train - a reduction in the cost of returning empty wagons through lower fuel consumption, less damage to the track and a greater power to weight ratio thereby increasing train speed and performance, and potentially the number of locomotives required; and

- for the loaded train - lower fuel consumption per tonne of product, lower infrastructure and rollingstock maintenance per tonne of product and the ability to carry more product in a given time.

Compared to older wagon designs, newer high capacity wagons can improve the payload to tare ratio by 50%. On a per unit basis, the wagon will be more expensive, but on a per product-tonne basis, there is reduction in capital cost by as much as 40%. Therefore, not only are capital costs reduced but running costs per tonne decrease.

Minimise cycle times - a key driver of locomotive and wagon productivity is the time that it takes for the train consist to complete a 'cycle' – load at the mine, travel to the port, unload and return to the mine. Cycle times are therefore dependent upon the actions of all of the parties involved in the coal chain, including the ports. The lower the cycle time, the greater will be the number of hauls that a single consist can make, over a period of time, and the fewer train consists required for a particular tonnage.

Train cycle times vary by distance, terrain, product hauled and speed limits. Currently, train cycle times in the coal network are typically under 24 hours, of which under 14 hours is travelling time. A very high proportion of time therefore is involved in the locomotives and wagons waiting for loading and unloading.

Boundary conditions

In meeting these objectives, there are three primary constraining factors:

- the future level of growth in the system needs to be considered. This will be reflective of the extent of present and future investment in the network;

- the facilities available at the ports, including unloading and stockpiling capacity, pose a potential limit on the throughput of rail operations from mines; and

- the strength of the rail will determine, amongst other things, the largest wagon capacity and maximum train speed.

With these key cost drivers and boundary conditions in mind, the Authority has considered the potential scope of a greenfields optimisation. This is considered below along with an assessment of the appropriate scope of the optimisation to be applied.

Parameters

A number of below-rail parameters have a dramatic influence on the efficiency of a rail system. Efficiency gains, in many cases, are ultimately realised through subsequent adjustments to above-rail parameters given the technological relationships between the above and below-rail factors.

Track standard - there are three elements in relation to track standard:

- alignment;
- quality; and
- specifications.

Track alignment - the alignment of the route is a composite problem of minimising travel distance, grades, curves and construction cost.

The trade-offs likely to be encountered in the choice of route are:

- lower operating costs, track maintenance, signalling and overhead line costs associated with shorter route lengths;
- higher earthworks costs associated with shorter routes. Typically the shortest route will not pass through the most benign topography;
- lower fuel consumption and locomotive costs associated with flat grades which are in turn associated with longer routes; and
- high train speeds, lower maintenance costs and higher earthwork costs associated with flat curves which are in turn associated with longer routes.

Choosing the most benign topography in the general direction of the destination and then evaluating a number of specific alignments using predetermined grade and curve parameters is a method frequently used in route selection. Refinement and relaxation of those parameters may be necessary if construction costs prove to be significantly less at the expense of subsequent operating costs. Ultimately, another route may be chosen for evaluation if the first route is not acceptable.

The current coal systems have all had some measure of history in terms of their development for the coal task. The Moura, Goonyella and Newlands systems have a history mainly associated with the development of the coal task. Some parts of those networks were in place prior to coal emerging as the major commodity, but their alignments basically coincide with that thought to be optimal today.

The Blackwater system, on the other hand, has a history of development that is mainly associated with the development of rural industries. The prominence of Rockhampton as a regional centre originally influenced the rail route for what has become known as the Blackwater system.

It is possible now with hindsight to ask the question as to whether, based on coal alone, the route from Gladstone to the Blackwater coalfields would be any different than the existing route. This question is largely theoretical because the existing route has influenced other infrastructure. Therefore it is not suggested that the existing route would be altered but rather, given a greenfields scenario, how would the infrastructure have been planned today.

This issue of optimally determining the alignment is not trivial because a number of conflicting requirements must be met. As discussed earlier, trade-offs exist between the cost of construction of the infrastructure (a shorter route to the Blackwater coalfields involves the negotiation of the Great Dividing Range), cost of maintenance of the infrastructure and the cost of above-rail activities. Selection of the most efficient route needs to take into account all of these factors.

A shorter route than the existing route could be possible near Marble Mountain saving 35 kilometres of the existing route length. Its shortened length combined with higher unit construction costs produce a neutral effect on total route construction cost but produces much lower above-rail operating costs for the coal task. This route would not be suitable to serve Stanwell Power Station. Clearly, however, Stanwell would not be located where it is if in fact the current rail line followed a different alignment.

In addition, domestic rail traffic to and from Rockhampton would also be required to adopt a different profile. Again, compared to today's coal task, those aspects may be of minor importance compared to the savings apparent in optimising the rail route for the coal task. Instead, today's rail route most probably creates a disadvantage for the coal task, having been 'optimised' for a completely different set of requirements.

To the extent that the current rail routes and especially Blackwater were constructed for tasks different from today's task, it is reasonable to conclude that starting again, with the knowledge we have now, better alignments for the coal task could be generated.

In terms of total system cost, including both above and below-rail activities more efficient alignment alternatives exist. In terms of below-rail costs, there could be a small advantage in a shorter route, primarily from reduced maintenance costs where the alignment adopts similar standards of curvature but where unit construction costs are higher. However, the more significant benefit from a shorter route arises from a reduction to above-rail operating costs by over 10%.

The QCA has not proposed that the alignment of the Blackwater system figure as part of the optimisation process at this stage.

Track quality - over time the quality of the track diminishes due to age, wear and tear and the climate, amongst other things. As this occurs, maintenance costs must rise to preserve system reliability and safety. Optimisation issues could arise for example, where track has recently been replaced for a mine with a very short economic life.

Track specifications - there are two critical technical aspects of track standard which are relevant to the below-rail optimisation process. These are axle load, or rail strength, and the gauge of the track.

Axle load is possibly the most important parameter that influences the ability of the organisation to deliver rail services effectively. The use of the highest possible axle load brings about benefits in relation to:

- wagon design and load carrying capacity;
- payload to tare ratios; and
- train load per unit length.

'Best practice' heavy-haul railways have been attempting to increase axle loading over the years, some now operating at up to a 35-tonne axle load (17.5-tonne wheel load). The increase in axle loading from the long standing 30-tonne to 35-tonne standard has a number of cost implications which predominantly relate to the upgrading of the track infrastructure and the increase in maintenance needed to ensure that the rail continues to provide a smooth surface for the wheel. On curves, higher axle loading creates higher wear rates on the side of the rail head for each wheel that passes.

Wear rates and maintenance can be controlled with the application of advanced alloy and heat-treated steels. Overall, taking into consideration the steel materials available for wheels and rails, the increased costs associated with maintenance, the maximum axle loads appear to be in the vicinity of 35 tonnes. This loading is being sustained in the heavy-haul operations of the Pilbara in Western Australia.

Axle load is a potential limiting factor on locomotive power, particularly on a heavy-haul railway. Highly powered, heavy-haul locomotives have to be heavy, otherwise they are not able to transmit their power (torque) to the rail.[100] In order to take advantage of the high power available, the locomotives will require the traction afforded by the maximum axle load of 35 tonnes. New technology, developed to ensure wheel slip does not occur, uses sophisticated electric motor speed control through so-called 'AC' traction motors.

The importance of locomotive characteristics emanates from the variations in capital, maintenance and operating costs, with changes to the power output and tractive effort. For a heavy-haul operation, the trend is towards the use of larger locomotives, taking advantage of all of their inherent advantages.

In capital cost, recent advances in locomotive technology has enabled a doubling in power and tractive effort for a small cost increase. The trend in heavy-haul operation is for an increase in locomotive power and the use of fewer locomotives in train consists. However, utilisation of that power requires a heavy locomotive, which in turn requires a higher axle load.

The larger locomotives result in fewer units being required and there is a consequent reduction in maintenance, which is typically based on the time or number of kilometres travelled. Since locomotive maintenance is a relatively large component of total maintenance, a reduction in the number of locomotives significantly reduces total maintenance costs.

With respect to operating cost, an inherent advantage of any larger electric motor (the traction motor) is that it is more efficient than a smaller electric motor. There are a number of reasons for this, most particularly the higher magnetic flux possible and its conversion to torque. Thus, larger motors can take advantage of the increased axle load available for the locomotive to transmit the tractive effort to the rail. The size of the motor is affected by both the axle load and track gauge.

The gauge of the track refers to the distance between the inner faces of the rail heads. Railways throughout the world operate on a variety of gauges ranging from 1 metre to 1.6 metres wide. This is especially the case in Australia, where there are many different gauges in use. In the past, the availability of rollingstock of a particular gauge was only available in a particular country. Arguments used to support the retention of existing track gauges centre on the availability of spare parts, service or expertise. Now, with the globalisation of markets and manufacturing, these arguments are less persuasive.

[100] The characteristics of most motors, mechanical or electrical, is that as speed increases, torque available to drive the wheels decreases. Hence, high-speed passenger locomotives are required to have high power so that, at high speed, there is sufficient torque to maintain that speed. These types of locomotives do not require high axle loads, since the torque provided to the wheels is not high enough to force the wheels to slip. This contrasts with the requirement of a heavy-haul railway. High torque is required at slow speeds, and the wheel load has to be high in order to transmit that torque (tractive effort) to the rail so that the wheels don't spin.

The importance of the gauge size lies in its relationship to the overall size of the wagon and locomotive. Track gauge effectively limits the height of the wagon, because the centre of gravity is required to fall within limits dictated by lateral stability. This has implications for both the payload to tare ratio and the speed at which the train can travel.

A wider, taller and longer wagon will proportionately produce a wagon with higher payload to tare ratios. Thus, the trend in wagon design has been to increase the carrying capacity to as much as possible, consistent with the gauge size.

In addition, a narrower gauge will, all else equal, limit the speed at which a train can travel in a safe and stable manner. Higher speeds are desirable from a cycle time perspective. A shorter cycle time will result in fewer train consists being required for a given tonnage. On the other hand, high train speeds are less fuel efficient, require route alignments that are more expensive, increase coal contamination of the track, require more expensive rollingstock equipment and necessitate greater degrees of maintenance on both infrastructure and rollingstock.

The common industry standard for standard gauge heavy-haul operation is to utilise less sophisticated and therefore cheaper rollingstock equipment, capable of running at 80 km/h.

In Queensland, as in South Africa where narrow gauge (1067mm) operates, the width and height of vehicles has also been limited. For a coal load, narrow gauge limits the axle load to 26 tonnes and the total gross load of the wagon to 104 tonnes that is 36 tonnes less than the gross wagon weight of the Pilbara railways and 16 tonnes below the weight of those used in the Hunter Valley, which are the largest coal wagons used in Australia.

The Pilbara railways carry iron ore, a denser product, on standard gauge (1435mm) and the gauge has not proven to be the limiting factor. In the Hunter Valley, also operating on standard gauge, the wagons have reached their width limit based on the centre of gravity considerations. In other words, gauge has been a limiting factor in that case.[101]

To make use of an axle load of 35 tonnes, it is likely that the track gauge will need to be as wide, if not wider, than standard gauge for coal haulage in an optimised operation.

A large portion of the cost of providing infrastructure is insensitive to the track gauge used and even the remaining components are only mildly sensitive to track gauge and axle loading. In a greenfields design, the incremental cost of constructing a wider, higher axle load track is small. The increased costs associated with a wider track gauge and heavier axle load are mainly manifested in higher rail, sleeper, ballast and formation costs. Most extra costs are the marginal costs associated with manufacturing the same number of units that are slightly larger in size (that is, 5%).

Table 13.15 outlines indicative values for a series of coal rail system parameters in various domestic, international and optimised operations. It highlights that, in most cases, QR's best-practice falls short of the above and below-rail standards operating in other domestic and international networks. Furthermore, it underscores that a greenfields optimisation will necessitate significant changes in the technical characteristics of QR's network, particularly in relation to below-rail parameters such as gauge width and axle load.

[101] In the United States, also operating with standard gauge, the usual axle load operated is 30 tonnes although recent trials have been undertaken using coal wagons with up to 35 tonnes axle load.

Table 13.15: Coal rail system parameters

Parameter	QR best practice	Hunter Valley best practice	United States Common practice	Optimised railway
Axle load (tonnes)	26	30	31.9	35
Rail section strength	60 kg/m[102]	60 kg/m	68 kg/m	68 kg/m
Gauge of track (mm)	Narrow 1,067	Standard 1,435	Standard 1,435	Broad[103] 1,676[104]
Wagon tare weight[105] (tonnes)	20.25	23	24	26
Payload (tonnes)	83.75	97	103.6	114
Gross wagon weight (tonnes)	104	120	127.6	140
Wagon payload to wagon tare[106]	4.14	4.22	4.32	4.38
Locomotive horse power	3,500[107]	4,000	6,000	6,000

Source : Rail Management Services Pty Ltd

System capacity - in considering the design of a railway system, the operating parameters of the equipment on the infrastructure will result in the requirement to operate a certain number of trains per day for a particular task.

For a single track system with passing loops, a requirement is that the loaded and empty trains must be able to pass one another. The spacing of the passing loops is the single largest determinant of the capacity of the system.

In addition, the length of the passing loop is critical. For heavy-haul operations, large economies are accessible through increasing train length to the maximum size commensurate with reliable and safe operation and having regard to terminal configuration and braking capabilities.

Commonly used train lengths for heavy-haul operations range from 120 wagons to 240 wagons, or approximately 1.5 km to 3 km. These variations have resulted from existing systems being constrained by terminal configurations. A purpose built system would not be constrained by these historical factors. However, the length of the train must be less than the length of the passing loop to permit the effective operation of the facility.

[102] Kilograms per metre of rail length. To convert to tonnes of rail steel per kilometre multiply by two.
[103] Broad gauge is a general name given to gauges greater than standard gauge. Internationally, India, Pakistan and Spain operate with a gauge of 1676 mm, while domestically Victoria and South Australia operate at 1600 mm.
[104] The broader gauge is necessary to obtain the volume needed for a 35-tonne axle load because wagon width is limited by centre of gravity constraints.
[105] Gondola type wagons can be lower tare than bottom dump type. Bottom dump is assumed.
[106] Wagon tare is different from train tare because of the influence of the locomotives. The locomotive weight and number will depend on the terrain.
[107] High horsepower locomotives are not available in a narrow gauge configuration because of space limitations.

The spatial ability of a train to follow the previous train or to proceed in the opposite direction is dependent on the headway clearance for which the system has been designed. In suburban systems, it is not uncommon for the headway to be less than 2 minutes. That is, a train can follow another train at normal speed after a 2-minute gap. In a freight system, considerations involving train stopping distance and length of train, result in the minimum practical headway of greater than 10 minutes and more likely 20 minutes.

On a single track, a common but conservative train density is for 12 trains in each direction each day. That is, a total of 24 trains in a 24-hour period run over each track section. This rule of thumb implies a tolerance in train running of approximately one half hour, provided there are sufficient passing loops constructed.

Simulation models have been used to optimise train timetables for infrastructure configurations. These models are valuable in ascertaining the value of adding another passing loop for instance.

System capacity can be increased considerably by the duplication of track. This involves the construction of a new line adjacent to the existing track, and is tantamount to the inclusion of a passing loop for the whole corridor. While duplication costs are higher than passing loop costs, the potential enhancement to system capacity needs to be weighed against the marginal benefits from continually adding passing loops. Forecast growth in system traffic will play an important part in this decision.

Assessment of excess system capacity - an assessment of the Central Queensland coal system capacities was undertaken and compared to that required for the 5 and 10-year coal task projection.

The assessment consisted of simulating the operation of the system using a computer tool designed for such an exercise. The tool's inputs consist of infrastructure characteristics, train consist details, sectional running times and terminal times. It also took into account possible delays caused by train interaction and below-rail failures.

A number of trains are simulated as running on the system, each train carrying a certain amount of coal and operating to the boundary conditions imposed by the infrastructure and the terminals. Train numbers were increased progressively to simulate the growth in the coal task over the 10-year period.

The Authority adopted tonnage projections for this review that were based on advice from Barlow Jonker and Energy Economics in order to ensure that a longer term view of incremental capacity and capacity optimisation could be made. This view was taken despite QR's forecasts that show a plateau of tonnages after 5 years. There was little difference between the respective 5-year projections. However, the differences were marked for the 10-year scenarios. Therefore the conclusions reached in the review provide a significant cushion against tonnage deviations from QR's projections.

The assessment consisted of testing the existing infrastructure for possible areas of over-capitalisation. The Authority was mindful of the need to ensure service levels provided by the infrastructure were not down graded in any consideration of capacity. Therefore, the ability of the coal systems to recover after incidents and to provide comparable train cycle and transit times with those currently experienced were taken into account.

Moura and Newlands systems - the Moura and Newlands systems comprise single-track infrastructure and, apart from passing sidings, there is no opportunity to reduce the extent of it. The analysis indicated that for the 5-year task it would be possible to eliminate one passing loop on each system but that all existing infrastructure is likely to be required for the 10-year scenario. The Authority does not propose to adjust the asset value for these systems on the basis that any adjustment would be minor and that QR should be provided with the benefit of a reasonable doubt.

Blackwater system - the infrastructure on this system is partially double-track and partially single-track construction. The test examined those double-track sections where, at the 5 and 10-year tasks, a single track construction would adequately provide capacity.

For the 5-year scenario, a small amount of double-track and a passing siding could be removed without compromising service levels. The conclusion for the 10-year scenario was that, on the double-track section between Gladstone and Rockhampton, a lesser portion of double-track is needed. This is not surprising, given that this section of track is required for the North Coast Line freight and passenger traffic. QR have indicated that approximately 50 km of that section would not be required for the coal-only task. The QCA accepts this estimate and has adjusted the asset value accordingly.[108]

Goonyella system - the infrastructure on this system is partially double-track and partially single-track construction. The test examined those double-track sections where, at the 10-year task, a single-track construction would adequately provide capacity.

For the 5-year scenario, a small amount of double-track could be removed and service levels be maintained. However the incremental savings associated with the scenario were not material. The Goonyella system could handle the 10-year task as long as the operators continued to use efficient trains of the reference train type. The use of less efficient trains or tonnages marginally greater than those estimated will lead to a need for infrastructure enhancement to increase system capacity.

The conclusion was that there was a small opportunity to decrease the length of double-track but that QR's projected maintenance work rendered such an adjustment inappropriate.

Conclusion

The optimisation of the rail system in Central Queensland is complicated by historical factors.

The network has grown over a number of decades to provide rail haulage services to enable the exploitation of the region's coal mineral deposits. It has expanded incrementally through the cumulative enhancement of its existing operations, as a response to the commencement of new mines and the growth in export markets.

Consequently, path dependencies have become a characteristic of the network, particularly within corridors. For instance, once one gauge is adopted for a particular sector or corridor, this decision determines the gauge for future augmentations to that corridor.

Nevertheless, if initial construction of the coal network was only commencing today, the adoption of a narrow-gauge would be improbable, given the limits that it places on the overall efficiency of the system through an inability to implement particular rail infrastructure standards and modern technologies.

[108] An additional issue concerned the spacing of passing loops – it appears that QR's passing loops may have been optimised for maximum speeds of 60 km/hr rather than the 80 km/hr maximum speeds that currently operate. However, the effect of this factor was considered minor.

An optimised system could result in significant reductions in the cost of coal transportation. In theory, an optimisation of QR's coal network could involve the deduction of the net present value of this cost penalty from QR's operating asset base. For the theoretically most efficient configuration, this would represent a substantial asset write-down of between 30 and 50%.[109]

However, the narrow gauge infrastructure is present, and it will remain irrespective of the Authority's findings. An optimal system would remain hypothetical given the existence of rollingstock and port interfaces sized for narrow gauge track. Consequently, from a regulatory perspective, the QCA believes that regard should be had for this historic development and that, accordingly, QR should not be penalised for its past investment decisions.

The Authority, therefore considers that a limited brownfields optimisation, in respect of track standard and capacity, is most appropriate. At this stage, the optimisation has been limited to the excising of approximately 50 km of track between Callemondah and Rocklands. This has reduced the asset value on the Blackwater System by $33.6 million.

QCA's position

In assessing QR's reference tariffs, the QCA considers that a limited brownfields optimisation is appropriate in the current circumstances. This has resulted in $33.6 million of track, comprising 50 km between Rocklands and Callemondah, being excised from QR's asset valuation.

[109] From a small increase in capital cost, there is the potential for significant reductions in total costs, both above and below-rail. Taking the net present value of these below-rail savings over the life of the mine translates into major reductions in the asset value of a non-optimised system.

CHAPTER 14. CONTRIBUTED ASSETS

KEY ASPECTS

Evidence - past contributions will only be recognised where recognition is justified by way of documentary evidence.

Extent of recognition - the amount of contribution that is recognised will be based on that documentary evidence.

14.1 Introduction

Since the 1960s, QR has required coal mine developers to make substantial capital contributions to the construction, augmentation and upgrading of rail facilities. In response to subsequent changes in the legal, financial and taxation environment, the approach adopted by the Queensland Government and QR in recognising and treating these contributions has involved a mix of arrangements which have evolved over time.

An examination of the implications of past user-funded capital contributions for asset pricing could therefore be considered in light of the historical background in which the contributions were made.

There is an argument that these users, having funded the initial capital for infrastructure to service a mine, should not be required to pay for those assets again by being required to pay rail freight charges that include a commercial return on assets that they have directly provided.

Alternatively, it may be argued that capital contributions represent past and irreversible cash flows, and as such 'bygones should be bygones'. The possible recognition of past capital contributions, perhaps after many years, could potentially result in the rewriting of contracts that have already expired.

If past contributions are to be recognised, further issues arise concerning the quantification of the benefit that current mines should have recognised under the access arrangements. Establishing the method by which credits should be quantified raises a number of issues that refer back to the time at which the contributions were made.

In July 1999, the QCA released an Issues Paper, *Queensland Rail Draft Undertaking – Treatment of Past Capital Contributions*, inviting comments from interested parties. The views ascribed to QR and other stakeholders in this Chapter are in relation to the issues raised in submissions to that paper.

14.2 Recognition of contributed assets

Clearly, whether a past contribution should be recognised is a threshold issue. The key consideration involves the nature of the initial contract and whether there exists any evidence of a commitment, that is independent of the contract, to recognise a capital contribution.

Establishing the basis upon which past contributions are to be recognised (if at all) will significantly influence the factors that are relevant to the recognition, such as the relevance of:

- the purpose of the contribution;
- whether the contribution-funded assets which were dedicated to a particular user; and
- the time that has elapsed since the contribution and the expiry of the contract pursuant to which it was made.

QR's Position

QR noted that the owners of the mines in respect of which capital contributions were made are typically parties to existing contracts with QR and any recognition of past contributions can only come into effect when mine owners renegotiate their existing contracts with QR or a third-party operator.

Pre-1993 coal rail haulage agreements (RHAs), negotiated by Queensland Treasury, were generally considered to be non-commercial and contained a defacto royalty component. The pre-1993 contributions were funded by either a refundable security deposit or a non-refundable developer contribution. QR advised that even the latter appeared to have been recognised in haulage rates. This was achieved by incorporating a 'post 10-year surcharge' in the haulage agreement. However, in 1992 the Queensland Government abolished this surcharge mechanism.

QR argued that the vast majority of contracts entered into by mining companies did not provide for any further recognition by way of reductions to rail haulage charges after expiry of the original agreement. Further, the failure of parties to specify entitlements beyond the term of the original contract period clearly indicated that the parties had no intention of extending the recognition of the contribution past the initial contract period. Hence, with respect to mines that have experienced a change in ownership since the original contract, the new owners could not have identified, and as such are unlikely to have paid for, any ongoing entitlement to recognition.

With respect to post-1993 contributions, because coal haulage agreements have been negotiated in a commercial framework, recognition of developer contributions should be wholly reflected in the terms of those agreements. Hence, consideration of any further recognition should not be necessary.

Stakeholder Comments

Views with respect to the importance of the initial contractual relationship varied markedly among respondents.

Table 14.1: Initial contractual relationship

FreightCorp - the initial contractual relationship is important. A case-by-case approach is required to assess whether negotiated haulage rates have taken account of past contributions. There are difficulties associated with such an approach however, particularly with the unbundling required to assess the level of any past recognition of contributed assets.

Queensland Government - the initial and subsequent contractual relationships are highly relevant to the recognition decision. In particular, the arrangements surrounding the capital contributions made prior to 1993, and the associated haulage agreements and renegotiated agreements that expire between 2004 and 2013, need to be considered. Full recognition will be effected with the expiry of current agreements and none of the current agreements contain provisions which provide for the continuation of credits beyond the term of those contracts.

Stanwell - the original contractual arrangements should be used to establish the extent of any property rights which the original contributor or existing rail user may possess. Further, because past capital contributions established those property rights it is important that they be recognised in pricing for access. The contractual arrangements between the rail operator and the State Government took the form of Queensland Treasury letters that directed it to provide the nominated capital contributions. Therefore, QR has never recognised that contribution via lower haulage charges.

MIM - past capital contributions (several hundred million dollars) were not recognised by reduced rail freights and in addition those arrangements were similar to those applying to most other mines, that is, high capital contributions coupled with monopoly freight rates. Under the terms of the original contract, freight rates were well in excess of commercial levels. However, because QR's pricing since 1993 has included some credit for past contributions, any credits offered since 1993 should be taken into account and greater transparency is required to ensure that the correct amount of those credits is recognised.

QMC - where applicable, each company's contributions to QR infrastructure should be identified, restated in present value terms, and refunded to the company as a lump sum or as a deduction from that company's access charges. Contributions should be recognised on the basis of:

- fairness and equity. Companies have already paid at least once for a large amount of QR's infrastructure assets. They were required to make lump-sum payments to fund capital works, over and above freight charges that were themselves sufficient to cover all costs (including the costs of capital establishment and renewal) and deliver an extraordinary return on all assets (including those funded by users). These arrangements did not come out of commercial negotiations, but were mandated by Treasury, and the mines that were required to make the largest contributions were typically those that were also required to pay the highest recurrent freight charges. There was no discernible relationship between the amount of capital contribution and the freight charge (that would indicate one element was commercially traded off for the other) or between the arrangements for different mines (that would indicate a form of systematic royalty policy had been applied);
- efficiency. 'Enlivening' assets, funded by the companies' contributions, in valuing them on a current basis and including them in Network Access' asset base would result in Network Access over-recovering its capital costs, unless there was a compensating call on allowable revenue in the form of refunding of those contributed amounts. QR's current net equity position embodies the present value of those company contributions, and will provide a cushion against the disciplines of competition policy if QRNA is permitted to retain all of the earnings from its permitted rate of return on those funds;
- precedents. There are several relevant precedents for recognising companies' contributions:
    - large user contributions to transmission and distribution assets were recognised in the establishment of the state electricity market in two ways. First, the outstanding balances of refundable security deposits (lodged under long-term monopoly power supply agreements) were immediately paid back to the companies. More importantly, in recognition of the companies' non-refundable contributions, their 'use-of-system' charges were reduced for the term of their new connection agreements with the government-owned distributors – the extent of those reductions being equivalent to the corporations' allowable returns on the contributed assets;
    - in the recent renegotiation of Ports Corporation of Queensland charges at Hay Point (Dalrymple Bay terminal), users' capital contributions were identified and re-valued on the same depreciated replacement cost basis as the rest of the facility. That amount ($100 million) is being refunded to the contributor companies through a reduction in their harbour dues;
    - in the corporatisation of the Gladstone Port Authority in 1994, the coal shippers' past capital contributions were identified and removed from the asset base on which the authority was permitted to earn a rate of return, and the effect was reflected in port charges; and
    - there is the precedent created by QR's own recognition of companies' past contributions following its corporatisation and the 1993 review of coal rail freight and royalty policy. That review decided that, in applying a new 'commercial' rail freight pricing approach to new and renegotiated rail agreements, 'appropriate allowance will be made for rail assets funded by coal mining agreements'.

  Consistent with this approach, QRNA should not be permitted to retain the portion of their allowable revenue that represent recovery of those contributed assets, given that the assets remain in service and are to be valued on a present value basis for the purposes of determining access charges; and
- not inhibiting competition. QR Coal and Mainline Freight (QRCMF) provides a freight rate credit for contributed capital. QRCMF has indicated that for new and renegotiated business it will offer a single freight rate inclusive of access and haulage charges – it will not separately identify these components. QRNA has said that for historical reasons, the coal reference tariffs determined by the Authority will not be the same as those contained in internal (and confidential) access agreements between it and QRCMF. Under these circumstances, unless QR was required to identify and forgo the capital recovery element of revenue from contributed infrastructure assets, it could use this revenue buffer to confer a competitive advantage on its above-rail operator. QRNA could enable QRCMF to maintain the capital credits in its rates by charging QRCMF discounted access charges (while rival train operators would have to pay the reference tariffs based on total asset value).

QCA's Analysis

Stakeholders indicated two distinct views as to the relevance of past contracts. The first view is that the current contracts fully reflect past contributions. The alternative view is that contracts are only relevant to the extent they actually recognise past contributions – that is, original contributions should be recognised to the extent that they weren't under existing contracts.

Clearly, the history of rail freight agreements in Queensland has involved the use of rail freights as a means of raising state government revenue. Those who made capital contributions did so in order to develop a resource and the rail freight agreements formed an essential component of those contribution arrangements.

In the coal industry, the contributions of coal mines to fund the expansion of rail infrastructure occurred during the following distinct periods, each of which reflect different government policy settings.

In the period between the late 1960s and early 1980s, developer contributions were collected by way of security deposits which usually included a contribution towards the full cost of the necessary rolling stock and wagons and an allocation of the cost of constructing/upgrading the below-rail infrastructure. The capital contribution was in most cases repaid to contributors over a 10-year period with full repayment conditional on the achievement of agreed coal haulage targets. Rail freights during this time included a capital charge and an operating cost component which included a state return or defacto royalty component.

Royalties (other than the de facto royalties) around this time were an ad valorem rate based on 4% for underground and 5% for open cut mines for export coal and a fixed rate of 5 cents per tonne for domestic coal. De facto royalties commenced in the late 1970s following a period of comparatively generous coal freight rates designed to facilitate the development of the coal industry in Queensland.

Following changes in the taxation arrangements with respect to contributed assets and changes in State Government borrowing arrangements in the early 1980s, developers were no longer required to pay security deposits. Schemes that commenced during this period usually employed long term (15-year) haulage contracts wherein developers who made capital contributions to QR did not have to pay any capital component in rail freight charges for the rail facilities they contributed. Coal freight rates for those assets only included an operating cost component and a defacto royalty.

With the move to place QR on a more commercial footing leading up to corporatisation in 1992/93, in particular the requirement that QR should adopt a commercial capital structure and meet an agreed rate of return target, it was necessary to more explicitly recognise past capital contributions in coal freight rates. As part of the move to more commercial rail freight rates which commenced in 1992, de facto royalty payments were to be phased out by 2000. Also, a new coal royalty regime was introduced which included an ad valorem royalty of 7% of the 'free on rail' value of both domestic and export coal.

The Authority is reluctant to revisit past contracts. In a sense, past capital contributions are indistinguishable from monopoly profit (if any) contained in the contract. For example, in the case of pre-1993 contracts, freight rates included a component for defacto royalties and other 'monopoly rental' components. Accordingly, it is extremely difficult to draw a distinction between end users who paid monopoly prices in the form of up-front capital contributions and those who paid them in the form of higher haulage charges. In contrast, post-1993 agreements implicitly recognise capital contributions through reductions in rail freight rates.

Consequently, the QCA considers it inappropriate to generally recognise capital contributions in the context of setting access charges under QR's Draft Undertaking. However, if a mine is able to produce evidence of a specific commitment to recognise a part contribution beyond that contained in existing contractual arrangements, then the Authority considers such a commitment should be recognised through specific adjustments to access charges in those particular cases.

The type of commitment must be one under which QR acknowledges liability beyond that which was recognised in contracts. To demonstrate such a commitment, the Authority would require documentary evidence, such as a letter.

Under this approach, a number of possible factors that might otherwise influence the recognition decision cease to be of relevance. These factors include:

- the purpose of the contribution;
- whether the contribution funded assets which were dedicated to a particular user; and
- the time that has elapsed since the contribution and the expiry of the contract pursuant to which it was made.

QCA's Position

In assessing QR's reference tariffs, the QCA considers that:

- **elements of past capital contributions will not influence the process that establishes reference tariffs;**
- **QR may have contractual obligations to honour past user-funded capital contributions, and these will be dealt with through the respective rail haulage agreements; and**
- **past contributions should only be recognised where a claimant can demonstrate that recognition beyond the existing haulage contract is justified by way of documentary evidence presented, in which case specific adjustments would be made to access charges.**

14.3 Quantifying the extent of recognition of past contributions

If it can be established that recognition for past capital contributions is appropriate, there are a number of issues to consider in relation to the quantification of the extent of that recognition, including:

- the method to quantify credits – essentially assessing whether the life of the asset that was contributed has any bearing on the quantification of the credit or whether the contribution should be amortised on some other basis (for example, the life of the contract or the commitment that was made). This is important to assessing the relationship between the original contribution and the credit that is to be provided to a customer;

- equity for the recognition – whilst maintaining equity between QR and its customers is critical, it is also important to achieve equity between different users. In practice, this involves establishing the vehicle for recognising credits, that is, whether through a generic change to reference tariffs (so that all mines benefit) or as an adjustment to reference tariffs for a particular user to recognise a credit for that user's mine;

- whether there should be a minimum threshold applied;

- whether the identity of the contributor is important – the issue arises where a mine is sold whether the entitlement to recognition should pass to the buyer;

- whether the tax benefit received by a contributor should be taken into account in quantifying the credit to be applied, and if so, how; and

- whether the asset that was funded by the contribution is relevant to the quantification of the credit to be applied. For example, should a contribution that funded the acquisition of rollingstock be treated differently to a contribution that funded infrastructure.

QR's Position

Appropriate method to quantify credits

QR proposed that instead of amortising the initial contribution over the contract life, it could be amortised over a defined time period. In QR's view this approach overcomes some of the difficulties encountered with the contract-based approach. The main difficulty is that the vast majority of the pre-1993 contracts in which developer contributions were made have already expired or been renegotiated. Hence, under the contract-based approach, little recognition (assuming renegotiation constituted a new contract) would be provided which may be counter to the government's wishes. The imposition of a specified time period on which to base credits provides for the possibility that some contributions have not been fully recognised to date and also that it is almost impossible to assess the extent of recognition that has been provided in the past.

QR suggested that the approach employed by the Ports Corporation of Queensland was based on the recognition that no credits at all had been provided to those contributors. QR states that such a situation does not exist in the rail sector where varying levels of recognition have been provided in the past.

Equity in the recognition of past capital contributions

QR argued that if the government wishes QR to recognise past contributions where there is no existing contractual entitlement, the equitable approach is to base the credits on the magnitude and timing of the original contribution. This, in QR's view, can not be achieved by the generic approach to setting of reference tariffs as it would fail to recognise timing and scale differences between users.

QR also noted that existing agreements provide some recognition of past contributions. To implement an approach that spreads credits evenly across users would be inequitable.

Minimum threshold to qualify for recognition

QR could see no reason to impose a lower limit on the size of contributions for recognition to be applied. For practical purposes however, QR considers that it should only provide recognition (where government dictates that credit be provided for which there is no legal entitlement) where there is sufficient details of any such contribution.

Identity of the contributor

QR considered that in instances where there has been a change in mine ownership since the payment of contributions, the most practical approach is to treat credits as applying to mining projects rather than to the companies that own the projects.

Treatment of above-rail contributions

QR is firmly of the view that the provision of credits relating to above-rail contributions in the access charge is inconsistent with the principles of accounting separation and ring-fencing with respect to that part of QR's business responsible for the provision of below-rail services.

QR considered that any credit provided through the access charge should only reflect contributions relating to rail infrastructure owned by QR. Nevertheless, the issue may not be a significant one as most of the rollingstock contributions will be past their useful lives by the time existing contracts come up for renewal.

Stakeholder Comments

Stakeholders could not agree on the most appropriate method by which to quantify credits for past capital contributions.

Table 14.2: Method to quantify credit for past capital contributions

Stanwell - access charges should be kept quite separate from any recognition of past contributions. The present value of the original contribution (depreciated and optimised on the same basis as the total asset base) should be calculated and the repayment of the resultant amount made either in a lump sum or by monthly or annual repayments over a given period, say, 10 years. This approach is akin to an asset-based approach that acknowledges that, for the most part, original capital contributions were not asset-specific. Hence, in order to determine the mix between infrastructure and rollingstock to apply to the depreciation and optimisation exercise, some standard mix of assets needs to be applied.

FreightCorp - an asset-based approach should be adopted on the basis that asset lives will, in the future, be significantly longer than contract periods and as long as credits can be passed on to future owners, the proposed structure of credits is fairer for both QR and contributors.

ARTC - a contract-based approach to quantifying the extent of the recognition is relatively simple, and may be more appropriate in the Queensland case.

Queensland Government - the existing contract-based approach to recognition should continue. Full recognition will be effected by the time existing haulage contracts expire.

Curragh - a 'one-off' payment equivalent to the current value of the original capacity of the contributed assets should be made. The value of assets involved would be that value adopted by QR for regulatory purposes.

QMC, MIM, Curragh - reference tariffs should be set quite independently of any recognition of past contributions and such recognition should take the form of either a one-off payment of the indexed value of the original contribution or equal annual payments to amortise the indexed amount over a defined period (that is 10 years).

QMC - payments would need to be delivered outside of existing contracts, but access charges (assuming unbundling is undertaken) could provide a mechanism for the payment of the refunds, as in the approach adopted by the Ports Corporation of Queensland for the refund of capital contributions at Dalrymple Bay.

There was no consensus in relation to whether equity considerations were warranted in recognising past contributions.

Table 14.3: Equity considerations

FreightCorp - a non-contributing user should pay the full cost-reflective access charge for the infrastructure, and, to ensure that QR did not earn a return or charge depreciation on those assets, the original contributor should be given credits that could be offset against other access charges incurred by it.

Stanwell - equity between users needs to be recognised by clearly identifying the extent of property rights for each contributor (or legitimate successor) and that any recognition should be treated separately from access charges. This is complicated by the different approaches used by the Government to extract capital contributions from rail users. While some mines and power stations made direct lump sum contributions, others were required to pay per tonne capital charges (in addition to 'commercial' rates) and defacto royalty payments via QR to the State. Whereas the former may assign property rights to the contributor, the latter may not.

Queensland Government - equity considerations have been taken account of in the contractual arrangements entered into between QR and the contributing mining companies.

MIM, QMC - equity between users is not an important consideration because the largest capital contributors were also the largest payers of monopoly rents. In fact, because there was seldom a capital contribution/rail freight charge trade-off, the issue of equity between one group of users that paid monopoly profits 'up front' and another that paid a similar amount over time via freight charges, rarely arises.

Stakeholders also expressed views as to the applicability of a minimum threshold to qualify for recognition, the identity of the contributor and the treatments of both tax benefits and above-rail contributions.

Table 14.4: Other quantifiable aspects of recognition

FreightCorp - a minimum threshold is appropriate for administrative simplicity. $2-$5m is an appropriate range with the measure of asset value based on the original cost of the asset indexed for asset inflation.

ARTC - a threshold contribution value of around $50,000 is acceptable.

QMC - the size of the original contribution (however valued) should not be a factor in determining whether to recognise a capital contribution. Verification of the actual payment of a contribution is all that should be required.

Stanwell - due to the small number of mines involved, a lower limit seems unnecessary.

QMC, Stanwell, ARTC, FreightCorp - whether a user is the original user or a successor in title is irrelevant in making a case for recognition of past capital contributions.

QMC, FreightCorp, Stanwell - account should not be taken of the tax benefit that the contributor derived from making the contribution.

ARTC - any recognition should be net of tax benefits incidentally derived by the contributor.

FreightCorp - the best way to handle the recognition of above-rail asset contributions is firstly to treat them in the same way as below-rail assets and secondly, to allow a further credit on infrastructure access charges. This would serve to nullify any anti-competitive effect in the above-rail market and also provide the required financial result to the contributor;

MIM - above-rail asset contributions should be credited against below-rail assets for the purposes of the recognition of contributions. Any other approach would allow QR to compete unfairly in above-rail markets by distorting prices in those markets.

> **Stanwell** - to overcome any problems associated with the recognition of above-rail contributions and the potential competitive advantage that this could entail for QR, vis-à-vis other third-party operators, the recognition of past contributions be separated from the access charge or QR haulage charge.

QCA's Analysis

Appropriate method to quantify credits

The QCA considers that the approach that should be applied in quantifying the extent of any recognition should be guided by the nature of the commitment that the mine is able to produce. It follows that an asset-based approach would only apply where such an arrangement was contemplated in the relevant documentation.

This is consistent with the view that the setting of reference tariffs needs to be isolated from the recognition of past contributions. If credits are to be recognised for particular mines, it would be simpler to adjust standard reference tariffs to reflect the level of credit that has been negotiated on a case-by-case basis. This adjustment could only be established by a separate contractual arrangement between the mine and QR or between the mine and a third-party operator (who would seek reimbursement from QR).

Equity in the recognition of past capital contributions

The Authority considers that where further recognition is considered warranted, the inclusion of such recognition in adjustments to reference tariffs is an effective way of ensuring equity between users.

While one stakeholder believed that equity issues were already accounted for in RHAs, a number of others expressed views that each contributing party should be individually assessed and compensated accordingly. Consequently, the QCA proposes that where warranted, published reference tariffs should be adjusted on a case-by-case basis to more correctly reflect respective contributions.

Minimum threshold to qualify for recognition

The QCA believes that if recognition is warranted, there should be no lower limit to the value of contributed assets to be included in the recognition.

Identity of the contributor

QR and all stakeholders agree that following a change in mine ownership, any ensuing contribution credits should be attached to the project, rather than the company that made the financial contribution. In other words, the credits should be independent of the identity of the original contributor.

To the extent that any recognition is forthcoming, the Authority concurs with this view. It believes that any future benefits accruing from past contributions should be already factored into the sale price of the venture. Consequently, the original contributor is compensated by virtue of a higher than otherwise selling price, whilst the new owner is willing to pay this premium to realise the benefits of greater potential profitability flowing from the contribution credits.

Treatment of tax benefits

The QCA believes that if recognition is considered to be appropriate, taxation effects are unlikely to be considered unless they are specifically identified in any documentation that a coal mine produces as evidence for recognition.

Treatment of above-rail contributions

The QCA believes that there are potentially significant anti-competitive implications in recognising contributions, particularly, if they are broken into above and below-rail components. For instance, if contribution for rolling stock is recognised only if QR's rolling stock is used for haulage purposes, then the recognition would become meaningless because the only restraint on QR's above-rail pricing comes from the prices proposed by new entrants. Consequently, the notion of recognising credit for rolling stock is incompatible with the creation of a competitive market for the services provided by these assets.

Accordingly, if credits are to be applied for past contributions, the QCA considers that there should be no differentiation of the original contribution into above and below-rail components so that the total amount of contributions is used in the calculation of rail infrastructure credits. In other words, if a contribution is to be recognised, it should be deemed to relate to below-rail assets. This view is held by the majority of stakeholders.

QCA's Position

In assessing QR's reference tariffs, the QCA considers that where further recognition of past contribution is warranted:

- **the approach applied in quantifying the extent of this recognition should be dependent upon the nature of the commitment that the mine is able to produce;**
- **the inclusion of recognition through adjustments to reference tariffs is the most effective means of ensuring equity between users;**
- **there should be no minimum threshold on the value of contributed assets to be included in the recognition;**
- **credits should be independent of the identity of the contributor;**
- **taxation effects should not be considered unless they are specifically identified in supporting documentary evidence; and**
- **all of the recognition should be deemed to relate to below-rail assets.**

CHAPTER 15. RATE OF RETURN

KEY ASPECTS

Rate of return - QR's allowed rate of return has been assessed on a post-tax nominal basis at 8.63%. This will vary with current conditions at the time of the Final Decision.

Risk-free rate - the risk-free rate is based on the Commonwealth Government 10-year bond rate on the date of the decision.

Market risk premium - the market risk premium of 6% has been assumed.

Capital structure - a debt premium of 120 basis points was adopted for QR's debt, which was assumed to comprise 55% of QR's capital structure.

Equity beta - an equity beta of 0.76 was assumed, based on an asset beta of 0.45.

Post-tax modelling - only QR's forecast tax liabilities were considered for the assessment of reference tariffs (that is the modelling was undertaken on a post-tax basis).

Dividend imputation - imputation credits were assumed to be valued at 50% of face value.

15.1 Introduction

The rate of return is the return expected by investors in capital markets for investments of a given level of risk. It is a forward looking concept based on estimated future expected returns and future expected risk. The rate of return is, essentially, the opportunity cost to investors to compensate them for the expected returns on foregone investment opportunities (that is, the expected return on the next best alternative asset).

In competitive capital markets, the rate of return is determined by the forces of supply and demand for capital. Accordingly the rate of return should provide a rate of return to investors that is commensurate with the returns available from other assets. It should be set at a level that is equal to the cost of attracting capital to a particular asset.

An inappropriate rate of return for QR's rail transport infrastructure may result in over or under investment in rail infrastructure and distort prices to end users of commodities delivered via the network. For example:

- if too high a rate of return is set, QR would be encouraged to invest in the network to an excessive extent and users would be required to pay too much for using the network, undermining the competitiveness of industries reliant upon QR; and

- if too low a rate of return is set, QR would not be adequately compensated for its investment. Whilst this would lower prices in the short term, QR would be unlikely to undertake further investment in the network, leading to congestion and an inability of users to deliver their product to the market in the longer term.

The method used to determine the rate of return on QR's rail transport infrastructure should encourage efficiency in the operation of the regulated business and shield those seeking access from the cost of inefficient financing decisions. It is also important that the rate of return does not induce any resource allocation distortions between the private and public sectors.

Hence, the identification of an appropriate rate of return is central to the setting of maximum prices for rail access charges that encourage efficient usage of the network and efficient levels of future investment in network assets in the medium to long term.

The calculation of an appropriate rate of return should not be performed with the rigid adherence to a particular conceptual financial model. Rather, the rate of return should reflect discretion and judgement based on realistic, commercial experience and understanding.

In May 1999, the QCA released an Issues Paper, *Queensland Rail – Draft Undertaking Asset Valuation, Depreciation and Rate of Return*, inviting comments from interest parties. Unless otherwise noted, the views ascribed to QR and other stakeholders in this Chapter are in relation to the issues raised in the submissions to that paper.

15.2 The method to estimate the allowed rate of return

Unlike the cost of debt, the cost of retaining and attracting equity funds is not observable for a government owned corporation such as QR because it is not listed on the stock exchange. Thus the cost of retaining and attracting equity funds must be estimated using data from security markets.

A number of alternative models have been developed to estimate the cost of equity funds, including:

- the Capital Asset Pricing Model (CAPM) which determines the return on equity using a single risk factor (known as beta β) related to market return. Basically, the total risk of a business activity can be separated into diversifiable and undiversifiable risk;[110]

- price/earnings (P/E) ratio, which involves capitalising the estimated future maintainable earnings of the business at a multiple appropriate to its risks and prospects so that a value for the business may be calculated;

- dividend growth model, which is based upon the premise that the value of any asset is commensurate with the present value of the expected dividend stream from holding the asset. The cost of equity is assumed to be the discount rate which equates the current market value of the asset with the present value of the dividend stream; and

- arbitrage pricing theory (APT), which involves identifying macroeconomic factors influencing the asset and the risk premium for each of these factors.

QR's Position

QR accepts and endorses the use of the Weighted Average Cost of Capital (WACC) and the CAPM framework for the purpose of establishing the risk-adjusted rate of return applicable to QR's network/infrastructure assets.

Stakeholder Comments

Stakeholders were in general agreement as to the most appropriate framework to be used in the determination of the rate of return.

Table 15.1: Determination of the rate of return

Queensland Government, QMC, FreightCorp, MIM, Stanwell – the use of the CAPM approach is most appropriate.

Queensland Government, QMC, FreightCorp, MIM – QR's rate of return should be expressed as the weighted average cost of capital.

Stanwell – QR's rate of return should be presented as the cost of equity because it better reflected the actual returns to the owner and is more practical.

QCA's Analysis

There was a general consensus among stakeholders that the approach advocated by QR, that is the WACC/CAPM approach, is the most appropriate method for estimating QR's rate of return. Each of the other methods considered exhibit shortcomings in the context of an assessment of the rate of return for QR's below-rail coal business:

[110] Diversifiable risk is that risk that is effectively removed from holding a security as part of a wide (diversified) portfolio of assets. The remaining risk is known as undiversifiable risk which relates the correlation between the riskiness of a company compared to the market as a whole and is estimated by a linear regression based on historic data. The CAPM assumes that investors are only compensated for the undiversifiable risk associated with an investment. CAPM asserts that the market risk premium required per unit of undiversifiable risk is the same across all assets.

- the absence of directly comparable listed companies in Australia renders the application of the P/E ratio and dividend growth models relatively subjective in the context of assessing the QR's rate of return, even though it is recognised that both methods are widely used by practitioners; and

- the APT model requires the identification and quantification of numerous risk factors that may affect the return on equity and is excessively subjective and selective.

CAPM's popularity is chiefly due to its objectivity and simplicity. However, the Authority also notes that there are theoretical and practical difficulties in implementing CAPM, especially in respect of government owned corporations, for which there are often no directly comparable companies listed on a stock exchange. For example, the estimation of the equity beta (β_e) is not entirely objective and in practice, some judgement is required.[111] All Australian regulators apply the CAPM for this purpose so that the adoption of the approach offers considerable regulatory precedent. In addition, the CAPM is widely used by regulators in overseas jurisdictions.[112]

Accordingly, the Authority accepts QR's proposal to use the WACC/CAPM approach to assess its rate of return. The Authority proposes to present both a cost of equity and a weighted average cost of capital, although, in doing so, it recognises that the weighted average cost of capital is the preferred presentation for the majority of stakeholders.

QCA's Position

In assessing QR's reference tariffs, the Authority will apply the Capital Asset Pricing Model to estimate QR's rate of return, which will be presented as the weighted average cost of capital.

15.3 Segment-specific or QR-wide rate of return

The rate of return could be calculated for QR's business as a whole or separately specifically for identifiable segments, for example coal traffics. QR proposes that reference tariffs will only be developed for its coal traffics, at least initially, as these are the services for which it is a monopoly provider. There are several aspects to this issue, including whether:

- it is possible to substantiate a risk difference between the businesses; and

- it is desirable to attempt to assess anything other than the rate of return for QR's below-rail coal business given the stand-alone cost approach that QR proposes be adopted for this business (that is, whether the substantiation of a difference is irrelevant in such a case).

[111] CAPM is a single period model which assumes that all investors have a common time horizon of unspecified length. It therefore has difficulty capturing the multi-period nature of most investments. As a result, it should be noted that the application of CAPM involves a certain degree of imprecision.

[112] For example, OFGEM (the Office of Gas and Electricity Markets), the UK electricity regulator, also used CAPM in its most recent regulatory decision with respect to electricity distribution. In contrast, the rail regulator in the United States of America utilises the Dividend Growth Model. However, the entities that are regulated are listed companies.

QR's Position

QR proposed that a QR-wide WACC is preferable to a segment-specific WACC. While QR recognised that asset segments have different risk profiles, they considered that it is an extremely difficult and subjective process to develop a segment-specific beta. QR's evaluation of the non-diversifiable risk profiles of the segments of its business suggested that there are no identifiable material differences between them. QR acknowledged that, in any event, the coal and minerals network/infrastructure assets make up the majority of its rail infrastructure assets.

Stakeholder Comment

Both submissions received on this issue proposed that QR's rate of return should be estimated on a segment-specific basis.

Table 15.2: Segment-specific or QR-wide rate of return

FreightCorp - a QR-wide rather than a segment-specific WACC should be used. There could be significant practical difficulties in estimating the appropriate level of risk for each category of freight.

Queensland Government - the QCA should consider determining betas and WACCs for each segment of QR (for example coal, other freight, etc) as the QCA will need to assess whether there is a significant difference in non-diversifiable risk between individual sectors and the Network Access Group as a whole.

QCA Analysis

The setting of reference tariffs, at least initially, will be restricted to below-rail services provided to above-rail operators on the coal network. Access charges in these areas will be expected to approach the upper bound of the floor/ceiling price range. However, not all access charges will be determined this way. For example, access charges for intermodal traffics will instead be heavily influenced by the cost competitiveness of rail relative to road transport.

The ceiling for the access charges is to be based on the stand-alone cost of providing the network for the transportation of coal. Accordingly, the starting point for any analysis of the rate of return to estimate the stand-alone cost should focus on the undiversifiable risks of the service that is provided – that is for the coal traffics. Adopting such an approach renders the substantiation of a risk difference between the businesses unnecessary.

Moreover, it is reasonable to expect the provision of below-rail services for the coal industry should be materially different to the remainder of its business. For example:

- QR's coal business is predominantly servicing the international coking and thermal coal markets. Typically, the market being served by the transport industry is within the domestic economy. Consequently, the earnings of transport industries are generally highly correlated with the phase of the domestic business cycle. However, QR's earnings from its below-rail coal traffics are indirectly sourced from international coal users and are therefore not highly sensitive to changes in the domestic economy;

- in contrast to many other markets QR serves, QR's below-rail coal network faces very low price risk and is not subject to competition from other transport modes; and

- QR's below-rail coal network serves an industry operating predominantly at the bottom of the world cost curve and therefore has relatively low volume risk, especially given the regulatory arrangements that will apply to this activity.[113]

Consequently, the Authority does not agree with the view put by QR that there is no material difference in the non-diversifiable risk profiles of the various Network Access segments. Moreover, assessing the rate of return for the provision of access for QR's coal business is unlikely to create an onerous regulatory burden as many of QR's other markets are unlikely to exhibit materially different characteristics to one another. In practice, a case-by-case approach will be adopted.

QCA's Position

In assessing QR's reference tariffs, the QCA will estimate the rate of return on a segment-specific basis, that is on the undiversifiable risks faced by Network Access in the provision of access for coal traffics.

15.4 Key parameters in the WACC / CAPM derivation

The central concept of CAPM is that of undiversifiable risk, known as beta. Basically, the total risk of a business activity can be separated into two distinct classes of risk, being undiversifiable and diversifiable risk. Undiversifiable risk is that which affects the market as a whole and relates to the correlation between the riskiness of an entity compared to that of the overall market. It can be calculated by a linear regression based on historic data.

The remaining risk is known as diversifiable risk. This risk can be removed by holding the security as part of a well-diversified portfolio of investments. CAPM assumes that investors will not be compensated for the risk they can cost-effectively avoid. This avoidable risk arises because the fluctuations in an investor's return from holding a security can be ameliorated by holding that security as part of a portfolio of diversified investments. In other words, CAPM assumes that investors will only be compensated through the rate of return for the risk that cannot be avoided through diversification.

However, this is not to say that diversifiable risk is irrelevant for valuation purposes. This is because the rate of return (based on undiversifiable risk) is then applied to the organisation's expected cash flows. These expected cash flows should reflect the diversifiable risks.

Accordingly, beta is a statistical assessment of the degree of undiversifiable risk associated with an asset or investment relative to the overall equities market. It assesses the systematic risk of the security, that is the risk that distinguishes it from the market as a whole. Since the beta of the market portfolio is 1, all investments can be identified as being more or less risky than the market as a whole. For example, an enterprise with a beta of 1 has an undiversifiable risk that is perfectly correlated with the expected return for the market as a whole.

The further a beta departs from 1, the more its returns are expected to vary from those of the market as a whole. A higher beta is associated with a more risky investment and a lower beta is regarded as less risky than the market as a whole. In the extreme, an investment that does not vary at all with the market has a beta of zero.

[113] This will continue in the regulated environment via a take or pay element to access charges and a volume threshold above or below which will cause reference tariffs to be reviewed.

CAPM states that assets should be priced such that the expected return from them is equal to the risk-free rate of return plus a premium for risk. The premium for risk is equal to the risk of the asset multiplied by the market risk premium, which in turn, is the difference between the return on the market as a whole and the risk-free rate.[114]

Accordingly, for a share, the cost of capital is the sum of the equity beta for that share multiplied by the market risk premium and the risk-free rate. The relevant measure of risk in the CAPM framework is beta. Undertaking a linear regression of the returns from a share provides an estimate of the equity beta for that share, which is a reflection of the undiversifiable risk related to it.

Therefore, given the risk-free rate, the equity beta of an asset and the overall market risk premium, the CAPM estimates the expected cost of equity funds for those assets. This figure can then be combined with the cost of debt for the regulated business to yield a WACC.

The cost of capital generated by the application of the CAPM will be in nominal post-tax terms. Complications therefore arise from the need to recognise tax payments and imputation credits.

The key parameters relevant to the estimation of WACC whilst using CAPM therefore include:

- the risk-free rate;
- the market risk premium;
- the proportion of debt funding and capital structure;
- the cost of debt;
- the equity beta;
- the value of imputation tax credits; and
- the corporate tax rate and inflation.

Each of these parameters are discussed in turn.

Risk-free rate

The derivation of a return on equity under CAPM requires the estimation of a risk-free rate. The risk-free rate represents the rate of return on an asset with zero default risk. In quantifying

[114] The CAPM is a forward looking model that can be expressed as:

$$R_i = R_f + b_i\left[R_m - R_f\right]$$

where

R_i is the expected return on asset i

R_f is the risk free rate

R_m is the expected return on the market portfolio

$b_i = \frac{\mathrm{cov}(R_i, R_m)}{s_m} =$ non-diversifiable risk of asset i

the risk-free rate, it is important to note that the rate of return provides compensation for a network owner's past investment and an indication of the rate at which future investment will be compensated.

There are two issues which arise in this context:

- whether it is appropriate to rely upon the prevailing interest rate at a point in time or an average over time; and
- what maturity period of bonds should be used to identify the interest rate (for example 5-year, 10-year, etc).

QR's Position

QR suggests the use of the 3-year forward 10-year Commonwealth bond rate as at 30 June 1999 of 6.51% as a proxy for the risk-free rate. The forward rate indicates the financial market's assessment of the expected spot rate at a point in the future and is estimated from the current yield curve for bonds of a similar credit rating. The following table is reproduced from page 23 of QR's submission:[115]

Table 15.3: QR risk-free rate parameters

Basis	Value at 30/6/99	20-day average
10-year spot	6.27	6.23
3-year spot	5.72	5.74
3-year forward	6.51	6.44

QR argues that the forward rate better captures the risk inherent in applying a static rate of return target for the period between reviews, particularly where there is a definite bias towards an increase in interest rates. QR believes that its rail infrastructure asset values would be adversely affected if it were unable to pass this increased opportunity cost on in its access charges due to the reference tariff being capped by the revenue limit.

QR has argued that it is more appropriate to use a forward yield on the 10-year bond rate which is consistent with the period expected between price reviews undertaken by the regulator. QR justifies the use of the forward rate by arguing that the Undertaking contemplates a period of 3 years between reviews of its reference tariffs and an evaluation period of up to 10 years. QR's consultant[116] argues that the rationale for the use of a forward as opposed to a spot rate is that it allows WACC to be estimated using a forward rate which represents the bond at the mid-point of a revenue cap period.[117] It also contends that the approach will consequently reduce the price spikes observed in spot prices.

[115] The Table has a footnote that reads "All rates are sourced from Queensland Treasury Corporation system and are in nominal terms".
[116] Green, Edwell Consulting Pty Ltd – letter to QR Network Access, 23 May 2000.
[117] As the regulatory review period will initially be three years, in order for the forward rate to bisect the review period, a forward rate of 18 months would be required rather than the 3 years suggested by QR's consultant.

Stakeholder Comments

A range of proxies for the risk-free rate were proposed by stakeholders.

Table 15.4: Proxy for the risk-free rate of return

QMC - a rate that reflects prevailing conditions in the medium term (as opposed to very long term) funds market should be used, for example the 5- or 10-year government bond rate, averaged over a period of weeks to smooth out any short term fluctuations.

FreightCorp - a 20-day average of the August 2010 capital indexed bond rate is an appropriate rate to apply.

Queensland Government - the Commonwealth Government 10-year bond rate averaged over the previous 20-day period should be used as a proxy for the risk-free rate of return.

QCA Analysis

The main issues considered by the QCA were:

- the choice of an appropriate maturity for the risk-free rate. Typically, this debate centres on whether the maturity of the risk-free rate should be set equal to, or as close as possible to, the life of the entity or to the regulatory review period. The following approaches have been identified as proxies for the appropriate maturity of the risk-free rate:
  - the 10-year Commonwealth Government spot market bond;
  - the use of spot or combined spot and forward rates corresponding to regulatory review periods; and
  - QR's proposed approach of using a forward rate which has the impact of extending the maturity of current spot market risk-free assets; and
- the measurement of the risk-free rate - whether it is appropriate to rely on the prevailing interest rate at a point in time or an average over some historic time period.

Choice of maturity for the risk-free rate

In relation to the choice of the appropriate maturity for the risk-free rate, the Authority considers that the objective should be to have as long a risk-free security as possible, providing it is sufficiently traded for it to provide a relevant risk-free benchmark. As noted in working paper 4, this is justified on both theoretical and empirical grounds due to:

- the high volatility of short rates relative to longer rates;
- the link between the longevity of the regulated assets and the planning/investment decision horizon; and
- expected yield spikes if assets are re-financed around the time of each re-set of the regulatory WACC.

The use of a long maturity for the risk-free rate is also supported by empirical findings[118] that there is no base level to which rates systematically return in both the short and long terms.[119] In addition, it is consistent with the overwhelming majority of regulatory decisions in Australia.[120]

The net effect of using a 3-year forward on the Commonwealth Government bond 10-year rate would be to artificially generate a risk-free rate that has maturity 13 years from the date of commencement. In an efficient capital market and assuming rational expectations, the yield to maturity of the 3-year spot and proposed 10-year forward rate should be equivalent to the yield on a 13-year bond.

In its submission, QR provided data for the 3-year and 10-year spot rates and a forward rate calculated. However, the submission does not identify the required 13-year spot rate which is needed to calculate the 3-year forward 10-year rate of 6.51%. Instead, QR indicates that these rates have been sourced from the Queensland Treasury Corporation (QTC). Hence, direct validation of the calculated forward rate is not possible from the available data. In the Australian market, the longest available Commonwealth Government Treasury bond at 30 June 1999 was the 5.75% coupon bond maturing at June 2011. This bond matures approximately 12 years from 30 June 1999.[121]

The QCA has concerns as to the efficacy of QR's approach. QR's proposed approach relies on one particular market participant's expectation of a longer term rate (which in turn is a derivative of the 10-year bond rate). Consequently, it is not a market-determined rate. If such an approach were justified, then it would not make sense to limit the life of the derived security to a future 10-year security as it would be more appropriate to adopt a horizon corresponding to QR's average asset life. Indeed, the use of a forward rate is inconsistent with CAPM.[122]

Moreover, the QCA does not accept the argument that the forward rate better captures the risk inherent in applying a static rate between reviews, particularly where there is a definite bias towards an increase in rates. First, QR itself is proposing a static rate be applied – it is just a different term (being a 13-year rate) to that observed in the market (which is a 10-year rate). QR does not explain why current rates would not reflect market expectations of a rise in long term rates.

Finally, it is not clear why QR's approach would reduce price spikes observed in spot prices. As the forward rate proposed is not traded, it is not possible to assess the likelihood of QR's proposed approach avoiding price spikes.

[118] Australian examples include: Ann, A.T.H. & Alles, L. (1999), 'An Examination of the Causality and Predictability between Australian Domestic and Offshore Interest Rates', Working Paper No 99-09, Department of Economics and Finance, Curtin University (examined bank accepted bills and AUD- Euro deposits); Mishkin, F.S. & Simon, J. (1995), 'An Empirical Examination of the Fisher Effect in Australia', *The Economic Record*, Vol 71, No 214, September 1995, pp217-229 (examined treasury notes); Moschos, D.M. (1995), 'The Information Content of the Yield Curve in Australia' *Journal of Macroeconomics*, Vol 17, no 1, Winter, pp. 93-109 (examined (examined Cash rates, Treasury notes and 2,5 and 10 year bonds).

[119] This is known as non-stationary behaviour. Typical visual characteristics of non-stationarity include that the series either grows in a secular way over long periods of time (for instance time series representing aggregate economic behaviour such as GDP), or the series gives the appearance of wandering around as if it has no fixed population mean (typically found in asset prices such as share prices). Alternatively, a time series may give the appearance of non-stationarity due to structural changes in the underlying economy which cause sharp and sudden shifts in mean levels.

[120] One exception is the ACCC, which has used a variety of shorter term bonds in its regulatory decisions.

[121] At 30 September 2000, this bond was still the longest maturity non-capital indexed bond on issue by the Commonwealth Treasury.

[122] Forward rates are derived from the spot yield curve rather than the coupon yield curve and are not market determined rates. The rates derived reflect the interpolation and filtering methods used to derive the spot yield curve and to calculate the forward rates. Therefore QR's approach implicitly assumes that forward rates are unbiased estimates of future spot rates.

After considering each of the above alternatives, the Authority supports the view that the bond rate used for modelling purposes should most closely approximate the lives of the assets of the business being regulated. However, in the Australian market, bonds beyond 10 years are not particularly liquid. In Australia it is conventional to use the redemption yield of 10-year Commonwealth Government bonds as a proxy for the risk-free rate, as it is a liquid instrument, provides the best reflection of the market risk-free rate and can be identified using available market data.[123]

Method of risk-free rate measurement

The Authority also considered whether to use the 'on-the-day' current market yield on the risk-free security or some average of historical spot rates. Regulators in Australia have applied a number of different approaches to measuring the risk free rate. The most common approach involves averaging the risk-free rate over the preceding month (that is, 20 trading days). Alternative approaches have involved a longer averaging period or none at all (that is, an on the day rate).

The Authority notes that it is theoretically correct to use the current risk-free rate in CAPM models. This is because in an efficient market, asset prices (including bond yields) reflect all available information, including any historical information about previous prices (yesterday, last week, last month etc.) and expectations from all relevant assessments.[124] On this basis, an averaging process would actually introduce an unwarranted bias into the assessment of the risk-free rate.

However, the issue arises as to whether there are circumstances in which the 'on-the-day' 10-year Commonwealth Government bond rate should not be used to estimate the rate of return. The Authority assessed this matter by analysing daily bond price data between January 1996 and June 2000.

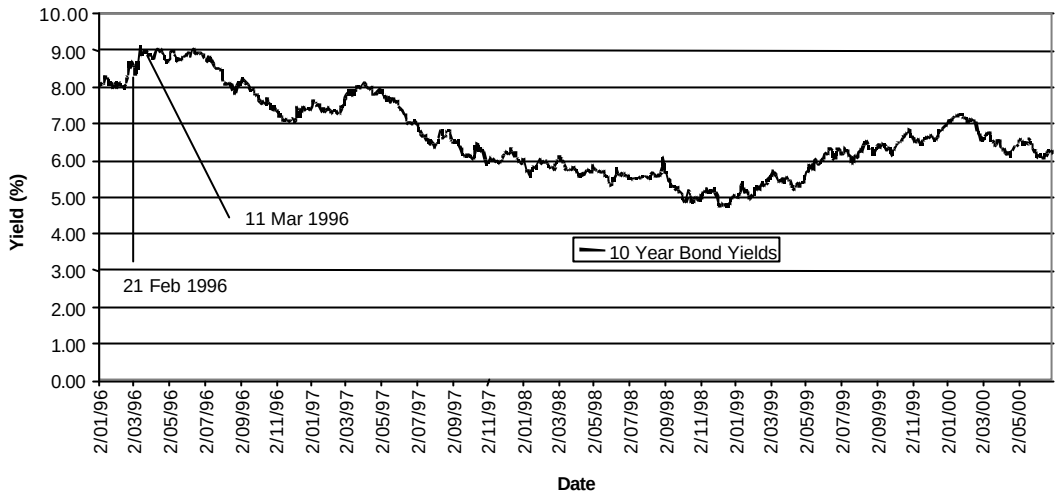
The Authority's analysis has shown that moving average data is incorporated within the range of the spot market data and that the use of moving average measures result in a lag following turning points in the spot market series which is further exacerbated the longer the moving average period. This is due to the equal weights used in the averaging process with the 40-day rate slower to react than the other averages. Consequently, the Authority has concluded that the use of moving averages adds no further information to the identification process.

Figure 15.1 shows daily 10-year Commonwealth bond yields during the period from January 1996 to June 2000. During this period, 90 percent of all absolute rate changes are less than 12 basis points, 95 percent less than 15 basis points and 99 percent less than 22 basis points. The 10-year interest rate moved by greater than 22 basis points on ten occasions during the sample period – changes in RBA official rates accounted for eight of these changes whereas two changes were due to market movements attributable to expected but unrealised interest rate changes.[125]

Changes in the level of interest rates due to unrealised expected news on interest rates should be regarded as extreme moves in interest rates and would therefore mis-represent the level of interests rates if applied in WACC calculations.

[123] This view was supported in private correspondence (25 July 2000) from Professor Bob Officer to the QCA.
[124] Including fundamentalist, technical analyst and quantitative assessments.
[125] On 21 February 1996,the 10-year rate rose 42 basis points and fell 18 basis points on the following day when official interest rates did not rise as expected. On 11 March 1996, the 10-year rate rose 48 basis points and fell 26 basis points on the following day when rate changes were again unrealised.

Figure 15.1: Commonwealth Government daily 10-year January 1996 to June 2000



Based on this analysis, the QCA has decided to use the 10-year Commonwealth Government bond rate measured at the time of its Final Decision unless the rate is considered not to encompass all relevant information, such as where there is a perturbation in the market on the day in question.

A perturbation may be due to an extraordinary event occurring or by market expectations of an official rate change not being realised. The Authority considers that to depart from the rate of the day, any market perturbation that occurs on the day should be material in the context of historical movements. Accordingly, it is proposed that for a departure to occur, there be a movement on the day, followed by a movement of similar magnitude on the following day in the opposite direction, that together sum to in excess of 30 basis points.

If such a test is satisfied (which would have been the case on 2 trading days in the last 4 and a half years)[126] then the Authority proposes to apply an average over the preceding 5 trading days. Given that regulatory decisions will generally not coincide with the release of new economic information to the market, such an adjustment is highly unlikely.

On 20 November 2000, the 10-year Commonwealth Government bond rate was 5.92% and the 5-day average was 5.96%. The 10-year Commonwealth Government bond rate rose from 5.87% to 5.92% (5 basis points) on 20 November 2000 and fell by 3 basis points to 5.89% on the next trading day, representing a net absolute movement of 8 basis points over the two trading days. This rate change does not constitute an extraordinary event nor unrealised expectations and therefore supports the use of the 'on-the-day' spot market figure. On this basis, the QCA would set the nominal risk-free rate of return at 5.92%.

The risk-free rate will be updated prior to the release of the Final Decision. It is proposed that stakeholders will be advised in advance of the date upon which it is to be set.

[126] During the four year period 1996 to 1999, 95% of daily absolute rate changes are less than 15 basis points. Thus a net change of greater than 30 basis points over two days would represent 2 consecutive days with rate changes greater than the 95th percentile of 15 basis points. Such rate changes would be regarded as outliers.

QCA's Position

In assessing QR's reference tariffs, the QCA will estimate the risk-free rate based upon the prevailing 10-year Commonwealth bond rate, unless there is evidence of market perturbation, in which case, the Authority proposes to apply an average over the preceding 5 trading days.

Market risk premium

The required return for equity is determined by application of the CAPM. For an individual security, the market risk premium represents the reward that investors require to accept the uncertain outcomes associated with owning equity securities. As investors become more risk averse, they should demand a larger premium for shifting from the risk-free asset and as the riskiness of the average risky investment increases, so should the premium. The equity market risk premium is measured as the extra return that equity investors expect to achieve over the risk-free rate. Therefore, from the perspective of the overall market, the market risk premium is based on the difference between the return on the market portfolios as a whole and the risk-free rate, both of which vary over time.

QR's Position

QR's research suggests that there is general consensus that the market risk premium is in the range of 6.0% to 8.0%. Accordingly, QR has adopted a market risk premium of 7.0%, which is the mid-point of this range. QR does not consider that there is compelling evidence to suggest that the changes to the taxation of dividends have substantially altered the risk premium, given the offsetting effect of the capital gains tax.

Stakeholder Comments

While there was no consensus, stakeholders generally considered that the market risk premium should be in the range 5.5% to 7%.

Table 15.5: Market risk premium

QMC - in line with recent regulatory decisions, the market risk premium should be no greater than 6%, which is generous in light of the introduction of dividend imputation.

Queensland Government - a market risk premium of between 6% and 7% has traditionally been accepted as reasonable, but the range may have altered in recent years. The QCA should review all relevant recent empirical studies in determining the market risk premium to be applied.

FreightCorp - a 5.5% market risk premium is appropriate based on the general consensus among Australian commentators that the long run market risk premium was in the range of 5% to 7%. Also, the ORG/ACCC Victorian gas access decision employed a 6.0% market risk premium, while IPART employed a market risk premium of between 5.0% and 6.0% in its decision on RAC's rate of return.

QCA's Analysis

The equity risk premium represents the reward (or extra return above the risk-free rate) that investors expect to receive to accept the uncertain outcomes associated with owning an equity security.[127] The market risk premium is based on the difference between the return on the market portfolios as a whole and the risk-free rate, both of which vary over time.

The Authority notes QR's proposal of the 7% market risk premium. Stakeholders on the other hand proposed a range of 5.5% to 7% with a preferred value of around 6%. The issue therefore is whether the Authority should depart from QR's proposal for the purposes of assessing its rate of return.

Working paper 4 discusses this issue in detail and concludes that the majority of recent Australian studies put the market risk premium in the range of 5% to 7%. Recent regulatory decisions have assessed the market risk premium in a range of 5% to 6%.

Research undertaken by the Authority found that there does appear to have been a sustained decline in the Australian equity market risk premium following the introduction of dividend imputation in July 1987.[128] However, this cannot be solely attributed to dividend imputation as other periods since 1882 have exhibited below-average market risk premia. The period since 1987 has been characterised by several developments, including:

- the decline in the risk-free rate to the lowest levels since the late 1960s and the sustained decline in the level of inflation during the 1990s, leading to decreased equity risk premiums;
- an increased use of financial leverage to engage in equity market transactions;
- changes in patterns of share ownership with increasing numbers of private shareholders following the recent floats by Telstra and AMP;
- increased influence of institutional investors on long-term investment horizons thereby decreasing equity risk premiums;
- improved communications and technology and corporate disclosure requirements which have decreased information risks as information is now disseminated very quickly; and
- significant reductions in the level of corporate tax.

The Authority considers that the market risk premium is between 5% and 7% and that an estimate from this range should be used for the determination of QR's rate of return on infrastructure assets. Following consideration of the submissions, recent regulatory trends and its own research, the Authority has adopted a market risk premium of 6%, which falls in the middle of the 5% to 7% band.[129]

[127] As investors become more risk averse, they should demand a larger premium for shifting from the risk-free asset and as the riskiness of the average risky investment increases, so should the premium.

[128] The Authority intends to account for the impact of dividend imputation by the inclusion of the utilisation factor, gamma (?), in the calculation of the cash flows rather than through an adjustment to the market risk premium. This is discussed below.

[129] Davis estimates that the market risk premium may have fallen following the introduction of dividend imputation in recognition of the additional value of franking credits. (Davis, K. (1998) The Weighted Average Cost of Capital for the Gas Industry, report prepared for Australian Competition and Consumer Commission and the Office of Regulator-General, pp 13-14). In contrast, Officer also supported the view that the market risk premium may be trending downward due to the prevailing stable inflationary environment, but concluded that there is insufficient evidence to justify the equity risk premium has moved beyond the historical 6% to 8 % range (see ACCC, Victorian Gas Transmission Access Arrangements

QCA Position

In assessing QR's reference tariffs, the QCA will estimate the market risk premium as being 6%.

Capital structure

An entity's WACC recognises that its capital is provided by two sources, namely lenders and equity investors (owners or shareholders), and is equivalent to the weighted average cost of servicing the various classes of financial claims on the firm. Each source of capital or financial claim will involve different risks and hence different costs.

An entity's WACC is calculated by adding the cost of its debt, weighted by the proportion of debt to total assets, to the cost of equity funds, weighted by the proportion of equity funds to total assets. The methodology requires estimates of the current market values of the firm's debt and equity and market rates for both sources of funds.

Capital structure refers to the relative weights of debt and equity that together finance the company's asset base. It is important in the assessment of both the cost of debt and the cost of equity. Typically, as the proportion of debt funding increases, the regulated business' risk profile changes. This increases both the cost of equity and the (lower) cost of debt.

However, it is generally accepted in finance theory that WACCs are approximately constant across a reasonable range of capital structures. This is because as the level of debt increases, the higher proportion of debt, which is at a lower rate than the cost of equity, offsets the effect of the higher cost of debt and equity.

The application of the WACC/CAPM model to the estimation of QR's cost of capital requires an assessment of QR's proposed gearing level in order to:

- calculate the relative weights to apply to the cost of equity and debt in the calculation of QR's WACC; and
- estimate the cost of equity funds.

Therefore, there are two sets of issues to be considered in the context of capital structure:

- whether to apply the organisation's current capital structure to assess its WACC; and
- if it is proposed to apply some other capital structure, to assess what that structure ought to be for the purpose of the estimation of the rate of return – this involves estimating the regulated entity's 'optimal' capital structure that will minimise its WACC.

QR's Position

QR believes that the optimal gearing for its Network Access assets lies in the range of 50% to 60% and regards the mid point (55%) as an appropriate gearing assumption for estimating the WACC for access pricing purposes.

Final Decision, October 1998). Subsequently, in private correspondence (July 2000), Professor Officer indicated to the QCA that he now supports a range of 5-7% for the market risk premium.

Stakeholder Comments

Stakeholders considered that QR's WACC should be based on an optimal capital structure.

Table 15.6: Capital structure

QMC, FreightCorp, Queensland Government - an optimal capital structure should be assumed.

FreightCorp - QR's capital structure is aligned with a conservative assessment of QR's optimal capital structure and therefore QR's current capital structure is assumed to be optimised.

Queensland Government - the optimal capital structure should relate to the Network Access Group as a stand-alone business.

QCA's Analysis

In theory, two alternative approaches could be applied to the determination of the appropriate gearing level for the pricing of QR's infrastructure services:

- application of the actual gearing level that exists at a particular date; or
- application of an industry-based optimal capital structure.

IPART[130] has noted that capital markets appear to regard a gearing level as high as 60% debt to total assets as acceptable, and are prepared to provide debt to a 60% geared business at a price commensurate with an investment grade rating (AAA to BBB). Further, in recent electricity and gas determinations, Australian regulators have most commonly assumed that the capital structure was composed of 60% debt financing (with a range of 50%-70% gearing).

According to QR's submission, the market value of its debt as at 30 June 1998 (after adjustments for certain provision accounts) yielded a gearing of 49%.[131] QR's 1998-1999 Annual Report indicates that the percentage of total liabilities to total assets in 1999 was 66.18% and 64.32% in 1998.[132] It also indicates that interest bearing debt[133] to total assets was 42.91% in 1999 and 44.32% in 1998. In excess of 99% of QR's borrowing is long term. Each percentage is based on book as opposed to market values for debt and assets.

All stakeholders considered that QR's WACC should be based on an optimal capital structure. It was argued that QR's existing gearing level is unlikely to be optimal, particularly when it is applied to its Network Access assets for pricing purposes. One stakeholder recommended the use of an optimal gearing level calculated on the basis that Network Access is a stand-alone business.

[130] Independent Pricing and Regulatory Tribunal of NSW: Aspects of the NSW Rail Access Regime (Final Report), April 1999.

[131] However, this figure appears to be based on asset book values rather than the economic values of those assets as reflected in the asset valuation exercise undertaken by the QCA.

[132] This applies to all of QR's total business which incorporates QR's below-rail coal network. Also, as the figures are taken from QR's balance sheet, it should be noted that total assets are measured in the balance sheet using historical rather than current cost method.

[133] This measure incorporates all borrowings, bank overdraft, and leases excluding operating leases. The ratio of total liabilities excluding provisions and operating leases to total assets was 47.07 in 1999 and 44.89 in 1998.

Given that access charges are being calculated for a component of QR's below-rail business on a stand-alone basis, it is inevitable that the cost of capital is estimated by reference to a hypothetical capital structure. Moreover, using actual capital structures raises the question of how changes in the capital structure are to be factored into the WACC model, and at what point in time a capital structure is to be determined for input to the model. Accordingly, the QCA accepts that, within the limitations of the model, the assumed gearing should be consistent with an efficient financing structure, that is, one that minimises the cost of capital.

QR also acknowledged that Network Access' optimal capital structure may not equate with that of QR as a whole but QR's existing capital structure is a useful first point of reference. QR recommended a gearing range of 50-60% and adopted a mid-point of 55% for calculating the WACC for access pricing purposes.

The calculation of an optimal capital structure based on an industry standard is difficult, especially given the limited number of comparable privately owned entities in Australia. The QCA notes that within a broad scope of 'commercial' capital structures, the cost of capital is not highly sensitive to small changes in capital structure.[134] The QCA therefore regards a gearing level of between 50 to 60% as appropriate and accepts QR's proposal for its gearing level to be set at 55% for the purpose of assessing reference tariffs.

QCA Position

In assessing QR's reference tariffs, the QCA has adopted a gearing level of 55%.

Cost of debt

The cost of debt is the return that the entity's debt holders demand on new borrowings. Unlike the cost of equity, the cost of debt can normally be observed either directly or indirectly, as interest rates can be observed in financial markets. The cost of debt will vary depending on the default risk of the borrower. This, in turn, will be affected by the gearing of the company (high gearing means a high level of debt relative to cash flows and consequently a higher risk of default), short term volatility of cash flows and long term security of revenue.

In estimating the cost of debt for regulatory purposes, the cost of debt needs to reflect the current market rate for debt for an entity that is efficiently financed. However it is important to note that under current government ownership, debt levels and regulatory structure, QR would obtain a higher debt rating than it would as a stand-alone entity due to an implicit Government guarantee. In other words, the cost of debt would be higher without this implicit guarantee.

[134] For example, the estimated WACC as leverage increases from 0.50 to 0.60 (assuming an asset beta of 0.50 and a debt beta of 0.20) ranges from 9.25% to 9.28% (assuming the debt beta does not rise in response to higher gearing). However in reality, as the proportion of debt increases the cost of debt would also increase to reflect the higher leverage. This would result in a higher debt beta. The increased leverage would also result in a higher equity beta. However, as these adjustments occur, the WACC would remain unchanged.

QR's Position

QR states that the cost of debt for the purposes of estimating its rate of return should be based on an appropriate margin added to the risk-free rate used in the CAPM. QR, as a corporate entity, has previously been assessed by Standard and Poors (S&P) with a BBB rating on a stand-alone basis (without any government guarantees) and assumes that the same rating would be applied to the Network Access assets. QR's analysis of current margins suggest that a BBB rating implies a 120 basis points (1.2%) margin over the 3-year forward 10-year Commonwealth Government bond rate.

Stakeholder Comments

Several risk-premiums, to be used in the calculation of QR's cost of debt, were identified.

Table 15.7: Cost of debt

Queensland Government - QR's cost of debt, which includes a competitive neutrality fee measured in basis points, is the relevant cost of debt figure to use in the estimation of QR's WACC. Alternatively, the market rate paid by an entity with a similar credit rating to that which has been notionally applied to QR as a stand-alone entity could be applied.

QMC - QR's cost of debt should be in the order of one percent above the risk-free rate.

FreightCorp - the nominal post-tax cost of debt should be derived by adding a 60 to 90 basis points risk premium to the 20-day average 10-year bond rate.

Easton Business Consultants - a premium over and above the risk-free rate should be calculated and applied to the estimation of QR's cost of debt funds.

QCA's Analysis

The QCA surveyed Australian regulators to ascertain the cost of debt margin adopted in recent regulatory decision in other jurisdictions. In the majority of cases, the cost of debt applied to the regulated entity's WACC calculations was between 0.9 and 1.1% above the risk-free rate. However, care must be taken when interpreting these statistics as they apply to different entities with different capital structures and different risk profiles.

Broadly, there are two different approaches that may be taken to the estimation of the cost of debt, namely:

- a weighted average of the existing debt of the entity; or
- the marginal rate at which a company can raise debt financing which is represented by a margin over and above the risk-free rate.

The Authority notes that the use of actual cost of debt figures (either an average of actual costs, or the marginal cost of debt) has the benefit of reflecting those costs currently faced by the entities concerned. However, such an approach has the potential to entrench higher debt costs and does not create incentives to seek the most efficient form of financing, because it accepts the prevailing rate of debt even if it is not the most cost effective available. Accordingly, adopting a margin above the risk-free rate creates the incentive for the cost of debt to be minimised. Moreover, it is not feasible to apply such an approach where a hypothetical capital structure has been assumed, as QR has suggested.

The required return on debt is usually defined as the marginal rate at which an entity can raise debt financing. This rate will vary depending on the default risk of the borrower, which, in turn, will be affected by the gearing of the entity, the term to maturity of the debt and the volatility of its cash flows. High gearing means a high level of debt relative to the cash flows available to service it with a commensurate higher risk of default. The lender charges a premium on loans corresponding to the degree of default risk associated with the loan. In practice, this marginal rate can be estimated by referring to interest rate premia associated with an assessed credit rating for the regulated business.

QR stated that the cost of debt for the purposes of estimating its rate of return should be based on an appropriate margin added to the risk-free rate used in the CAPM. QR has previously been assessed in August 1997, on a corporate-wide basis, by S&P[135] with a BBB rating[136] on a stand-alone basis (without any government guarantees) and assumes that the same rating would be applied to the Network Access assets.[137] QR's analysis of current margins suggests that a BBB rating implies a margin of 120 basis points over the 3-year forward rate on the 10-year Commonwealth Government bond.[138] QR reaffirmed this position in November, 2000.

The Authority has considered the submission by QR's Network Access, the 1997 S&P report supplied by QR regarding its credit rating, examined the weighted average cost of debt for QR across all terms to maturity and has concluded that:

- the Authority has reservations about the recency of the S&P rating of BBB as it is over three years old. There is the possibility that a more recent analysis may produce a materially different credit rating in light of changes in the rail industry and Australian competition policy;

- the Authority has reservations about the application of the S&P rating of BBB for QR as a whole to QR's below-rail coal network which is likely to exhibit the lowest business and financial risks of any of QR's businesses; and

- QR's proposed parameters for the assessment of its cost of capital, depart materially from the book values of net assets and debt that would have underpinned the original S&P analysis.

QR proposed access charges for the use of its network for coal transportation be developed on the basis of the stand-alone cost of providing those services. The Authority therefore engaged Access Economics to undertake an independent assessment of how a credit ratings agency would most likely assess QR's below-rail coal network relative to the remainder of its below-rail business.

[135] No coal-specific rating was undertaken by S&P.

[136] However, QR has increased its level of debt since the time of the report. Other things being equal, the effect of this debt increase would tend to suggest a deterioration in QR's credit rating.

[137] Typically government guarantees and debt pooling arrangements often associated with government borrowings afford government owned enterprises debt financing on better terms than their private sector counterparts.

[138] From the 1998-1999 Queensland Rail Annual report it is noted that the weighted average cost of debt for QR (including the government guarantee fee) on debt exceeding 5 years was 7.20%. At 30 June 1999 the 10-year Commonwealth Government 10-year bond rate was 6.27%, indicating almost a 95 basis point premium for QR debt. At this same time, the 5-year Commonwealth government bond rate was 5.90%, indicating a difference of 130 basis points.

Credit ratings are normally performed in a two stage process. The first stage is qualitative and assesses the level of business risk exhibited by an organisation (for example from excellent in the lowest risk quintile to vulnerable in the highest risk quintile). The second stage is the assessment of financial risk which is quantitative in nature involving a forecast of key parameters (such as interest cover) over a horizon (normally 5 years). The results of the quantitative assessment are then compared to benchmark ratios, that are driven by the business risk assessment, to arrive at a credit rating.

This assessment found that QR's below-rail coal business risk was above average to excellent as compared with QR's Network Access as a whole, which was assessed as average. The business risk profile for QR's below-rail coal business reflected its low risk as a natural monopoly business and the stability of its revenues, given stable growth and the very low volume and price volatility to which it is exposed. These low risk characteristics were assessed to more than offset the relatively high risk associated with the comparatively high fixed cost nature of its operations.

The assessment undertaken departs materially from that which underpinned the S&P analysis since:

- the DORC valuation of QR's coal network was used to provide a proxy of QR's net assets instead of book values, which were depreciated historical costs; and

- QR's submission proposed a level of debt of 55% of net assets which is higher than its current capital structure (based on an apportionment of debt on the book values of assets) would imply.

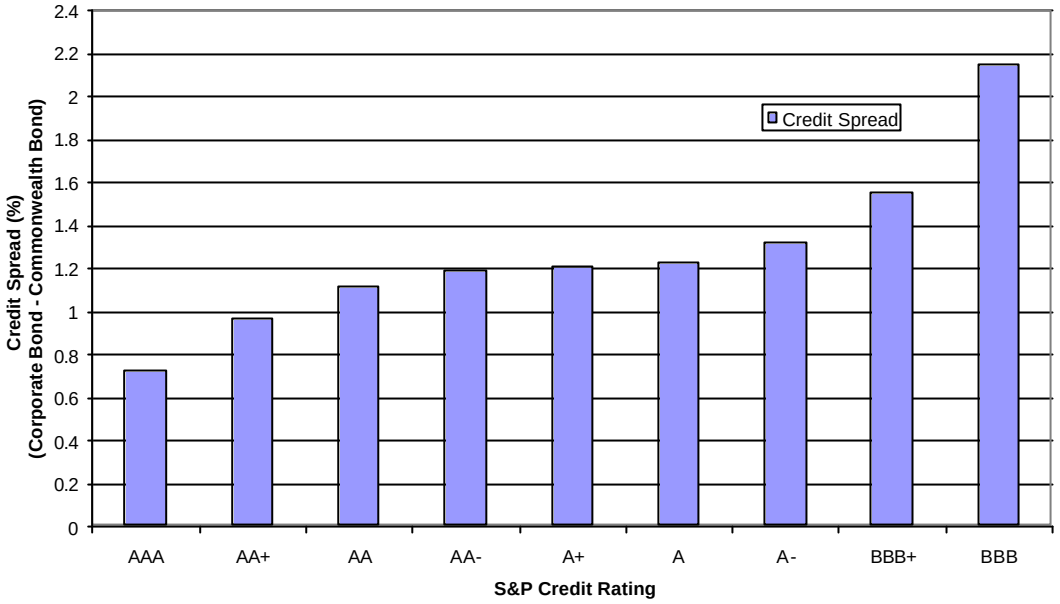
Access Economics' advice was that QR's below-rail coal business would most likely be assessed by an independent credit rating agency at a AA credit rating based on a book value apportionment of debt. However, on the basis of the parameters assumed for the review of QR's reference tariffs, the business was more likely to be assessed at an A rating.

Therefore, the Authority concludes that, despite QR's below-rail coal business having a materially different risk profile to QR as a whole, an A rating is appropriate for these operations, based on assumptions underpinning the assessment of QR's reference tariffs.

QR requested a debt margin of 120 basis points above the risk-free rate for its return on debt. The Authority accepts that a 120 basis point margin falls within the range of the premia expected in debt markets for an A-rated entity.

This is evidenced by data from CBA Spectrum which indicates, as depicted in Figure 15.2 below, implied 10-year credit spreads for a range of credit ratings.

Figure 15.2: Implied 10-year credit spreads
1 December 2000



Source: CBA Spectrum

QCA Position

In assessing QR's reference tariffs, the QCA accepts that the cost of debt should equal the risk-free rate plus a premium of 120 basis points.

Asset and equity betas

There are two factors which have been identified as key determinants of an entity's equity beta:

- asset risk arising from the entity's sensitivity to cash flow movements – relative to overall economic activity, where more cyclical cash flows are associated with higher betas; and

- financial risk arising from financial leverage – the ratio of debt to equity, where a higher level of debt implies a higher beta.

An asset beta (β_a) represents the risk arising from the sensitivity of the operating cash flows generated by the assets of an entity compared with the market in general (that is, the market risk associated with an entity's assets). Asset betas vary with the volatility of free cash flows and are driven by sensitivity to the economy and operating leverage.

The difference between an asset beta and an equity beta therefore reflects the additional financial risk to a shareholder arising from the extent to which debt is used to finance the entity's assets. Because debt holders have senior claims to the entity's cash flows and assets, equity holders face an additional risk. This financial risk increases as the level of debt in the organisation's capital structure rises. CAPM assumes that a linear relationship exists between an entity's gearing and the financial risk associated with that gearing.

Accordingly, it is asset rather than equity betas that should be compared for the purposes of benchmarking risk. This is because equity betas are affected by the gearing of the entity under review whereas asset betas are not. An entity's asset and equity beta will be identical if it is 100% equity financed.

However, asset betas are not directly observable whereas equity betas can be estimated by undertaking a regression analysis of a security's returns relative to the market as a whole. Asset betas can only be derived from equity betas by separating that beta into the financial risk from an organisation's capital structure and the underlying risk of its assets. This later component then forms the asset beta that may be used for benchmarking purposes.

Accordingly, estimating an equity beta for an organisation that is not listed involves the following steps:

- estimate equity betas for comparable organisations;
- de-lever these equity betas to derive asset betas;
- assess the subject organisation's asset beta based on a comparison with the other derived asset betas; and
- once an asset beta has been estimated for the subject organisation, re-lever that asset beta to derive an equity beta for the subject organisation.

In practice, this process requires judgment be exercised based on commercial experience and understanding rather than rigid adherence to a particular financial concept.

QR's Position

In June 1999, QR's consultants reported that Network Access' asset beta is in the range of 0.5 to 0.6. QR considers that it would be most appropriate to use 0.6 in the calculation of the price ceiling due to the degree of error inherent in deriving these values. QR estimated that its Network Access equity beta is between 0.91 and 1.34 and considers 1.20 as the most likely value.

In August 2000, QR subsequently submitted a lower asset beta for Network Access in the range of 0.45 to 0.55 with QR's below rail coal business having a range of between 0.45 and 0.5. QR considered it appropriate to establish QR's below-rail coal business's equity beta at 1.02. [139]

Stakeholder Comments

There was no consensus as to the value of an appropriate equity beta for QR.

Table 15.8: Asset and equity betas

QMC - IPART's estimate of RAC's equity beta range of 0.8 to 1.0 is high.

MIM - only systematic risks should be recognised and specific risks, such as the risk of stranded assets, should not be rewarded.

[139] QR's August 2000 submission originally argued that equity betas in the range between 0.76 to 0.87 were appropriate for its asset beta range of 0.45 to 0.50. The Authority's analysis suggests that to generate an equity beta of 0.87, QR would need to adopt a market risk premium of 6% rather than 7% as originally submitted. QR subsequently proposed an equity beta range of between 0.80 and 1.02. However, the Authority estimates that the relevant equity beta range appropriate for QR's underlying assumptions is in fact between 0.8 and 0.9. QR has not responded to the Authority's request for confirmation of this matter.

FreightCorp - QR faces substantially the same level of risk as that of the New South Wales network. Accordingly, QR's equity beta should be 0.78, which is also similar to the Australian Graduate School of Management transportation sector equity beta of 0.76.

QCA Analysis

For entities with no traded equity, such as QR's below-rail coal network, it is necessary to use judgement in determining the appropriate asset and equity betas to be used in the estimation of the required return on equity funds.

The first concern arises in measurement error and the tendency of some equity betas to move toward 1 over time (due to growth or diversification).[140] These factors have caused some data providers to adjust the raw equity betas generated by regression analysis. The adjustment approach applied by Bloomberg is as follows:[141]

$$Adjusted\ beta = 0.33 + raw\ beta \times 0.67$$

The procedure has a number of inconsistencies in its implementation which suggests that the use of adjusted equity betas is not without significant problems. These include:

- adjusted betas can potentially overstate (understate) the asset beta of low (high) raw equity beta firms (depending if the assumptions underlying the beta adjustment are justified in the particular case). For example, assume that an entity has a raw equity beta of 0.39, a debt to equity ratio of 0.50, a debt beta of 0.12 and a corresponding asset beta of 0.30. The entity's adjusted equity beta is equal to 0.59. This equity beta corresponds with an asset beta of 0.43.[142] The adjustment for this relatively low equity beta firm is disproportionate when compared to a firm with an equity beta close to 1;[143]

- the implementation of the adjustment procedure does not consider the level of leverage held that is used by the firm – low leverage firms may substitute debt for equity over time thereby increasing the equity beta without increasing its business risk. For example, if the entity described above was 100% equity financed, with a raw equity beta of 0.39, this would correspond to a raw asset beta of 0.39. However, using the beta adjustment would increase the equity beta to 0.59 which corresponds to an adjusted asset beta of 0.59; and

- the adjustment does not consider that long established pure play businesses such as QR's below-rail coal network would be unlikely to increase their business risk over time to a higher equity beta. Indeed, adjusting the equity beta on the basis of future diversification and growth is somewhat inconsistent with the stand-alone basis of the proposed assessment of QR's below-rail coal business.

[140] Over time, high betas tend to move down and low betas tend to move up. This issue is discussed further in Appendix D of working paper 4.
[141] Once the adjusted beta is calculated an implied adjusted asset beta can be de-levered.
[142] The figures in this example correspond with calculations undertaken for the coal mining company Centennial Coal Company Ltd. The difference between these asset betas yields a margin of approximately 0.8% for the company's weighted average cost of capital in absolute terms or about 10% in relative terms.
[143] For example, consider an entity with the higher raw equity beta at 1.05, a debt to equity ratio at 0.40, a debt beta of 0.06 and an asset beta of 0.77. This firm has an adjusted equity beta of 1.03 and a corresponding asset beta of 0.75. The figures in this example correspond with calculations undertaken for the transport company Toll Holding Ltd.

The difficulties outlined above merely serve to highlight that the calculation of WACC, using CAPM to estimate the return on equity, involves some degree of imprecision and requires judgement to be exercised. In exercising this judgement, the Authority considers that regard must be had to the fact that considerably more social harm could be caused by selecting too low a rate of return (leading to no investment in the network) than one that is at the upper bound of a reasonable range. Consequently, the Authority proposes to consider adjusted (as well as raw) betas in the assessment of QR's rate of return for its below-rail coal business.

The calculation of an equity beta for QR's below-rail coal network requires:

- the selection of an appropriate asset beta based on an analysis of comparable asset betas;
- analysis of factors affecting the stability of its cash flows; and
- an assessment of the most appropriate asset beta for QR's below-rail coal business which can then be re-levered to account for QR's below-rail coal network debt to equity ratio.

Analysis of comparable companies

Comparable asset betas were estimated from adjusted equity betas and reported for domestic and international firms involved in rail, alternative forms of transport including domestic road transport, coal mining and entities in the infrastructure and utilities business. Table 15.9 contains asset beta ranges from the domestic market, listed firms and regulatory bodies.[144]

Table 15.9: Industry asset beta ranges

Industry	Asset beta range (based on adjusted equity betas)	Median asset beta
Rail (regulatory decisions)	0.29-0.55[145]	
Alternative transport (listed companies)	0.24-0.72	0.59
Coal mining (listed companies)	0.39-0.84	0.51
Infrastructure and utilities (listed companies)	0.12-0.81[146]	0.48
Infrastructure and utilities (regulatory decisions)	0.35-0.55	

Although not directly comparable to Australian asset betas, it is noted that international asset betas are available for rail and for infrastructure and utilities. These are summarised in Table 15.10.[147]

[144] This table summarises the more detailed analysis contained in working paper 4.
[145] There are a number of methods of 'delevering' an equity beta to obtain an asset beta. The IPART equity betas, asset betas and gearing assumptions are not mutually consistent with the Brearley-Myers delevering method used in the QCA analysis, implying the use of a different delevering procedure. Hence, IPART's asset betas are not directly comparable with those derived here.
[146] Caution was exercised in interpreting this range as for Envestra (asset beta of 0.12) the equity beta was estimated using only 36 observations with a gearing of 0.7978. This makes the firm an outlier relative to other electricity and gas distributors which have a range of 0.1700 to 0.5148. If excluded the asset beta range becomes 0.45 to 0.58.
[147] This table summarises the more detailed analysis contained in working paper 4.

Table 15.10: International industry asset beta ranges

Industry	Asset beta range (based on adjusted equity betas)
Rail (US – Listed)	0.44-0.59
Rail (UK – Listed)	0.53
Infrastructure and utilities (US)	0.23-0.34

The estimated asset betas across the broad range of comparable Australian industries suggest that the asset beta should be less than that experienced by the Australian domestic road transportation industries. This is because organisations in that sector are heavily exposed to domestic economic factors. Consequently, those companies provide limited guidance for the assessment of an asset beta for QR's below-rail coal business.

However, greater insight may be gained from analysing the market served by QR's network. Whilst it could also be argued that QR's coal network faces the same risks as the coal companies in their exposure to world coal markets,[148] the Authority considers that these companies place a reasonable upper limit on the asset beta of QR's coal network due to:

- the considerably lower price risk for coal rail transport. QR's coal business is not directly exposed to fluctuations in world coal prices. Moreover, its indirect exposure is very small. For example access charges for each tonne of coal will constitute, on average, less than 5% to the average coal price; and

- volume risk has been mitigated by the regulatory environment and the fact that QR services low cost coal producers.[149]

QCA research revealed that each of the coal companies considered could be differentiated with respect to their contractual arrangements,[150] mine and operational performance and cost competitiveness. Taking account of each of these factors, it was considered that Centennial Coal Company Ltd was the most representative of the coal companies.[151]

Analysis of the annual reports of each of the listed coal companies revealed that Centennial had the least exposure to the world price of coal. This is because approximately 48% of Centennial's sales are made under long term contracts to domestic electricity generators, down from 57% in 1998.[152] Under these contracts, volumes are certain and a fixed base price is subject to indexation. Consequently, the sales revenue generated is highly uniform and predictable. This most closely resembles the relative earnings stability that QR's below-rail coal business is likely to experience.[153]

[148] Industry Commission (1991), Choosing the Appropriate Rate of Return for Coal Rail Investment (Appendix J of Rail Transport Report), p. 122.
[149] Chapter 16 sets out the circumstances in which QR's reference tariffs may be reviewed due to a unexpected decline in throughput. Both QR's below-rail coal business and coal mining are capital intensive activities.
[150] In particular the proportion of sales into long term domestic contracts versus exposure to price and volume risk in international contracts.
[151] Other Australian coal companies considered, but dismissed for comparative purposes, include Austral (small company), Coal and Allied (thinly traded with majority shareholder controlling nearly 99% of shares) and Cumnock and CIM, both of which exhibited highly unstable betas.
[152] The transition during 1999 followed the acquisition of Clarence Colliery where production was committed to premium export markets.
[153] Centennial also has a history of consistent performance in its mining operations.

In contrast, QCT Resources Ltd's output is exposed to both price and volume risk from its contractual arrangements with respect to international coal sales. Long-term export contracts are generally subject to annual price and volume negotiations. Price and revenue volatility under these agreements has consequently been much higher than has been the case for domestic utility contracts with certain volumes and prices indexed to the CPI. Price volatility on export markets is further exacerbated by the increasing proportions of export volumes that are sold under short-term contracts and into spot tenders.[154] As a result the Authority considers that QCT Resources is not representative of the Queensland coal industry.[155]

There are three important reasons why it might be expected that QR's stand-alone below-rail coal business would exhibit a materially lower undiversifiable risk (and hence asset beta) than Centennial:

- QR's cash inflows have significantly less exposure to the international coal market;
- the relative stability of QR's cash flows are protected by the regulatory environment; and
- Centennial Coal is a significantly smaller company than QR's below-rail coal network. As noted in Appendix D of working paper 4, empirical evidence suggests that there is an inverse correlation between market capitalisation and systematic risk (beta). That is, smaller entities tend to have higher betas than larger entities.[156]

Consequently, shareholders would expect that if QR's below-rail networks had identical leverage to Centennial Coal, then its equity beta should lie below the beta for Centennial Coal.

The lower end of the range should reflect the lower risk in listed infrastructure and utilities companies, although caution must be exercised here as several of the equity betas may be subject to measurement error. If considered independently of the cash flows, this would place the asset beta calculated with raw equity betas in a range from 0.35 to 0.45. This suggests an adjusted equity beta in the range of 0.53 to 0.76.[157]

[154] Other reasons why QCT is unlikely to be representative of the Queensland coal mining industry is that it held its assets as a minority interest and has experienced problems in mine performance. The company has also been subject to speculation as a takeover target, culminating in BHP's recent successful takeover of the company. Analysis of QCT Resources' equity beta by the Authority found that since December 1998 the raw equity beta of QCT Resources has jumped from under 0.80 to over 1.20. Decomposition of the equity beta into its covariance and variance components revealed that most of the increase is attributable to increased volatility of QCT Resources' share price following the redemption of its preference shares in December 1998.

[155] Examination of the equity ownership of each of the coal companies also reveals that Centennial has the most diversified ownership with the top 20 shareholders holding less than 27% of the shares. This contrasts directly with the other companies which are more narrowly held (for example Austral 63.40%, Coal & Allied 98.90%, Cumnock 99.49% and QCT Resources 69.88%).

[156] Berk, J.B. (1995), 'A Critique of Size-Related Abnormalities', *Review of Financial Studies*, (Summer), pp. 275-286.

[157] Calculations were performed assuming a debt to equity ratio of 1.22 (debt = 0.55, equity = 0.45) and a debt beta of 0.20. The actual calculated adjusted equity beta range is 0.63 to 0.85. Caution must be exercised in the calculation of equity betas across a range of asset betas. As documented in F. Marston & S. Perry (1996), 'Implied Penalty for Financial Leverage: Theory versus Empirical Evidence", *Quarterly Journal of Business and Economics*, Vol 35, No 2, pp77-97, the relationship between equity betas and financial leverage is non-linear with a higher penalty in the calculation of asset betas for those firms with high levels of leverage relative to firms with low leverage.

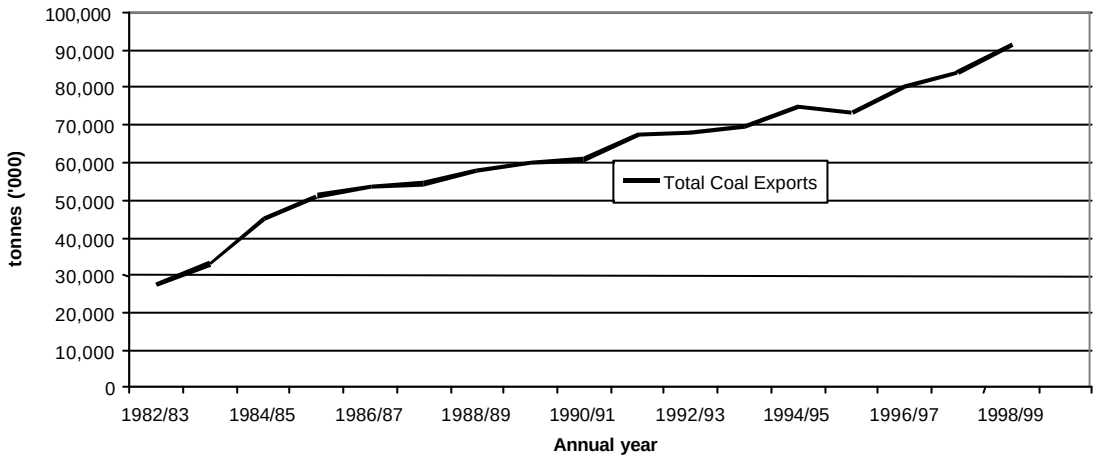
Analysis of QR's below-rail coal cash flows

The cash flows of QR's below-rail business were analysed by the QCA with respect to:

- variability in the railing of coal. Figure 15.3[158] shows the volume of coking and thermal coal exported from Central Queensland during the period from 1983 to 1999. It highlights substantial historical growth in coal exports at an average of 8.14% per annum since 1983 and having very low volatility;[159]

- the volume of coal available for mining (measured and indicated) substantially exceeds the cumulative coal production (see figure 15.4). Further, the regulatory environment should insulate QR's below-rail coal network from further volume risk. This is because a reduction in volume of 10% or more will trigger a review of the below-rail access charges for coal transportation, allowing QR to increase access charges to restore its expected return on assets (refer to section 16.6). Given that access charges per tonne of coal are likely to constitute less than 5% of the value of a tonne of coal on average, it seems unlikely that QR's regulated return could be threatened by a downturn in the coal market;[160]

Figure 15.3: Total coking and thermal coal exports - Central Queensland coal haulage (1983 - 1999)

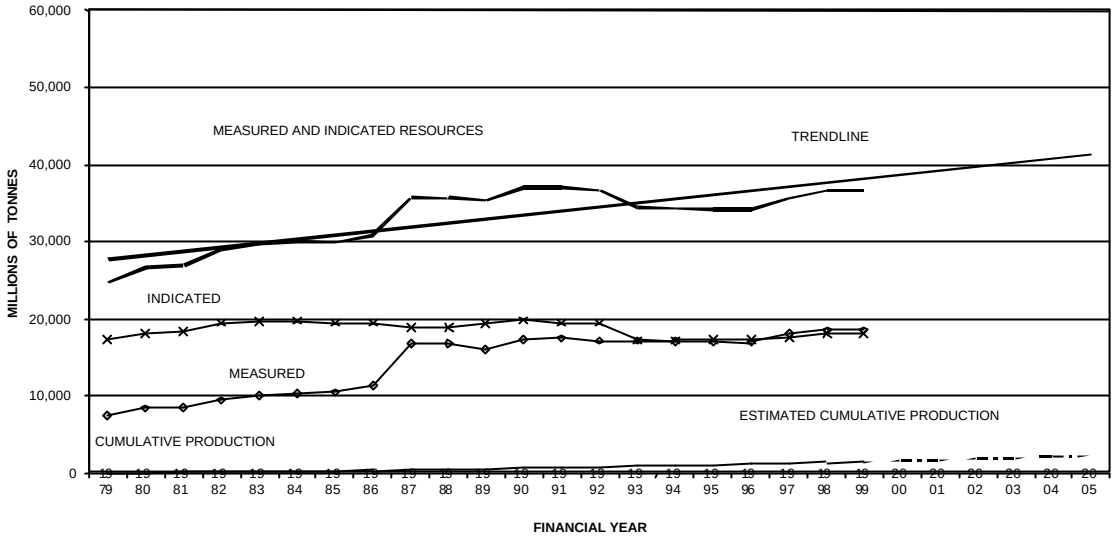


[158] Data is extracted from Central Queensland coal haulage export statistics provided by QR. These figures exclude West Moreton.

[159] The standard deviation of the annual growth rates has been only 4.12% since 1986.

[160] Section 16.2 discusses the regulatory arrangements to apply to QR's reference tariffs. It is true that the asset beta for the provision of access to QR's coal network could be lower if QR was subject to a pure revenue cap (with an unders and overs account) rather than a price cap. This is because under a pure revenue cap, volume risk is effectively removed from the entity. A company's share price will fluctuate with changes in earnings expectations relative to the market as a whole. Under a pure revenue cap (accompanied by unders and overs arrangements), there is, therefore, little reason for the expectations of the regulated entity's earnings to fluctuate significantly (except that its net cash flows will be affected by changes in costs). However, in the case of QR's coal network, it would be difficult to attribute a difference (if any), in the asset beta between the two regulatory approaches as volume risk is likely to be assessed as being low under either approach. Nonetheless, revenue caps could adversely affect QR's incentive to encourage additional traffic onto the network.

Figure 15.4: Cumulative production vs measured and indicated resources



- analysis of the coal mines that QR serves suggest many are low cost producers by world standards. In 1998 for both thermal and coking coal, approximately two thirds of Queensland mines operate in the lowest quartile of the world cost curve. In 1998, all Queensland coking coal mines, except one, operated below the world median[161] cost price. In the same year, only six thermal coal mines operated above the world median cost price;

- credit risk exposures for QR's below-rail coal network are mitigated by guarantees from appropriate parties (for mining companies);[162]

- QR's below-rail coal network faces relatively low exposure to domestic macroeconomic risks. Only about 10% of the volume of QR's coal net tonnage involves the transportation of domestic coal. Most of the domestic tonnage is sent to Queensland base-load power stations. The 90% balance is exported to international users. QR's exposure to inflation is reduced via the CPI-X mechanism (as it passes through inflation in reference tariffs). This mechanism also alleviates interest rate risk for the regulated entity;

- the size and experience of the business. A well-established and large enterprise such as QR will have less variable cash flows than a smaller firm in a competitive market. The level of competition is negligible and there are no substitutes for the QR below-rail coal network. Also, QR's experience and use of well known technology limits the exposure to operating risks; and

[161] The median is the 50th percentile of a distribution and thus represents the middle observation of all available data. In a normal distribution the median will equal the mean – however in skewed distributions this measure will take a different value.

[162] See Note 21 regarding Credit Risk Exposure in Queensland Rail Annual Report 1998-1999.

- changes to the technology used in track operation have been slow and incremental. Basic track construction featuring rail, sleepers, ballast and formation has been largely unchanged for decades. Hence, there appears to be little risk of obsolescence or the need for technology substitution due to advances in technology.[163]

Assessment and conclusions

In summary, QR's below-rail coal network cash flows display a number of characteristics which suggest that the equity beta is well below 1. In particular these include:

- the very low level correlation between QR below-rail coal earnings and changes in the domestic economy;
- the nature of QR's contract, pricing and regulatory arrangements;
- QR's limited volume risk; and
- the absence of any obvious negative impacts on QR's future cash flow.

These characteristics would suggest that QR's below-rail coal network has limited exposure to the domestic market and therefore would have returns which are not highly correlated with returns in market portfolio – thereby reducing both the equity and asset betas to the lower end of the comparable industry ranges.

The QCA has also considered QR's revised submission of an asset beta in the range of 0.45 to 0.55 for its Network Access group[164] and 0.45 to 0.50 for the below-rail coal business. Other stakeholders' submissions were also considered. However, when comparable industries are jointly assessed with QR's below-rail coal network characteristics, the QCA believes the asset beta[165] should fall between a range of 0.35 to 0.45 and has estimated the asset beta at the upper end of this range (that is at 0.45).

Based on an asset beta of 0.45 the Authority has arrived at the adjusted equity beta for QR's below-rail coal network of 0.76.[166]

QCA Position

In assessing QR's reference tariffs, the QCA estimated the asset beta at 0.45 which translates into an equity beta of 0.76.

[163] The risk of technological obsolescence is more likely to be characterised as diversifiable risk.
[164] This asset beta range was arrived at after consideration of available data on QR other rail companies and other relevant organisations. It is noted however that the equity and asset betas for the Class 1 US railways used have fallen dramatically since June 1999.
[165] Based on adjusted equity betas.
[166] It should be noted that under the framework adopted by the Authority, the margin on the risk-free rate is primarily a function of the asset beta – the equity and debt betas will vary with the proposed capital structure such that their weighted average will equal the asset beta.

Value of imputation credits

Dividend imputation was introduced in Australia in July 1987. Under the imputation tax system, Australian resident taxpayers can claim a credit against the income tax payable by them on dividends received from Australian resident companies, to the extent of the Australian income tax that has been paid by those companies in respect of that dividend income. The dividend is said to be 'franked' to the extent of the income tax that has been paid at the company level.

Under this system, a taxpayer can fully utilise the tax credits available, that is company tax is a pre-payment of personal tax for that shareholder. Hence, ignoring the timing impacts, an Australian resident taxpayer can be completely compensated for the incidence of company tax (but not personal tax). For foreign investors, Australian tax credits cannot be used to reduce tax payable in their own countries. Therefore, the after-tax return for a foreign investor receiving a franked dividend is lower than that for a domestic investor with an equivalent personal tax rate.

Gamma, typically expressed as a number between zero and one, represents the percentage of each dollar of dividends that is covered by an imputation credit. For instance, a gamma of 0.80 implies an imputation credit of $0.80 per dollar of dividend paid.

QR's Position

QR considers that a gamma of 50% is appropriate for the following reasons:

- a presumption that the required rate of return for regulated pricing purposes should be reflective of the profile of the average private Australian shareholder on the domestic equities market rather than taking account of government or foreign ownership;
- it will drive pricing behaviour consistent with a firm facing the profile of an average Australian investor;
- other input variables are chosen with respect to an average Australian investor (market risk premium and risk-free rate); and
- recent regulatory decisions by ACCC and IPART endorsed a dividend imputation credit estimate of 50%.

Stakeholder Comments

There was no consensus as to what should be the appropriate value for imputation credits.

Table 15.11: Valuation of imputation credits

QMC, Stanwell - gamma should be set equal to 1.0 to be consistent with the Steering Committee on National Performance Monitoring of Government Trading Enterprises recommendation, recent studies (unspecified) that have found that imputation credits are recognised and increasingly valued by shareholders, competitive neutrality grounds and simplicity.

FreightCorp - the imputation credit utilisation rate of 50% should be adopted. This is based on research by the University of Western Australia, which estimated that the average value of gamma was 80% while the Graduate School of Management found that the value of gamma was approximately 47%.

QCA's Analysis

Empirical evidence on the valuation of imputation credits

The market value of franking credits is typically estimated by analysing ex-dividend share price movements. Company share prices can be considered as a bundle of expected future dividends and franking credits. The market's valuation of franking credits by shareholders may be determined by comparing the share price fall of companies paying franked dividends to the share price fall of companies paying unfranked dividends, on the day that the books close for dividend entitlements.

The available research and regulatory opinion on the issue of valuing the actual level of utilisation of imputation credits is set out in working paper 4. Direct comparison between the results of these studies is difficult as they cover different time periods and different methodologies. The research reported in working paper 4 supports a gamma value within the range of 0.5 to 0.7. The QCA surveyed Australian regulators to ascertain the gamma factors adopted in recent regulatory decisions in other jurisdictions. In the majority of cases surveyed, a value of 0.5 was identified with the remainder recommending a range between 0.3-0.5.

Estimation of gamma for QR's below-rail coal business

The Queensland Mining Council and Stanwell Corporation Limited, agreed with the recommendation of the Steering Committee on National Performance Monitoring of Government Trading Enterprises and proposed that a gamma value of 1.0 be applied to QR. FreightCorp, on the other hand, recommended the adoption of a gamma value of 0.5 based on research undertaken by the Graduate School of Management that found that the value of gamma was approximately 0.47.[167]

QR proposed a gamma of 0.5 on the grounds that the required rate of return for regulated pricing purposes should be reflective of the profile of the average private Australian shareholder in the domestic equities market rather than taking account of its government ownership. From the perspective of the marginal investor, application to QR of a gamma value from this range would be consistent with eliminating resource misallocation by treating GOCs in the same manner as private sector equivalents. However, in contrast, the Government, as shareholder of QR, could be regarded as having the benefit of full dividend imputation credits, subject to the timing difference between the date of paying tax and the date of dividend distribution (that is, a gamma approaching 1).

Gamma is equivalent to the ability to access franking credits or the access rate (determined by the creation and distribution of imputation credits) multiplied by the utilisation rate (determined by the redemption of the franking credits). Accordingly, the valuation of imputation credits is determined by the following three key events in the life of imputation credits which are discussed below:

- creation of imputation credits;
- distribution of imputation credits; and
- redemption or utilisation of imputation credits.

[167] Securities Institute of Australia, Notes to Applied Valuation and Analysis, 1996, page 94.

Creation of imputation credits - franked dividends are those dividends paid out of profits on which Australian corporate tax has been levied and hence carry a credit for income tax paid by the company. The return on a share with a franked dividend will be greater than the return on an equivalent share with a non-franked dividend. Dividends can be franked if the entity's income is earned in Australia and hence taxed at the corporate tax rate, and the income has been earned since the introduction of the imputation tax system on 1 July 1987.[168] It should also be noted that both dividends and franking credits can be issued from retained earnings and not just from the current year's free cash flows.[169]

Analysis of QR's below-rail coal network after tax free cash flows shows that:

- all of QR's profits will be earned in Australia and are hence eligible to be franked; and
- QR's below-rail coal network is forecast to require modest capital expenditure over the next 10 years and thus it is anticipated that, on a stand-alone basis, there will be few impediments to this part of QR's business having a high payout ratio.

Distribution of imputation credits - an entity's dividend policy affects the value of imputation credits. The smaller the payout ratio, the less value imputation credits hold as the time value of imputation credits diminishes if a company defers payment of fully-franked dividends. The introduction of dividend imputation in Australia has resulted in companies adopting generally higher payout ratios than during the pre-imputation period. Hathaway and Officer[170] found that 80% of company tax payments are distributed as imputation credits. The New Tax System (NTS) reverses some of the incentives for high dividend payout ratios that emerged from dividend imputation. This is because, under the NTS, capital gains attract a relatively low effective tax rate in a low inflation environment.[171]

One issue in the context of assessing the level of imputation credits is whether profits earned on the coal traffics, which are retained by QR for investment elsewhere in the network, should effectively be allowed to reduce the value of imputation credits (because of the deferral of payments) and hence increase QR's cost of capital. The Authority's view on this matter is that QR's cost of capital should not be substantially increased on account of major investments in the network not referable to its coal traffics. In other words, non-coal investments should not become a justification for effectively increasing the price of coal transport. Any other outcome would be inconsistent with the stand-alone cost approach QR has proposed.

Redemption or utilisation of imputation credits - each shareholder attaches a different value to imputation credits depending on their tax status. The treatment of this issue is contingent on whether one adopts the position that the Queensland Government is the only shareholder or that the utilisation should reflect that of the marginal shareholder in the market. Each of these alternatives is discussed in turn.

[168] The value of imputation credits is therefore dependent on the entity's effective tax rate. The lower the effective tax rate, the smaller the corporate tax payments and the smaller the advantage of dividend imputation.

[169] Thus there is no incentive to hold after-tax free cash flow in retained earnings in perpetuity but also they can be retained over time without loss of availability.

[170] Hathaway, N., and Officer, R. (1999), 'The Value of Imputation Tax Credits', Finance Research Group, Melbourne School of Business. The study covers the period until 1995.

[171] The NTS may affect dividend pay-out ratios in several ways. For example, capital gains will not be indexed for the purposes of assessing capital gains tax under the NTS but they will be subject to tax at only 50% of the income tax rate. This means that there will be a tax advantage to shareholders receiving returns as capital gains (dividends) instead of dividends (capital gains) in times of low (high) inflation.

In one view, QR and its sole shareholder are both exempt from Commonwealth tax (QR instead is subject to a State-based tax equivalent regime). Given that the State Government retains all of QR's tax payments, is it appropriate to assume the tax status of the Queensland Government as QR's only shareholder will enable it to fully utilise any imputation credits created. In this case, it could be assumed that the utilisation would equal 100%.

The alternative view is that the ability to utilise the franking credits should be contingent on the shareholder status of the marginal shareholder. As noted by Hathaway and Officer, 60% of the distributed franking credits are redeemed by taxable investors. The key issue is then the assumed shareholder status of the Queensland Government in the context of the assessed value of imputation credits. In this regard, the Authority considers that the most appropriate approach is to ignore any particular shareholder status emerging from QR being a GOC. This is because any other approach risks cost of capital induced resource allocation distortions towards the public sector.

As part of the NTS, the Commonwealth Government has passed legislation that permits the full offset of excess franking credits against income tax liability for Australian resident individuals and superannuation funds that previously were unable to claim the refunds.[172] Subject to the other effects from the NTS, this of itself would tend to increase utilisation levels relative to historical benchmarks.

Assessment - when estimating the value of imputation credits for the purpose of calculating QR's below-rail coal network cost of capital, the QCA took the following factors into consideration:

- all of QR's profits will be earned in Australia and are hence eligible to be franked;
- on the basis of the Authority's cash flow modelling, QR's below-rail coal network will be in a position to maintain a high contribution towards QR's dividend payout ratio over the next 10 years. Consequently, it is expected that consistent with prior studies, 80% of QR's tax payments are distributed as imputation credits; and
- the range of utilisation will be between 60% and 100%.

Given that gamma is equivalent to the access rate (determined by the creation and distribution of imputation credits) multiplied by the utilisation rate. This will give a range for gamma between 0.5 and 0.80. The Authority considers that the most appropriate approach to identifying gamma is to ignore any particular shareholder status emerging from QR being a GOC. Accordingly, in the context of the marginal shareholder, the Authority has accepted QR's below-rail coal network level of gamma at 0.50.[173]

QCA's Position

In assessing QR's reference tariffs, the QCA will estimate gamma (reflecting the value of imputation credits) at 0.5.

[172] See Chapter 2 in New Business Tax System (Miscellaneous) Bill 1999 Explanatory Memorandum. House of Representatives, The Parliament of the Commonwealth of Australia. When passed the law will have effect from 1 July 2000. The net effect of the tax change will be to increase the return to low income earners and superannuation firms and will thereby increase the market value of a franking credit above current levels. However, overseas shareholders are still unable to use franking credits.

[173] This reflects gamma calculated as 0.80 x 0.60 = 0.48 (approximately 0.50).

Treatment of corporate tax and inflation

Alternative methods also exist to calculate WACC on either a pre-tax or post-tax basis and on either a nominal or real basis. The appropriate WACC to use depends on the form of the cash flows being capitalised. Consequently, nominal (real) cash flows should be discounted with nominal (real) discount rates and post (pre) tax cash flows should be discounted with post (pre) tax discount rates. Each of the approaches should be equal in perpetuity but can have significant differences when measured in discrete time.

QR's Position

QR proposes that the WACC rate be calculated on a nominal (including inflation) pre-tax basis, which is consistent with QR's proposed approach in the Draft Undertaking. The rationale for nominal terms is because all cash flows, including the notional net inflationary effects on the asset base, are expressed in nominal terms. QR considers that the complexities associated with attempting to assess the appropriate tax payable are comparable with the complexities associated with determining the appropriate assumption for the tax rate to incorporate in the WACC definition. Therefore, as outlined in the Draft Undertaking, QR advocates the nominal pre-tax approach.

QR proposed to use the statutory corporate tax rate, as there are the following difficulties associated with estimating an effective tax rate:

- estimates regarding the tax position of a company over periods up to, or in some cases over 50 years, renders the resultant rate questionable;
- the potential for change to the Australian taxation system or rate of taxation is high; and
- adopting a tax rate less than the statutory rate would imply that the tax shield on debt is not fully available to the entity.

Stakeholder Comments

No consensus emerged in submissions as to whether the WACC should be based on pre or post-tax cash flows.

Table 15.12: Corporate tax and inflation

QMC - provided that the basis of conversion from nominal to real is clear and transparent, then the QCA should be indifferent on the issue of pre-tax versus post-tax rates of return.

FreightCorp - pre-tax cash flows were more relevant to the calculation of returns to QR and that for simplicity and transparency of calculation, the statutory corporate tax rate of 36% should be used in calculating QR's WACC.

Queensland Government - a post-tax rate should be used to ensure consistency with CAPM and market determined beta estimates.

QCA's Analysis

Pre or post-tax WACC

The use of a pre-tax rate of return is often advocated on the grounds that it avoids the need to explicitly add into the 'cost of service' calculation an amount to compensate for tax obligations of the regulated business. However, the tax calculation still needs to be undertaken to convert from the post-tax rate of return indicated by CAPM benchmarks to the corresponding pre-tax rate required for the regulatory framework. Therefore both approaches require tax liabilities to be properly assessed.

In discrete time, different formulations of WACC can affect arguments in favour of a post-tax WACC including that:

- CAPM produces a post-tax nominal return on equity and WACC. The conversion of this to a pre-tax equivalent is complex and varies with regard to the techniques available for pre-corporate tax or pre-corporate and personal taxes;

- corporate taxes are a cost to the company like any other cost, and post-tax measures of return are more relevant to investors. Adopting a post-tax WACC requires cash flow modelling to explicitly address the question of the cash flow implications of taxation liabilities and an organisation's financial position. Accordingly, this approach is the most transparent and rigorous;

- the concept of pre-tax is not a common one and there is potential for misunderstanding. There is difficulty in estimating a long term effective tax rate as the tax system is not static. This may result in a perception that there may be a risk that adjustments would not adequately compensate for any changes in the tax system or errors could be introduced which result in under compensation in the rate of return; and

- the conversion from post-tax to pre-tax WACC should be 'neutral' in that it is important to maintain consistency between the WACC used and the underlying cash flows – particularly in respect of corporate taxation and dividend imputation. Otherwise, there is risk of significant distortions being introduced.

The key point is that for there to be no difference between pre and post-tax formulations tax, cash flows should be explicitly incorporated as part of the modelling process. Accordingly, it would appear that the most appropriate way to address the treatment of tax is to adopt a relatively simple WACC formulation and to deal with tax liabilities and imputation credits in the cash flows.

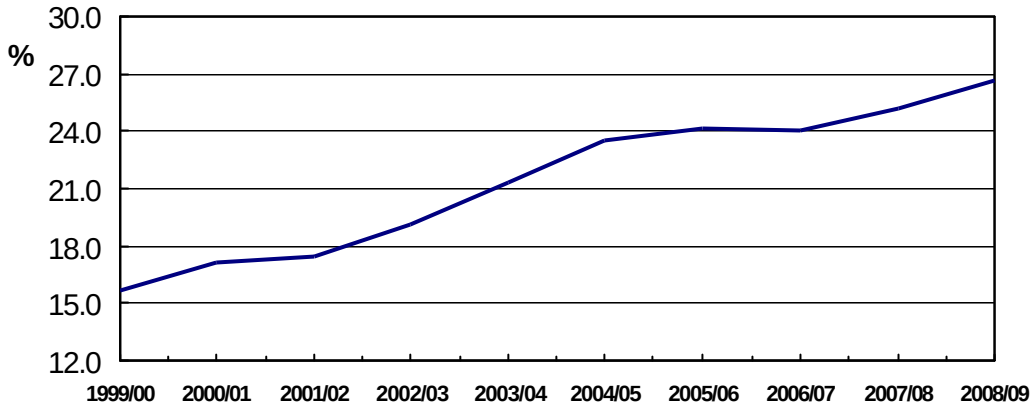
This approach treats tax liability in the same manner as any other cash flow item. Explicitly addressing tax expense through the cash flows ensures that users only pay for the tax expense actually incurred by QR in the provision of its below-rail services. It will also remove much of the ambiguity, uncertainty and error by keeping taxation issues out of the definition of the WACC and is also consistent with the underlying CAPM approach adopted (for example, the determination of the return on equity and the treatment of imputation credits).

Nevertheless, Australian regulators have not reached a consensus on this issue. Supporters of the pre-tax WACC formulation argue that it is consistent with intergenerational equity. This is because customers of the network at different points in time will pay different charges for the same set of assets as a result of the assets' changing tax position rather than the underlying value of the service being provided. This is particularly the case where the firm takes advantage of tax concessions in the early years of the life of an asset, with tax liabilities increasing over time (the so-called 'S-bend debate').

However, these arguments overlook the fact that accelerated depreciation arrangements generate favourable cash flows for the regulated entity. Ignoring these cash flows will create a windfall benefit for the regulated entity. In any event, the Authority's 10-year modelling horizon, for an organisation that has a portfolio of assets with differing ages, substantially alleviates these concerns. In practice, other factors, such as the growth in the use of the network, could normally be expected to dominate the tax timing issue in terms of pricing impacts.

Figure 15.5 illustrates the effective tax rate that this approach produces, based on QR's forecast below-rail coal profit in each year of the modelling horizon. The steady rise over the period reflects the decreasing influence of accelerated depreciation in reducing QR's effective tax rate relative to the statutory rate.

Figure 15.5: Effective tax rate - QR's below-rail coal business



Accordingly, the Authority has adopted a post-tax cost of capital. In other words, the prevailing statutory tax rate (which equates to 34% in the 2000-01 tax year and 30% thereafter) has been applied to QR's forecast taxable income in order to estimate QR's tax liabilities. Adopting this approach means that issues such as quantifying the 'tax wedge' are no longer relevant. Importantly, it is also consistent with the assumptions underlying the CAPM.

Similarly, it is possible to record the impact of dividend imputation, either as an adjustment in the WACC calculation, or as an adjustment to the cash flows of the business. The Authority's view is that it is appropriate to address dividend imputation in the same manner as any other cash flow item and therefore prefers to record the impact of dividend imputation in QR's cash flows. This will also help avoid any possibility of double counting of dividend imputation in both the cash flows and the WACC.

Real or nominal WACC

The QCA accepts QR's proposal to model these cash flows on a nominal basis for the following reasons:

- depreciation in a nominal framework is transparent and there is no potential for confusion over the extent of recovery. However, this is not the case for a real framework as depreciation allowances include adjustments for inflation so that accumulated depreciation may exceed the actual cost of the asset unless depreciation amounts are deflated;

- interest expense and other non-inflationary cash flows, such as capped revenues or revenues from contracts containing no CPI adjustments, require particular caution when converting from nominal to real. Errors in the conversion will result in discrepancies in the underlying cash flows;

- tax and balance sheet items such as debt and equity are all expressed in nominal terms. Consequently, the stock of debt must be deflated if modelling is to be undertaken in real terms;

- a nominal WACC is directly comparable with other financial benchmarks such as the nominal rate of return of other investments;[174] and

- the nominal approach is the preferred approach of academics[175] and practitioners.[176]

Again, whilst it is possible to achieve identical results in a real or nominal environment, the Authority prefers to adopt a nominal WACC to minimise the risk of modelling errors.

Estimation of inflation

The level of expected inflation is not an explicit parameter in the calculation of WACC. However, it is relevant to the financial modelling exercise. During periods of inflation, there is a fall in the purchasing power of money.

Four primary methods exist for the estimation of expected inflation:

- survey-based methods where market participants are surveyed to assess their expectations of expected inflation;

- statistical-based methods using regression or time series models;

- models based on the Fisher (1907)[177] which suggests that there is a systematic relationship between nominal interest rates and the expected rate of inflation. Here the level of expected inflation is implied from the yields on nominal and Commonwealth Treasury capital indexed bonds (CIB); and

- the use of secondary sources, including monetary and fiscal policy documents. For example, the RBA medium-term inflation target is 2 to 3 percent. Similarly, in forecasting future revenues, State and Commonwealth governments report the anticipated value of the CPI as part of their fiscal policy budget.

The Authority's preferred approach is to measure inflation using the Fisher approach as the difference between the nominal bond rate and inflation-indexed bonds over the same period. The benefit of such an approach is that it delivers a forward-looking estimate of inflation rather than a historic measure. This method is also consistent with the approach adopted by other regulators, such as the ACCC and IPART.

[174] This is likely to avoid any confusion with financial markets and other interested parties as they may not understand the economic relationship between real and nominal as well as pre and post tax rate of return.

[175] ACCC and ORG, 'Public Forum on the weighted average cost of capital (WACC) in the Victorian Gas Access Arrangements', (3 June 1998) and K. Davis, "Asset valuation and the post-tax rate of return approach to regulatory pricing models', paper presented at the ACCC Asset Valuation Forum, Melbourne, 16 June 2000.

[176] ACCC and ORG, 'Public Forum on the weighted average cost of capital (WACC) in the Victorian Gas Access Arrangements', 3 June 1998, p. 18. Michael Lawriwsky from Banker's Trust critiqued the use of pre-tax real rates of return and stated "The market is not used to dealing in pre-tax real WACCs".

[177] Fisher, I. (1907), *The Rate of Interest: Its Nature, Determination and Relation to Economic Phenomena*, Macmillan, New York. See also Fisher, I. (1930), *The Theory of Interest*, Macmillan, New York.

Consistent with the view that information should be as up to date as possible, the Authority has calculated an expected inflation rate based on the difference between the 10-year bond rate and a similar duration indexed bond rate based on the rate of the day of the decision.[178] On 20 November the 10-year Commonwealth Government bond yield was 5.92%. The yield on a CIB of similar maturity was at 3.295% which implies an inflation rate of 2.54%. The level of expected inflation estimated using this approach has been under 3.00% since 1998 except for a brief period in the first quarter of 2000.

A study by Macquarie Bank Risk Advisory Services Limited (1998)[179] reported that anecdotal evidence suggests that the premium at which nominal bonds trade may incorporate a small risk premium for inflationary uncertainty as well as inflationary expectations. This suggests that 'true' inflationary expectations may be less than the nominal/CIB spread. Therefore, the Authority has set the expected inflation to 2.50% for use in determination of the real rate of return.

QCA's Position

In assessing QR's reference tariffs, the QCA will apply a post-tax nominal framework with tax liabilities on forecast taxable income assessed at the prevailing statutory tax rate.

A summary of the parameters, selected by the QCA as appropriate for QR, are detailed in Table 15.13. The nominal post-tax WACC for QR's below-rail coal network has been estimated to be 8.63%, which represents a margin of 2.7% over the risk-free rate.

[178] Caution should be exercised in using the Fisher equation as bonds must be matched as close as possible by maturity and coupon and the equation must account for the compounding frequency of the coupons.

[179] Macquarie Risk Advisory Services Limited (1998), Weighted Average Cost of Capital: Further Issues, report Commissioned by ORG, September.

Table 15.13: Summary of parameters and WACC estimates for the Draft Decision

Parameter	QCA Draft Undertaking
Nominal risk-free rate (%)	5.92[180]
Market risk premium (%)	6.00
Equity beta	0.76
Asset beta	0.45
Debt beta	0.20
Debt/value (%)	55
Franking credit (gamma) (%)	50
Debt margin (%)	1.20
Cost of debt (%)	7.12
Tax rate (%)	30[181]
Nominal post-tax cost of equity (%)	10.48
Nominal pre-tax cost of equity (%)	12.33
Nominal post-tax WACC (%)[182]	**8.63**
Nominal pre-tax WACC (%)	9.46

[180] Rates as at 20 November, 2000. The rate to apply as part of the Final Decision will be foreshadowed to interested parties before the decision is released.

[181] The statutory tax rate is set at 34% in the 2000-01 tax year and 30 percent thereafter. The nominal pre-tax cost of equity and pre-tax WACC will use the effective tax rate that has been estimated from QR's below-rail network forecast cash flows.

[182] Alternative measures of post-tax nominal WACC would have produced the following results using data from working paper 5:

WACC	WACC
$WACC\ 1 = r_e \frac{(1-T_c)}{(1-T_c(1-g))}\frac{E}{(E+D)} + r_d(1-T_c)\frac{D}{(E+D)}$	6.62%
$WACC\ 2 = r_e \frac{E}{(E+D)} + r_d(1-T_c(1-g))\frac{D}{(E+D)}$	8.04%
$WACC\ 4 = r_e \frac{E}{(E+D)} + r_d(1-T_c)\frac{D}{(E+D)}$	7.46%

CHAPTER 16. INCENTIVE REGULATION

KEY ASPECTS

Escalation - reference tariffs will be escalated each quarter by the CPI, less an efficiency factor (or X-factor) of 1.5% per year.

Price caps - price caps have been applied for the reference tariffs.

GST - specific adjustments to the CPI may be necessary on account of the GST impact on the CPI.

X-factor - the calculation of reference tariffs in the future will be based on the X-factor reduction applying exclusively to the allocative component of the tariff structure.

Review - changes in taxes or departures from volume forecasts of greater than 10% will trigger a review of reference tariffs.

16.1 Introduction

Any involvement in the market will have both intended and unintended consequences. If the intended consequences are overwhelmed by the unintended consequences, the interference may do more harm than good. For example, by allowing too low a rate of return, in an effort to eliminate monopoly profit, the regulator may create an environment in which the regulated business is unwilling to invest. The capacity restrictions that may result from the congested infrastructure could be more costly to users than the original monopoly profits.

Different regulatory approaches will assign rights and responsibilities differently to the affected parties. This assignment of rights and responsibilities will affect the regulated entity's risks and rewards and, in turn, its incentives. Accordingly, it is important, when considering alternative regulatory approaches to be aware of the potential unintended effects of the assignment of rights and responsibilities implicit in those arrangements.

Traditional rate-of-return (ROR) regulation allows for a regulated organisation to achieve a profit equivalent to an allowed rate-of-return on its asset base. Since rates are often set annually, ROR regulation creates a predisposition toward a 'cost-plus' approach to price setting. ROR regulation provides only limited incentives for the regulated organisation to use its superior information so that it may achieve efficiency gains throughout the regulatory period. Cost reductions achieved beyond those budgeted are simply passed on to customers in the next assessment period.

To address this shortcoming, incentive regulation recognises that an organisation will always know more about its business, and *how to improve its business*, than the regulatory body. Incentive regulation therefore seeks to provide a regulated organisation with an incentive to invest effort (and take the risks) necessary to improve its profitability and the quality of the service provided to its customers.

The incentive that is provided often involves allowing the regulated organisation to retain profits generated for a set period, on the basis that, in return, prices for the relevant products will fall by a predetermined amount in each year of the regulatory period. The key point is that, providing the regulated entity with the ability to retain the profit or value it creates through the regulatory period, an incentive for that organisation to reveal how efficiently it is able to operate.

The predetermined amount is normally established on the basis of prices increasing on account of inflation. In addition, at the end of the regulatory period, at least some of the additional profit may be returned to customers through lower prices. In this way, a 'win-win' environment can be created.

However, such an environment may be undermined if the regulated organisation believes its out-performance of the target during a regulated period will be immediately returned to customers at the end of the period. Accordingly, an inappropriate regulatory environment can jeopardise any incentive for a regulated organisation to improve its performance. This may reduce the regulated organisation's profitability in the short to medium term and defer, or eliminate, price reductions for customers in the long term.

The creation of an incentive regulation regulatory framework therefore requires the following matters be addressed:

- the price inflator to be applied;
- the quantification of the predetermined amount each year by which prices reduce;
- the benefit sharing arrangements that apply for out-performance during, or at the end of, the regulatory period; and
- the circumstances in which the prices charged can be reviewed within the regulatory period.

The Draft Undertaking implies there would be no incentive regime applied to QR to improve the productivity with which it delivers below-rail services. As this is a complex issue, the QCA released, in September 1999, an issues paper *Queensland Rail's Draft Undertaking - Reference Tariffs, Reference Train Services and Rate Regulation*. The views ascribed to QR and other stakeholders in this Chapter are in relation to issues raised in the submissions to that paper.

16.2 Type of regulatory framework to be applied to QR's reference tariffs

Different regulatory approaches will vary in the way they assign rights and responsibilities to the parties, with differing effects on the incentives faced by each party. These incentives are an important element of a regulatory regime.

The key issue concerns whether the regulatory environment will be based on incentive regulation or rate of return regulation. Under either regime, it is necessary to decide whether the regulation is to focus on prices or revenues and the period of time that should elapse before the arrangements are revisited. The decisions that are taken on each of these components will produce different incentives and therefore could be expected to influence behaviour in different ways.

In their most general form, price caps are determined by an index established for individual products or groups of products (that is, a tariff basket). Price-cap regulation aims to control the prices charged by the regulated organisation, rather than its earnings or rate-of-return. In contrast, under a revenue cap, an organisation's earnings are limited to a revenue cap – that is, its 'global' cash flows from its sales are subject to the cap rather than particular prices.

QR's Position

QR submitted that incentive regulation is the preferred regulatory approach to apply to QR in the establishment of reference tariffs. In addition, QR considered that the revenue cap approach is more suited to the rail infrastructure business than the price cap approach because, under the revenue cap model, volume risk is borne by the customer which makes the process of fixing future demand projections less contentious.

However, QR expressed concern that the pure revenue cap model does not take account of the cyclical nature of QR's costs and reduces QR's pricing and risk management flexibility. Consequently, QR proposed a combination of price cap and revenue cap regulation, with a focus by the QCA on the established reference tariffs to ensure consistency with the revenue limits, rather than on measuring QR's actual revenue compared to a predetermined revenue cap.

QR also proposed that the regulatory period for the purposes of incentive regulation should coincide with the second reference tariff review, that is 6 years from the introduction of the initial reference tariffs, on the basis that an earlier adjustment would likely inhibit the effectiveness of the regulatory regime. Nevertheless, adjustments to reference tariffs within the regulatory period will transpire following completion of the 3-year reference tariff review periods and if any material change events, including volume triggers, occur.[183]

Stakeholder Comments

Views of stakeholders on the regulatory framework were mixed, although the differences related more to the application of the model to present circumstances, rather than the fundamental approach.

Table 16.1: Form of the regulatory review

Queensland Government - incentive regulation is the most appropriate form of regulation for the coal network. There might be advantages in the revenue cap approach, or a combination of price cap (for reference tariffs) and revenue cap (for revenue limits). Also, given the possibility that there may be few access agreements that will adopt the standard reference tariff, it would be preferable to adopt a revenue-cap approach.

QMC - the reference tariff review approach is superior to a revenue cap with an 'unders-and-overs' account, as it will achieve the same result in a simpler way. In between pricing reviews, in each year tariffs should be reduced by a pre-determined factor (such as CPI-X), to reflect the required level of productivity improvement, and these tariff reductions would need to directly relate to reductions in the actual haulage charges being paid by mines and access charges being paid by third-party operators.

National Rail - incentive regulation would provide the motivation required to ensure QR improves operational efficiency and adopts optimal investment strategies. A price-capping approach would provide the greatest incentive for QR to expand system throughput, is more transparent and does not expose users to the risk of non-performance of competitors.

Stanwell - the application of price cap regulation provides QR's customers with greater certainty of future access charges.

FreightCorp - the use of incentive regulation in the case of QR is not favoured until QR's cost base is more closely aligned with more efficient benchmarks. The management of large cost reductions that are needed in QR's case can not be achieved through the application of incentive regulation. Once QR's costs have been reduced to a more efficient level, benefit sharing is the most appropriate regulatory framework for the infrastructure provider. Price caps are also preferred to revenue caps.

QCA Analysis

Adoption of incentive regulation

Until recently, the dominant method of regulation has been the ROR method. Under traditional ROR regulation, regulators determine the revenue required in order to recover the organisation's costs, including an allowed rate-of-return on its asset base.[184]

Incentive regulation developed out of dissatisfaction with the cost-plus approach encouraged by traditional ROR regulation. The key idea behind incentive regulation is that an organisation

[183] The Authority's assessment of QR's proposals in relation to changes to reference tariffs are considered in section 16.6 below.

[184] Several submissions to the QCA supported a ROR approach based on efficient cost calculations, rather than 'reasonable costs' as currently proposed by QR. These same organisations indicated incentive regulation was a second best approach.

subject to regulatory intervention will always know more about its business and how to improve its business than the regulator.

The effectiveness of any regulatory intervention is limited by the information available to the regulator. It is therefore important that the regulatory environment harnesses the regulated business' informational advantage to the wider benefit of the community as a whole (rather than purely to its own benefit – a situation that arises in an unregulated monopoly environment). This is the central goal of incentive regulation. Implicit in incentive regulation is that gains for all parties are possible if the organisation can be encouraged to employ its superior information to increase the efficiency and effectiveness of its operations.

Typically, this is achieved through a process of encouraging the regulated entity to 'outperform' a benchmark set by the regulator, by allowing it to retain the benefit from doing so. For example, if a regulator believes a regulated business should be able to improve its efficiency by 3% each year, and the regulated business manages to improve by 5% per annum instead, then the regulated business should retain a portion of the extra benefit from that superior performance.

Clearly, if the regulatory environment prevents the organisation from retaining enough of the benefit of its efforts, it will have little incentive to devote managerial effort to achieve the gains. However, by allowing the regulated company to retain the benefit of its efforts, there is an incentive for it to invest the time, effort and expense, and accept the risk to seek to improve its performance. In the absence of such an incentive, those potential improvements simply will not be pursued. By providing this incentive, customers ultimately benefit by sharing in the gains that are realised over time. In this way a 'win-win' environment is created.

The only stakeholder who did not endorse the incentive regulation approach suggested that QR's costs were too high for incentive regulation to be applied. However, at least for its coal network, the Authority's analysis suggests that the gap between QR's costs and those of relevant benchmark organisations is not large relative to other entities that have been subject to incentive regulation. Accordingly, the Authority proposes that incentive regulation be applied to QR's coal network.

There is a range of possible approaches to incentive regulation including:

- price capping for particular products or for average prices; and
- revenue capping.

Price versus revenue caps

Both price and revenue caps assign any risks associated with the regulated entity's costs (other than inflation), including the risk that costs decline in line with the X-factor, to the regulated organisation. This risk may be ameliorated in relation to specific input costs if review triggers or cost passthroughs are permitted, an issue discussed later in the Chapter.

The key difference between price and revenue caps concerns the assignment of output volume risk. Under pure revenue cap regulation, the regulated business is assured of a revenue stream irrespective of the volume of throughput that is achieved. In the extreme case of pure revenue caps, the regulated business may have an incentive to restrict output if it is able to earn the same revenue and incur less cost in doing so.

Revenue caps are often accompanied by an unders-and-overs account. An unders-and-overs account allows (requires) the regulated organisation to increase (decrease) its earnings in the year (or years) subsequent to that in which its revenues fall short of (exceed) the cap. Often an interest rate is applied to the unders-and-overs account to address timing issues.

This assignment of volume risk affects price stability. Under revenue cap regulation, risks associated with volume fluctuations within the review period are borne by the customer. Consequently, under revenue cap regulation, prices change to maintain the regulated entity's revenues over the regulatory period.

In contrast, price caps establish a price level for the term of the review period so that volume fluctuations are borne directly by the regulated entity's earnings. Consequently, price caps should be more stable than revenue caps, at least during the course of a regulatory period. Since price caps assign the benefit of greater than expected traffic volumes to the regulated business, the mechanism encourages QR to maximise traffic and does not expose users to the risk of non-performance by their competitors.

The QCA agrees with stakeholders that reference tariffs should take the form of price rather than revenue caps and sees merit in such an approach applying for this first tariff review. QR pointed out that adoption of a price cap would make demand projections contentious. The QCA has formed its own view on demand forecasts as discussed in Chapter 11. However, the Authority is aware that both QR and end users (through the QMC) prefer some sharing of the volume risk. This is considered in section 16.6 in conjunction with triggers for intra-period review of reference tariffs.

Length of the regulatory period

When assessing the regulatory period, it is important to distinguish the appropriate modelling horizon from the regulatory period (that is the time when reference tariffs will be reassessed).

The modelling horizon should be long enough to capture cyclical fluctuations in costs that arise from the periodic need to undertake major maintenance or replacement of infrastructure, such as rail. Whilst it could be argued that major maintenance activity is likely to be spread across the system, so as to keep the assets and skilled crews employed, the Authority has adopted QR's proposed 10-year horizon for modelling purposes. The Authority considers that this period provides a horizon that is consistent with protecting the legitimate business interests of QR and users of the system.

Factors relevant to the choice of regulatory period include:

- ensuring a reasonable adjustment period for the regulated business to implement the measures necessary to reach efficiency targets. Whilst QR proposed that it be allowed a 6-year period to reach proposed efficiency targets, the Authority has concluded that 3 years provides a reasonable period given the extent of transition required;

- providing the regulated business sufficient opportunity to internalise any benefit from the initiatives it pursues during the regulatory period – very short regulatory periods undermine the very innovation that incentive regulation is designed to promote; and

- ensuring that the life of the regulatory period does not inhibit the evolution of the above-rail market – there is likely to be a considerable amount learned in the early years of the regulatory arrangements suggesting that it may be desirable to avoid very long review periods, at least initially.

The QCA considers that the reference tariffs should be reviewed in conjunction with its next review of QR's Draft Undertaking which is scheduled to be completed 3 years after the approval of the current version of the Draft Undertaking. Given the transitional nature of this process, it would be more appropriate to match the time frame for reviewing reference tariffs with other aspects of the regulatory environment.

Commencement

QR's reference tariffs were expressed to apply from 1 January 2001. Given the timing of this Draft Decision, and the fact that a Final Decision is expected to be released in the second quarter of calender year 2001, is thought more appropriate that the regulatory period apply from 1 July 2001.

QCA's Position

In assessing QR's proposed reference tariffs the QCA has adopted:

- **a price cap approach; and**
- **a 3-year regulatory period commencing 1 July 2001.**

16.3 Price inflator for reference tariffs

The adoption of incentive regulation involves establishing arrangements whereby prices (or revenues) decline by a pre-determined amount each year. However, as the arrangements typically apply over several years, it is also necessary to ensure that account is taken of general price movements over the period.

Accordingly, incentive regulation is often described as a 'CPI-X' environment. In this formulation, the consumer price index (CPI) is the price inflator that is applied and the X-factor is the pre-determined amount by which price is reduced each year. However, the CPI is not the only price inflator that may be applied in this environment. Industry specific inflators may also be used.

There are a number of issues associated with the choice of inflator:

- whether a general inflator is to be used, such as the CPI, or an industry-specific factor is to be applied;
- the form of the escalation; and
- whether allowances should be made for the introduction of the goods and services tax.

Resolution of these issues then facilitates the basis for the determination of the X-factor.

QR's Position

QR proposes that its reference tariffs should be escalated on a quarterly basis using relevant CPI figures for Brisbane. It acknowledges that, while there is no industry-specific price index for heavy haul railroads available in Australia, given it simplicity and ready availability, the CPI is the most appropriate price inflator.

QR has indicated that the following general formula should be used to indicate the applicable reference access charge on each escalation date following the commencing date.

$RAC_n = [(1 - X_1) \times TAC + X_1 \times TAC \times CPI_n/CPI] + [(1 - X_2) \times ETC + X_2 \times ETC \times CPI_n/CPI]$

where:

- RAC_n means the total reference access charge to apply after the escalation;
- TAC refers to the relevant track access charge;
- ETC refers to the relevant electric traction charge;
- X_1 is the percentage of the relevant track access charge to be escalated;
- X_2 is the percentage of the relevant electric traction charge to be escalated;
- CPI_n means the Consumer Price Index Brisbane (Australian Bureau of Statistics Publication No. 6401.0), as first published, for the quarter the midpoint of which is 6 months prior to the midpoint of the quarter commencing on the escalation date for which the variable RAC_n is being determined;
- CPI means the Consumer Price Index Brisbane (Australian Bureau of Statistics Publication No. 6401.0), for the quarter the midpoint of which is 9 months prior to the midpoint of the quarter commencing on the first escalation date;
- quarter means each period of 3 consecutive months commencing 1 January, 1 April, 1 July or 1 October in each year;
- escalation date means the dates 1 January, 1 April, 1 July and 1 October in each year on which the reference access charges are to be escalated in accordance with the reference tariff schedule; and
- first escalation date is the date identified as the first escalation date in the reference tariff schedule (1 April, 2000).

Stakeholder Comments

The only submission on this matter proposed that the CPI was the most appropriate price inflator for regulatory purposes.

Table 16.2: Choice of a price inflator

National Rail - even though the CPI had limitations as a cost-adjustment parameter in infrastructure industries, it is the preferred measure of cost inflation, particularly given the lack of a readily available alternative specific to the rail industry. The CPI is already used throughout Australia for the purposes of price and cost adjustment in regulated industries and, in the context of incentive regulation, has a number of highly desirable characteristics including:

- wide public availability;
- not subject to revision; and
- cannot be materially affected by the behaviour of the regulated entity.

QCA's Analysis

CPI versus a rail specific inflator

The inflator used in setting the incentive mechanism ideally should reflect, as closely as possible, the basket of goods and services used as inputs to the regulated business. There are several alternative indices to reflect these prices. Perhaps the best way of doing this is to use a specially constructed index that weights together the prices of inputs by their shares in industry costs. In the United States, a rail specific cost inflator known as the Rail Cost Adjustment Factor (RCAF) is used for regulatory purposes by the Surface Transportation Board.

However, there is no equivalent index in Australia. Price information is not readily available, particularly given that rail regulatory regimes are yet to fully mature. If an index was to be adopted, the Authority would have to be confident that it could not be affected by the regulated entity itself. The small number of heavy haul railroads in Australia and the relative size of QR to the industry could compromise the reliability of such an index. However, it is possible that an index based on, for example, benchmarks in the maintenance prices contract market could be constructed that would not be unduly affected by QR. Nevertheless, it would be impractical at this stage to construct such an index for QR.

A commonly used alternative is to choose a generally available price index such as the GDP deflator or the CPI. The CPI measures movements over time in the retail prices of goods and services commonly purchased by metropolitan households in Australia. As such it is a general measure of price inflation for the household sector. The Australian Bureau of Statistics (ABS) compiles a series of indexes for each of the state capitals, Darwin and Canberra. A national index is then constructed as the weighted average of the indexes of the eight cities.

These statistics have become frequently used for macroeconomic policy management purposes and as a general measure for the indexation of public and private contracts and charges. In addition, they have been widely adopted by regulators to inflate a regulated entity's cost base. A particular strength of CPI is that it provides a consistent basis for the forecasting of inflation for modelling purposes. This is because capital indexed bonds provide an estimate of the real risk-free rate assuming CPI indexation. This means that CPI indexation is consistent with forecasting inflation by comparing Commonwealth bonds with capital indexed bonds.

However, it should be noted that the CPI is not without its limitations in the context of measuring general price movements. These limitations include several biases,[185] such as:

- substitution bias – the formula does not account for the ability of consumers to substitute across items. The representative but fixed basket of goods and services, commonly referred to as the regimen, fails to account for the fact that consumers will substitute relatively less expensive items for those goods that are now relatively more expensive;

- quality adjustments – the CPI does not capture quality improvements that occur over time. The index is designed to separate price and quality changes and report only the former; and

[185] See Moutlon, B (1996), 'Bias in the Consumer Price Index: What is the Evidence?', Working Paper No. 294, Bureau of Labor Statistics ,Washington. Research has identified the likelihood of additional biases arising from the nature of the sampling process.

- new goods – the CPI does not account for improvements to consumer well-being that result from the introduction of new goods. New items are only introduced following major reviews of expenditure patterns, which are conducted every 10 years,[186] while the component weights are reviewed periodically prior to the compilation of a new series.

Accordingly, whilst the CPI is the best general index available, it is important to recognise that it is not without its limitations.[187]

Both QR and stakeholders identified the desirability of a rail-specific price inflator. However, in the absence of the availability of the requisite data, they supported the use of the CPI because of its simplicity in application, widespread recognition and the clear price signals that it sends. The QCA concurs with this view. While acknowledging that the CPI is not designed for this specific regulatory purpose, the Authority is satisfied that it does provide a sufficiently unbiased and widely accepted estimate of inflation.[188] However, the Authority proposes investigating the feasibility of developing a rail-specific inflator during the first regulatory period.

The range of inputs to QR's below-rail services is very wide. Notwithstanding that a number of these are sourced from outside of Queensland, the QCA considers that it is acceptable for the applicable CPI indicator to be the Brisbane measure as was proposed by QR.

The escalation formula

The amount of the quarterly escalation of QR's reference tariffs is determined by the escalation formula. This is a general formula which proposes that where an access charge has a component for electrical traction as well as for track access, each component will be escalated separately. For systems such as Moura and Newlands which are not electrified, or where an operator contracts to run a diesel locomotive, the electric traction component is irrelevant and the formula collapses to one that escalates the track access charge only. QR have also proposed that only a proportion of the access charge be escalated.

The escalation factor is the ratio of two variables:

- a base figure for the CPI; and

- a CPI value corresponding to a particular escalation period.

In November 2000, QR submitted reference tariff schedules to the QCA for consideration, on the presumption that approved tariffs would be in place by January 2001. These reference access charges are expressed in January 2001 monetary terms, and are proposed to be applicable for the three years until 31 December 2003.

While future inflation will erode the real value of these charges, an indexation would need to commence from the period immediately after commencement of the regulatory period and continue over the term of the reference tariff schedules. QR has proposed that the initial escalation date would be April 2001.

[186] INDECS (1995), State of Play 8, Allen & Unwin, Sydney, p.28.

[187] The Boskin Commission (1996) found that the CPI in the United States consistently overstated cost of living increases by approximately 1.1% each year.

[188] Kiss (1991) in Einhorn, M.A. (ed), *Price Caps and Incentive Regulation in Telecommunications*, Kluwer Academic Publications, United States, p.102, concluded that "… the experience of the telecommunications industry in the United States has been that the CPI provides a useful surrogate for the input price indexes of the regulated telecommunications carriers." For QR, the major input cost relates to infrastructure maintenance. Anecdotal evidence from rail infrastructure maintainers in Australia is that real price reductions are small and steady. This suggests that the CPI is a reasonable proxy in the absence of a better alternative.

A measure of the prevailing general price level needs to be identified as a base or denominator for the escalation factor. QR has proposed that a measure of the CPI for the September 2000 quarter, be used for this purpose. Due to lags in the collection and publication of ABS data, at the commencement of the regulatory period in January 2001, the September 2000 CPI figure would be the most current.

The amount of quarterly indexation necessary is determined by the ratio of the most recently available CPI figure to the base period number. QR have proposed that an escalation to account for the decline in the real value of the access charge during a particular quarter, occurs on the first day of the subsequent quarter (for instance on July 1 for the 3 months to the end of June). Ideally, for the purpose of consistency, the CPI figure for the recently completed quarter, (in this case the June quarter), should be applied to the escalation factor. However at that point in time, the statistic would be unavailable from the ABS. Consequently, QR has proposed to use the most recently available CPI figure, being that for two quarters prior to the quarter of the current escalation date. This is represented in the formula by CPI_n, and in the example considered, would correspond to the March quarter statistic.

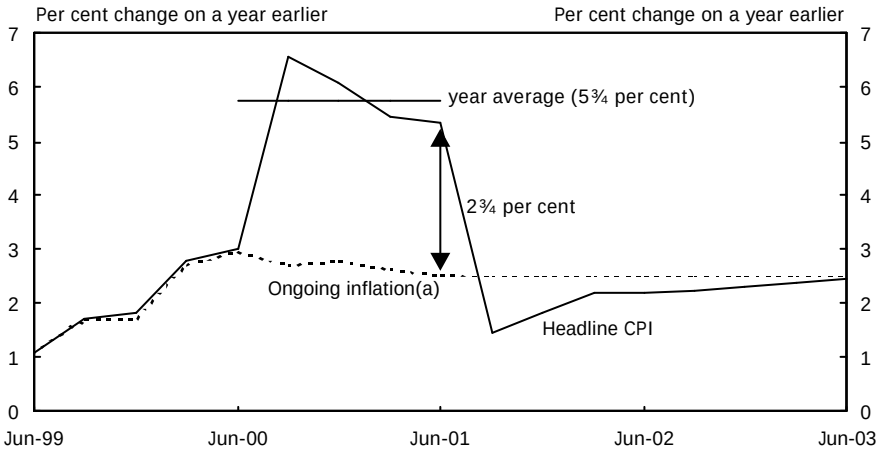
The Authority has adopted a 3-year regulatory period, commencing 1 July, 2001. Consequently, reference tariffs will be expressed in July 2001 monetary terms to coincide with the beginning of the regulatory period. In addition, the base period for CPI escalation calculation purposes would become the March 2001 quarter and 1 October would be the first escalation date.

The QCA is satisfied that the formula establishes an appropriate escalation mechanism for the indexation of access charges over the term of the reference tariff schedules.

Inflationary impact of the new tax system

The implementation of the principal elements of the New Tax System occurred on July 1, 2000. Consequent temporary inflationary effects will not be felt evenly throughout 2000-01 and beyond. This can be clearly seen in Figure 16.1 which compares Commonwealth Treasury forecasts of the headline (or published) CPI rate with the inflation rate which would be expected to prevail had the taxation system remained unchanged.

Figure 16.1: Forecasts of the Impact of the New Tax System



(a) Excludes the impact of *The New Tax System* on prices.

Source: Commonwealth Budget 2000-01 Paper Number 1, Statement 3, Part 5.

The initial or direct effect of the revised taxation arrangements will be to raise the headline inflation figure above the on-going rate. This will take the form of a 'spike' in the September 2000 quarter CPI figure which will flow through to the December 2000, March 2001 and June 2001 quarters. The spike arises because the introduction of the Goods and Services Tax (GST) on retail prices will only be partially offset by the removal of a raft of wholesale sales taxes on final consumption items.

From the September 2001 quarter onwards, the headline CPI rate is expected to fall below the underlying CPI rate, creating a negative 'spike'. This is predominantly a statistical phenomenon due to the fact that the CPI series from September 2001 are derived from the higher post-GST quarterly CPI figures. However, in addition, there are likely to be second-round effects which arise where firms supplying inputs benefit from the abolition of the wholesale sales tax and can pass lower prices onto businesses purchasing these inputs. It is presumed that as businesses gain access to lower input costs,[189] these savings will be passed on to consumers in the form of lower prices of goods and services. Over time, the two series are expected to converge.

Alternative regulatory approaches to GST adjustment

The Australian Competition and Consumer Commission (ACCC) has prepared Price Exploitation Guidelines[190] which emphasise the net dollar margin rule, requiring a business to ensure that its net dollar margin does not increase following the imposition of the GST, thereby passing onto consumers the full effect of the tax changes.

On this basis, the ACCC's approach to GST adjustment involves a two-stage process in which:

- revenues are adjusted to take account of the direct effect on the business of the abolition of wholesale sales tax and the estimated second-round effects of the New Tax System changes; and

- to ensure that profit margins do not increase, revenues/prices are adjusted for the impact of the GST on the CPI. This adjustment occurs in the year following the introduction of the GST because of the lagged CPI indexation and should be maintained through to the end of the regulatory period. It is proposed that the figure deducted from the CPI will be the most up-to-date official Commonwealth Treasury forecast of the spike.

From Figure 16.1 above, the impact of the New Tax System on the CPI has been explicitly modelled by the Commonwealth Treasury. It is of the view that the through-the-year increase in the CPI at the end of the September 2000 quarter is likely to be 6½%, with approximately 3¾% attributed to the one-off price change resulting from taxation reform. In June 2001, twelve months after the introduction of the GST, the tax-related rise in the CPI is expected to be 2¾%.

[189] The removal of wholesale sales taxes and lower diesel excise reduce embedded production and transportation costs and thereby place downward pressure on prices. Business costs can be expected to fall further from July 2001 with the abolition of a range of state taxes including accommodation tax, financial institutions duty and stamp duty on marketable securities. Subject to review by the Ministerial Council for Commonwealth State Financial Relations, debits tax and various other business stamp duties may also be phased out by July 2005. The Authority has assessed the extent to which QR's below-rail costs will be reduced via the withdrawal of wholesale sales tax on inputs as part of its forward looking assessment of below-rail costs. Only costs with the wholesale sales tax component removed have been considered for the purposes of the QCA's assessment of QR's reference tariffs.

[190] ACCC, Application of the Price Exploitation Guidelines to Regulated Industries: The Process, March 2000.

State regulators have not been consistent in the adoption of an appropriate measure and treatment of the CPI-spikes. The approach implemented by IPART in its recent water determinations, for the period commencing 1 July 2000, indicates a preference for an ABS-related measure of the initial spike[191] with which to adjust the CPI inflator throughout the regulatory period. In contrast, the electricity pricing order in South Australia requires the South Australian Independent Regulator to adjust the CPI by 3% over the period 1 July 2001 to 30 June 2002.

ORG's approach, while relying on Commonwealth Treasury estimates, is more comprehensive. Rather than making a single adjustment, it proposes[192] to implement a series of annual adjustments throughout the regulatory period. This includes an adjustment to the pass-through amount in 2001, based on the CPI-spike estimated for that period (3¾% using the September quarter 2000 CPI), and an additional adjustment for each subsequent year when the headline rate is less than the rate of on-going inflation. ORG considers that these additional adjustments, which are expected to be positive and small, are necessary to maintain businesses in an economically-neutral position throughout the entire regulatory period.

Assessment of alternatives

The Authority wishes to ensure that, following the imposition of the New Tax System, QR is left in a neutral position. In this regard, it is just as important not to leave QR worse off by not taking account of all relevant factors. Accordingly, consideration needs to be given as to the manner in which a potential CPI-related windfall gain should be treated and care taken not to leave QR inadvertently disadvantaged.

As a result of the initial spike, reference tariff approvals made in respect of CPI-X price controls, given that the CPI figure is post-GST, will provide QR with a windfall gain unless a compensating adjustment is made. This gain arises due to the different speed of adjustments in the CPI and business input costs. Following the introduction of the GST in July 2000, the CPI rises immediately, reflecting an increase in many retail prices, while the decline in business' input costs occurs over time. In other words, full CPI indexation would compensate QR for rising input prices at a time when they were in fact decreasing.

Consequently, there are two sets of issues associated with incorporating GST impacts into the reference tariff assessment:

- ensuring that the removal of wholesale sales tax is effected from the regulated entity's cost base; and

- ensuring that the CPI statistics are adjusted to take account of the effects of the GST.

WST removal - The wholesale sales tax that was formerly levied on QR's inputs needs to be removed from its cost base. The most significant issue concerned adjusting for the reduction in diesel fuel prices. The QCA has undertaken this task and had the results audited by Arthur Andersen.

CPI adjustments - adjustments must be made to the headline CPI figures for use as the inflator in the regulatory framework. The QCA is of the view that ORG's proposal to make periodic adjustments to the regulatory CPI inflator is consistent with the Authority's objective of ensuring that QR is not adversely affected by the new fiscal arrangements.

[191] See for instance Hunter Water Corporation: Prices of Water Supply, Sewerage and Drain Services – Medium Term Price Path from July 2000

[192] See for instance Office of the Regulator General (2000), Gas Final Approach: Change in Tax Decision – Response to the Goods and Services Tax, prepared in response to notices from Victorian gas distribution and retail businesses, July 2000.

The ABS recently published an experimental constant tax rate measure, in an attempt to isolate and remove the direct or first round effect of the changes in tax rates on the prices of consumer goods and services between June and September 2000 quarters.[193] The results indicated that the New Tax System contributed 1.7 percentage points (or 46%) to the increase in the CPI in the September quarter.

However, the ABS made several qualifications to this measure and cautioned that the measure was a poor guide.[194] It noted further that the Commonwealth Treasury estimates of the price impact of the new fiscal arrangements are more comprehensive because of the incorporation of estimates of the impact of second round effects. Consequently, it has decided not to publish estimates of the measure in subsequent quarters and thus the QCA does not consider it appropriate to apply this measure for the CPI.

On 25 October 2000, the ABS released the September quarter 2000 CPI numbers. They indicated that the all-groups CPI measure rose 3.7% in the September quarter, up from 0.8% in the June quarter 2000, and rose 6.1% between the September quarters 1999 and 2000. This is somewhat less than the through-the-year Treasury forecast of 6½%.

This lower than expected inflation outcome has two implications for the regulatory exercise. First, the inflationary impact of the CPI may well be greater in future quarters, due for instance to an initial reluctance on the part of retailers to pass on price rises. However, it is also possible that CPI adjustments for the negative spike in 2001-2 could also be less than those indicated by the Commonwealth Treasury. This is because the lower than expected September 2000 CPI outcome could ameliorate the negative "spike" expected for the September 2001 quarter.

The QCA's estimation of inflation from the capital indexed bonds has provided an inflation estimate for the purposes of carrying forward the Authority's modelling for the assessment of reference tariffs as at 1 July, 2001. There are two main issues that arise in the context of GST adjustments:

- the initial escalation of access charges will occur on 1 October, 2001. On the basis of QR's escalation formula, this will use the CPI figures from the March and June 2001 quarters. The Authority notes that CPI number from both of these quarters will be affected by the initial positive spike. However, while, the NTS-induced rise in inflation was smaller than expected in the September 2000 quarter, it is possible that its impact in subsequent quarters will also be lessened; and

- the prospect of a negative spike occurring in the September 2001 quarter which will materially understate underlying inflation in that and subsequent quarters. This will influence the escalation factors to be applied from 1 January 2002 onwards.

The Authority proposes to assess these impacts, based on the available information at the time, having regard to the Commonwealth Treasury forecasts and the underlying inflation estimates. Because the March 2001 quarter CPI figure is a crucial component of the escalation process for the duration of the term of the reference tariffs, the Authority considers that it is important to identify a representative value of underlying inflation for that period.

This position will be reviewed before the release of the Final Decision.

[193] See ABS (2000), 'Measuring the Impact of the New Tax System on the September Quarter 2000 Consumer Price Index', a feature article in the Australia Now – A Statistical Profile section of the Bureau's website at http://www.abs.gov.au.
[194] See ABS (2000), 'Price Indexes and the New Tax System', an ABS information paper, May.

QCA's Position

In assessing QR's proposed reference tariffs, the QCA has adopted the Consumer Price Index, Brisbane, published by the Australian Bureau of Statistics as the inflator, adjusted by available information to account for any CPI-spikes.

16.4 Derivation and calculation of the X-factor

The key design issue for both price-caps and revenue caps is the selection of X. X is the real (normally annual) reduction in price (or total revenue earned) by the regulated entity. Often, when assigning an X-factor to a regulated organisation, the focus is on quantifying an anticipated efficiency improvement. In translating anticipated cost savings to the determination of X, regard should be had to the future scope for productivity improvements in the regulated organisation relative to productivity growth in the economy or industry as a whole.

However, in practice, a number of factors beyond anticipated productivity improvement could be considered in making an informed judgement about the quantum of X. Indeed, it may be more useful to consider the X-factor in the context of the underlying rationale for incentive regulation – to provide incentives for the regulated entity to increase the value of its business, or the service it provides to customers, on the basis that some of the value would be returned to customers over time. Often, investments in value-adding initiatives and innovation that may be undertaken by a regulated entity will have little to do with cost savings.

For example, one of the most significant ways in which the owner of the rail network might increase the value of its business lies in its capacity management. This is because an investment in improved capacity management, which allows customers to reduce above-rail costs, would not be reflected in a cost saving for the owner of the network. However, it may be desirable for such an investment to take place. If so, it could be necessary to ensure that QR is provided with sufficient incentives to induce it to undertake necessary investment.

Finally, in this context, incentive regulation also needs to be considered in the context of the wider performance regime. The very purpose of incentive regulation is to focus management attention on particular issues. Accordingly, failure to ensure that all critical aspects of the QR-customer relationship are addressed in the framework could result in important issues being ignored.

QR's Position

QR argued that the X-factor should be set in recognition of QR's definition of reasonable costs. Any shortfall in revenues below the actual costs incurred by QR would be borne by them while any efficiency gains achieved in excess of the adjusted revenue limit would be retained by QR, subject to the benefit sharing mechanism discussed below.

Stakeholder Comments

There was general agreement among submissions that QR should only recover efficient costs.

Table 16.3: Cost recovery

AMC, Stanwell - mechanisms need to be introduced to ensure QR achieves ongoing efficiency improvements which are passed on to customers.

Queensland Government - QR should seek to recover efficient operating costs determined by reference to relevant national and international benchmarks.

Stakeholders proposed various approaches to derive the X-factor.

Table 16.4: The X-factor

Stanwell - the X-factor in the CPI-X formula should be developed such that, over time, QR's pricing is based on best practice operating standards. The derivation of the X-factor should have regard to QR's capacity utilisation, operating cost structure, capital expenditure, etc.

QMC - the assessment of QR's infrastructure maintenance and operating costs is a pragmatic approach to the need to establish best practice performance targets for incentive regulation purposes. The calculation of the X-factor in the incentive regulation model should be significant enough to be genuinely challenging to QR's monopoly precepts while still being achievable.

National Rail - the derivation of the X-factor is extremely difficult and requires extensive analysis and considerable subjective judgement. But the general strategy should be to use a cost-linked X-factor, based on a forward-looking analysis of revenue requirements.

QCA's analysis

The components of the regulatory approach proposed by the QCA are as follows:

- the X-factor;
- the other relevant factors relating to improving the standard of the service provided by Network Access; and
- performance incentives.

X-factor

Introduction - incentive regulation is designed to provide strong incentives for regulated businesses to improve productivity by allowing them to retain a portion of the benefits from doing so. Part of the incentive regulation environment involves compelling regulated businesses to pass on anticipated productivity gains to customers through lower prices. The effective implementation of price cap regulation requires the provision of sufficient incentives for cost reduction and the assurance of adequate revenues, in spite of price reductions to consumers.

The principal objective of CPI–X regulation is to achieve outcomes similar to those that would be achieved in a competitive market. The process of competition leads to industry output prices reflecting industry unit costs, including a normal rate of return on the market value of assets. Because no individual firm can influence industry unit costs, each firm has a strong incentive to maximise its productivity performance to achieve lower unit costs than the rest of the industry. This will allow it to keep the benefit of new, more efficient processes that it may develop until such time as they are generally adopted by the industry.

This process leads to the industry operating as efficiently as possible at any point in time and the benefits of productivity improvements being passed on to consumers relatively quickly.

Because competition in the provision of a railway network is normally limited (even though many of the inputs are subject to, or potentially subject to, competitive pressures), incentives to minimise costs and provide the cheapest and best possible quality of service to users are not strong. CPI–X regulation of such industries attempts to strengthen these incentives by imposing similar pressures on the network operator to those exerted by the process of competition in other markets. It does this by constraining the operator's output price to track the level of estimated efficient unit costs for that industry.

In choosing a productivity growth rate to base the X-factor on, it is important that the productivity growth rate be external to the firm being regulated and instead reflect industry trends at a national or even international level. In this way, the regulated firm is given an incentive to match (or better) this productivity growth rate while having minimal opportunity to 'game' the regulator by acting strategically.

The magnitude of X-factors applied by regulators of other capital-intensive industries, such as electricity, water and gas, may also provide an indication of the scope for productivity gains in the rail sector in Queensland. The following table outlines the magnitude of X-factors currently being applied by Australian regulators in a number of industries.[195]

Table 16.5: X-factors in other jurisdictions

Regulator	Industry / Firm	X-factor (%)
ACCC	Electricity transmission:	
	Transgrid (NSW/ACT)	-1.3[196]
	Gas Transmission (VIC)	2.7
	Airports:	
	Melbourne	4.0
	Brisbane	4.5
	Perth	5.5
	Telecommunications:	
	Telstra's core services	7.5
	Telstra's other regulated services	1.0
IPART	Gas distribution (NSW):	
	Great Southern Energy	0.6
	AGL	1.5

X as a percentage of CPI or a reduction from CPI - QR's proposal for an escalation of its revenue (price) limit for track access and electricification charges by X% of CPI rather than CPI-X is not appropriate. The productivity factor is independent of the inflation rate, not a function of it. In addition, with low inflation, setting X as a percentage of the CPI limits possible real price reductions to a very low level. It would also rule out reductions in nominal prices.

[195] These regimes often allow for changes in input costs that are clearly outside the control of the regulated entity to be passed through to customers. External factors beyond management control that may be passed through to customers are discussed in section 16.6.

[196] With respect to electricity transmission pricing in NSW and ACT, the ACCC's Final Decision to apply an X-factor of -1.3%, that is a net increase in annual revenues, largely reflects TransGrid's sizeable planned capex program that outweighs the operating expense savings identified as achievable during the period. In terms of real savings in operating expenses, the ACCC determined that Transgrid was capable of annual reductions of 1.5% over the regulatory period.

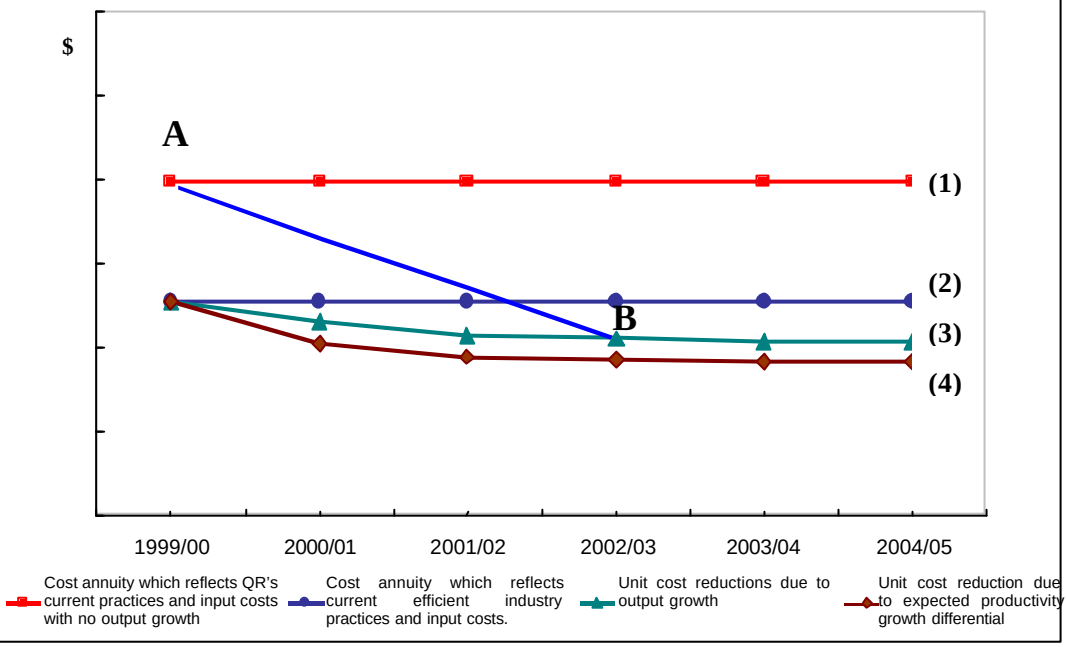
Components of the X-factor - the composition of the X-factor to be applied to the regulation of QR's reference tariffs is more easily understood when it is decomposed into its three basic elements, namely:[197]

(a) an initial adjustment to take account of operational inefficiencies which exist at the commencement of the regulatory process;

(b) an adjustment to take account of any 'gap' that is expected to emerge over the regulatory period between efficient industry practice and the rest of the economy; and

(c) an adjustment to take account of the fact that, typically, natural monopoly infrastructure exhibits declining average cost as output increases.

Figure 16.2: Cost reduction, growth and productivity gains



The approach to be employed in the determination of the X-factor is illustrated diagrammatically in Figure 16.2 above. It shows how the initial productivity adjustment, the growth related gains and the pure efficiency and factor price effects are combined into a single, constant X-factor for the regulatory period.

[197] In addition to the three components discussed above, the X-factor can also be used to reduce the rate at which existing monopoly profits are competed away following the introduction of contestability in the above-rail market. This issue is raised in the context of the public interest in Chapter 1. It may also be appropriate to alter the X-factor to include an adjustment to take account of factors that should be considered in the initial decision but which occur beyond the initial regulatory period. Maintenance expenditure that takes place beyond the 3-year period but which is part of the normal maintenance cycle has been incorporated in the 10-year cash flow model used to calculate annual maintenance charges for the regulatory period. Such costs should only relate to traffic volumes operating during the regulatory period. In other words, maintenance that relates to future growth should not be included in the maintenance costs for the purpose of determining annual maintenance charges for the regulatory period.

Line (1) represents the unit infrastructure cost based on a total cost annuity that reflects QR's current maintenance practices and input costs with no provision for future growth in output. Line (2) represents the unit infrastructure cost based on a cost annuity that reflects current efficient industry practice and input prices, again with no provision for output growth. The gap between these two horizontal lines represents the efficiency adjustment identified above in point (a).

Line (3) traces the reduction in efficient infrastructure costs during the regulatory period that results solely from output growth. The increasing gap between line (3) and line (2) represents the output growth adjustment referred to above in point (c). Line (4) reflects the further reduction in unit costs resulting from the pure efficiency gains expected to occur during the regulatory period as outlined above in point (b). In essence, the difference between lines (3) and (4) is best practice today (line 3) and the likely movement of best practice over time (line 4).

The sloping line AB traces the price path during the regulatory period and allows QR a transitional period during which time it can affect efficiency improvements. However, it makes no adjustment for any gap that might emerge between unit costs in the rail industry and the economy as a whole during the regulatory period. Anecdotal evidence from the rail contracting industry suggests that a 1% per annum real reduction in unit maintenance costs could be expected, based on recent changes in contract rates.

These factors are considered in turn.

Existing operating inefficiencies[198] - the first component relates to the initial efficiency gap. The aim of this adjustment is to ensure that current efficient industry practice is reflected in QR's cost base. There are three alternative approaches to handling this adjustment, namely, the application of a one-off adjustment at the start of the regulatory period, the application of an annual adjustment factor over a transitional period, or a combination of the two. While this adjustment does only relate to existing inefficiencies, it may be implemented over time to lessen the adjustment impacts on QR. Under the latter approach, the annual adjustment factor would be one component of the X-factor to be applied during the regulatory period.

For the first review of QR's reference tariffs, the X-factor to be applied has only taken account of operational inefficiencies that only relate to direct infrastructure maintenance costs. Chapter 12 addressed the evaluation of the efficiency of QR's maintenance activity.[199] In summary, the QCA engaged RMS to study the cost effectiveness of this activity. The study revealed that, on average, QR's infrastructure maintenance expenditure is around 15% more costly than it would have been had it been based on competitively-determined contract rates for the maintenance activities being performed.

[198] Capital efficiency is being addressed separately via the asset valuation exercise where the DORC valuation methodology is being employed.

[199] The absence of a competitive underlying market renders the evaluation of QR's performance in the provision of the remaining regional and system-wide support functions extremely difficult. However, the Authority's assessment was that an allocation of QR's current costs fell at the upper bound of a reasonable range for the provision of these services for a stand-alone coal railway.

Future productivity gains - the X-factor to be applied to QR's reference tariffs should, in addition to existing inefficiencies in maintenance costs, reflect:

- the productivity differential which identifies the extent to which the rail sector can improve its productivity more rapidly than other sectors of the economy; and

- the input price differential which distinguishes the extent to which the rail sector's input prices grow less rapidly than the general economy-wide price level.

Thus, if the regulated industry has the same productivity growth and rate of input price increase as the economy as a whole, then the X-factor attributable to this component would be zero. If the regulated industry has a higher (lower) productivity growth, or a lower (higher) rate of input price increase than the economy as a whole and these trends were expected to continue, then the X-factor should be positive (negative).

The scope for future productivity gains can be assessed having regard to:[200]

- productivity gains achieved by railways and infrastructure providers. Whilst over the last decade railways have achieved significant productivity improvements, much of this can be explained by reference to 'catching up' with best practice rather than improving on it. Efficiency gains in the performance of the contract maintenance sector have not been, and are not expected to, be great;[201] and

- more general economy-wide productivity trends – productivity growth in the economy as a whole has been relatively high in recent years as a consequence of sustained growth[202] and technological change.[203]

Input costs for track maintenance are comprised of labour (30%), consumables such as rail, sleepers, ballast and signalling equipment (20%) and capital (50%). Most of the price and cost information needed to assess input price changes at the required level of activity is difficult to obtain or simply not available.

However, it is reasonably clear that the combination of relative productivity improvement and relative input cost change manifests itself in a rate of real increase or decrease in the contract maintenance industry. Anecdotal evidence suggests that real maintenance costs can be expected to continue to decline by around 1% per annum.

[200] While it may be possible to speculate on the potential improvement in industry practices and input prices in a similar way to that employed in determining the P_0 adjustment, such speculation would be extremely unreliable.

[201] According to the Productivity Commission, the annual improvement in the productive efficiency of Australian rail freight services over the period 1989/90 to 1997/98 was in the order of 3.7 to 8.2% depending on the productivity measure applied. Individual performance varied considerably, with QR achieving an average rate of improvement of between 2.5% and 6.1%. Productivity improvements achieved by North American freight were estimated to be in the order of 2.5% to 4.8% over the period 1990 to 1997. Growth rates in other countries over similar time periods varied between –4.5% (Portugal) and 7.1% (Great Britain). These productivity estimates reflected integrated operations and did not separately consider maintenance activities. NERA, in a report for the Office of the Rail Regulator in the UK, estimated productivity growth in US maintenance activity at approximately 3% per annum between 1986 and 1999. It is not clear from the report whether this assessment considered this growth in isolation or relative to productivity growth in the economy as a whole.

[202] Productivity growth tends to exhibit cyclical patterns related to the business cycle. During periods of high economic growth the level of investment in new and technically superior capital infrastructure increases giving rise to productivity growth. The current upward trend in productivity growth has been associated with the longest period of continuous growth on record.

[203] In the period 1993-94 to 1997-98 productivity growth averaged 2.4% per annum compared with an average annual growth rate of 1.4% since 1964-65. The Productivity Commission considers productivity growth will slow but is likely to remain above historical levels.

Since maintenance costs account for less than one-third of total cost, this rate of reduction might be expected to equate to a 1% reduction in total cost over a 3-year period. The Authority does not intend to incorporate this further productivity improvement in the calculation of the X-factor to be applied during the initial reference tariff period, instead incorporating it in subsequent review periods.

Asset utilisation and output growth - the third element that should be reflected in the X-factor is the output growth related productivity gains. These gains arise principally from the improvements to asset productivity from higher traffic densities (and, to a lesser extent, scale economies in track maintenance). These gains will need to be taken into account in determining the overall X-factor to be applied to QR's reference tariffs for the coal region.

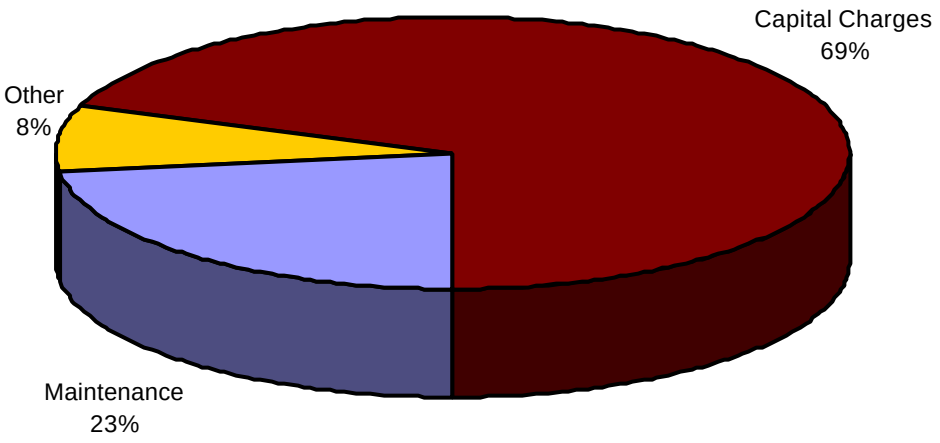
QR expects substantial growth in traffic volumes over the 5 years to 2004/05 with total coal traffic expected to increase from 44.3 billion GTK in 1999/00 to 50.4 billion GTK in 2004/05 (14%). While increased traffic volumes will give rise to some additional costs, it will also lead to an overall reduction in unit costs.

The QCA's approach is to assess the cash flow impacts of increased output by explicitly reflecting scale economy and density-related effects. Hence, no further adjustment to the X-factor is considered necessary. If output growth is materially higher or lower than that forecast, then a review of reference tariffs may be triggered. This is discussed in section 16.6 below. Otherwise, variations from expected tonnage levels that do not trigger tariff reviews will be taken into account in growth forecasts at the scheduled review of reference tariffs in 3 year's time.

Transitional path - QR pointed out that too difficult a transition path might reduce its incentive to undertake productivity improvements. Regard needs to be had for QR's capacity to achieve efficiency gains. If, for example, QR is unable to cover actual operating costs from cash flows, its financial viability will be undermined, with possible reductions in the quality of services provided. For instance, in an effort to improve cash flow, QR may defer maintenance, leading to speed restrictions and greater costs to above-rail operators, due to derailments. Therefore, it is necessary to weigh the benefits of appropriate incentives and gains from efficient costs against the detrimental effects of imposing too difficult a transition path to an efficient cost structure.

The adjustment levels vary across maintenance activities due to different capital/labour intensiveness, usage of materials and variations in the difference between internal and external contract rates. Overall, RMS estimated an efficient annual maintenance cost of approximately $13 million less than that proposed by QR. However, because maintenance expenditure constitutes less than 30% of total cost for the provision of the network (figure 16.3), this translates into an adjustment of approximately 5% of total below-rail costs over the period.

Figure 16.3: Coal region total below-rail costs 2000/01



Source: QCA Analysis

Implementing this efficiency adjustment over a three-year period would require the application of an X-factor of 1.5% per annum.

The QCA recognises that it may be unrealistic to expect QR to achieve efficient costs from the outset of the access regime. However, given the magnitude of the proposed adjustment, a transition path of 3 years should provide QR with sufficient time to manage the cash flow implications of the change, as well as undertake significant productivity improvements. The QCA would expect the transition to take place at a uniform rate.

Other components of the regulatory framework

A rail network provides a physical connection upon which transportation occurs. The network does not provide the actual transportation, but facilitates it through the provision of transport capacity (as does an oil or gas pipeline and an electricity grid). The value of the network is therefore a function of the trade it engenders.

Train operators require access to the capacity provided by QR's track in order to operate train services. Consequently, rail infrastructure provides a capacity service - the capacity to transport products and people between specified origins and destinations. However, the capacity service provided by rail infrastructure operates as part of a wider chain which includes the following facilities:

- the mine;
- the stockpile at the mine;
- the loadout;
- the rail transport system (that is, below and above-rail);
- the discharge pit at the port;
- the stockpile at the port; and

- ship loading infrastructure.

The coal chain represents the series of complementary, yet to some extent substitutable, links in the transportation of coal from the mine face to the ship. For example, stockpiles at the mine and the port may help improve utilisation of the rail infrastructure by allowing railings to be more constant. Therefore, it is important to recognise that QR's Draft Undertaking only addresses one link in this chain. In order to produce the best result, the nature of the regulatory environment for Network Access should be considered in the context of the chain as a whole.

Markets do more than impel participants in the market to operate more efficiently. They also provide an incentive for market participants to better identify and fulfil customer desires. Indeed, the whole concept of efficiency can only be considered in the context of the factors that a customer values most.

Consequently, whilst the Authority acknowledges that the focus in the setting of the X-factor in regulatory exercises is normally on productivity-related concerns, it is useful to consider it in a slightly different light. The Authority views the X-factor as the vehicle for returning the economic value that is created by the regulated entity to users.

Lower prices, through the application of the X-factor is only one dimension to this process. In other words, the value created by Network Access, both for itself and its customers, goes beyond procuring efficient maintenance of its track and its other operations.

In practice, the gains to emerge from taking steps that improve the productivity of above-rail operators will significantly exceed those that arise from more efficient maintenance and operational activities. For example, reducing cycle times by up to 10% (and possibly even more) through reducing transit times and improving interfaces with ports could decrease total haulage costs by nearly 5%. A 10% reduction in maintenance costs would lower total haulage costs by less than 2%. Consequently, the gains by improving the former could exceed the gains from reducing maintenance costs.

Clearly, if a regulated entity has no incentive to create this value there will not be any benefit to assign, other than perhaps the productivity shortfall that is identified through benchmarking studies. However, it would not be appropriate to immediately confer all of the benefit of any value created through the efforts of Network Access to it for the following reasons:

- Network Access cannot secure all of these benefits by itself – instead its role in the process will involve co-operating with the ports, the mines and above-rail operators. Consequently, the issue arises as to how these benefits are assigned between these parties; and

- where Network Access reduces transit times or reduces variability, above-rail operators must be able to internalise the benefit from these improvements – this might involve sufficient notice being given to enable adjustments to be made to above-rail operations and is likely to require contractual commitments to deliver reduced or more reliable transit times.

Network Access will almost certainly play a major role in securing these benefits as it is responsible for the scheduling process. It will also be responsible for investing in and maintaining the network. Accordingly, the regulatory environment should provide it with an incentive to pursue this function with a view to improving above-rail productivity.

However, given the data limitations and the limited involvement of other partners in the coal chain, the Authority considers that it is too difficult to establish appropriate arrangements for the first regulatory period. Indeed, at this early stage in the maturity of the regulatory environment, the QCA's key concern has been to ensure that more sophisticated arrangements are able to emerge in the future. However, the Authority will be keen to pursue these issues in the context of future reviews.

Performance incentives

The QCA's proposed performance reporting regime is set out in Chapter 5. However, a further issue concerns whether, and if so how, performance incentives should be established in the regulatory environment. Clearly, Network Access can only be responsible for below-rail faults.[204]

At this stage of the regulatory process, it is premature for the regulator to be establishing a performance regime. Instead, the negotiation of appropriate arrangements will occur in the wider context of the negotiation of the access agreement.

In this context, it is evident that transit times will be a critical factor for above-rail operators. However the issue of transit time must be considered in the wider context of the recoverability of the above-rail operator's weekly and monthly tonnages. There will normally be some opportunity to make up tonnages that the above-rail operator is obliged to deliver. This, in turn, highlights the importance of the capacity entitlement that an operator negotiates with QR.

Accordingly, the Authority would regard the following issues as being important in the negotiation of a performance incentive arrangement as part of an access agreement:

- the cost associated with an unutilised train. This cost is similar in quantum to the demurrage incurred for a ship;
- the recoverability of the above-rail operator's weekly and monthly tonnages in response to a failure on Network Access' part to meet its transit time commitments; and
- the loss that an operator (or an end user) suffers in not meeting customer expectations that is consistent with the rights contained in the access agreement.

QCA's Position

In assessing reference tariffs, the QCA considers that the escalation factor should be derived using a CPI-X framework, with an X-factor of 1.5% to be applied for each year of the regulatory period.

16.5 Sharing of efficiency gains

The essence of incentive regulation involves offering the regulated organisation an incentive to outperform the X-factor, as doing so will enable it to increase profitability. However, the incentive to outperform is likely to be undermined if the organisation believes its out-performance will be immediately returned to customers at the end of the period (especially if the regulatory review period is relatively short - for example, QR currently proposes 3 years in its Undertaking).

[204] If QR's above-rail business groups engaged in an anti-competitive behaviour to prevent entrants utilising their capacity entitlements, then action may be taken under the Trade Practices Act 1974 and the Queensland Competition Authority Act.

However, part of the desirability of incentive regulation stems from the fact that customers should ultimately share in any benefit of superior performance. Questions therefore arise as to:

- whether different considerations apply where determination of the X-factor is based on providing a transitional phase for the removal of monopoly profits;
- the extent to which out-performance of the X-factor benchmark should be shared with customers;
- the period over which it should be shared with customers; and
- the profile of the sharing arrangements.

There are several possible approaches that may be adopted to share the benefits of out-performance of X with customers, including:

- a glide path – gains are passed onto customers either entirely (full glide path) or partially (partial glide path) over time. This allows the regulated organisation to realise the profit benefits of efficiency gains for a period beyond the regulatory review period (for example the out-performance may be spread over the next regulatory review period);
- one-off reductions – gains in excess of those stipulated through X in the previous period are passed directly onto consumers in the development of new service prices at the commencement of the next price review; and
- gains maintenance – the full gains for each year are retained by the regulated organisation for a pre-specified time (for example 5 to 10 years) unconnected to any regulatory review, whereupon gains are passed onto customers in a one-off or phased reduction.

In practice, there are many judgements to be made in applying a benefit sharing arrangement. This merely reflects the range of possible variations. For example, a glide path could incorporate a one-off reduction at the commencement of the following review period. It could return the benefit of out-performance over a long period (say, 10 years) or a shorter period (say, 5 years). The key issue to be considered is the trade-off between the passing-on of benefits to customers in a reasonably timely fashion, against the risk of reducing the incentive for regulated organisations to pursue efficiency gains in excess of the X-factor.

In addition, it might be expected that the approach adopted would have some impact on the regulated organisation's incentive to pursue efficiency gains at the beginning and the end of regulatory review periods. For example, where out-performance is passed onto customers as a one-off reduction, the regulated organisation will have little incentive to invest in efficiency enhancements towards the end of any regulatory period.

QR's Position

QR acknowledged that efficiency gains in excess of the 'efficient cost' benchmark should be subject to benefit-sharing arrangements operating through changes to QR's revenue limits and resulting reference tariffs. QR proposed that a full glide path approach over the next regulatory review period (that is, in years 7 through 12) be employed to achieve the appropriate level and timing of benefit sharing. Therefore any cost reductions, excluding those covered under the definition of material change events and productivity improvements resulting from higher than expected growth assumptions achieved in years 1 through 6, would be returned to operators through glide path adjustments in years 7 through 12.

However, where reference tariffs are expected to produce an amount of revenue significantly less than the prescribed revenue limit (for example, in most of the non-coal systems), the reference tariff need not reflect the benefits of QR's out-performance of its reasonable cost benchmarks. QR stated that the regulatory regime should not constrain QR's improvement in financial performance in these instances unless it is likely to result in QR earning excessive returns.

QR further argued that if it did not achieve the efficient cost target in regulatory review period one (years 1 – 6), and a review of efficient costs conducted at the commencement of regulatory review period two found that the original target was unreasonably set, then the efficient cost target to apply to the second regulatory review period should be updated.

Stakeholder Comments

Stakeholders proposed various ways in which efficiency gains could be shared between QR and end users.

Table 16.6: Sharing of efficiency gains

National Rail - it is not desirable to specify a priori a detailed plan for the transfer of benefits at the end of the regulatory period because the actual sources of the profit increase needs to be considered as well as the magnitude. Consequently, the QCA should be given some discretion in this regard. The shortness of the regulatory period, however, may restrict the capacity of the QCA to redistribute benefits to users in subsequent regulatory periods.

Queensland Government - efficiency gains should be shared between QR and its customers, through the use of the glide path method.

Stanwell - the redistribution of efficiency gains should be affected through the commercially acceptable arrangements negotiated between QR and third-party operators. The role for the QCA in this framework would be minimal.

FreightCorp - in order to provide sufficient incentive for QR to reduce costs, prices charged should reflect an entity operating at full efficiency. QR would then keep 100 per cent of any efficiency gains it actually makes. The 'full efficiency' cost structure should be reviewed periodically, say every 3-5 years.

QCA's Analysis

The essence of incentive regulation involves offering the regulated organisation an incentive to outperform the X-factor, as this will enable it to increase the value of its business. However, the incentive to outperform is likely to be undermined if the organisation believes the benefits will be returned to customers at the end of the period.

There are several possible approaches to share the benefits of out-performance of regulated efficiency gains with customers. Regulators in other jurisdictions have used all of the following approaches:

- adjusting the prices at the beginning of the next review period to take account of out-performance, either immediately (P_0 adjustment) or over time (glide path);
- adjusting on a rolling basis; or
- adopting an earning sharing mechanism.

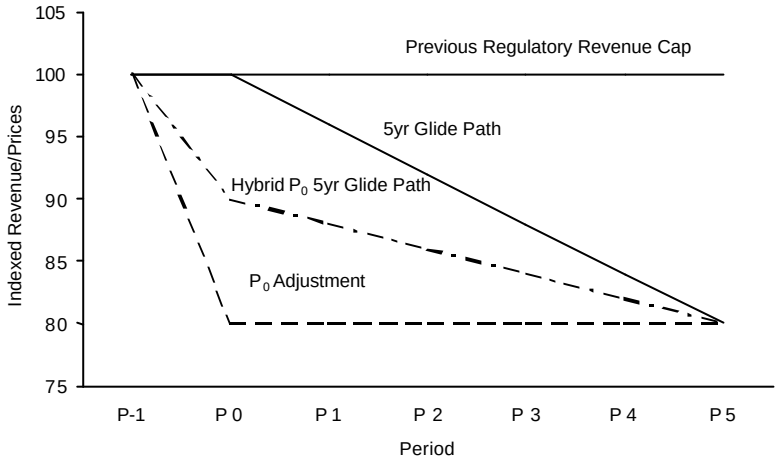
Adjusting initial prices[205]

One approach to benefit sharing between consumers and the regulated firm is adjusting the initial price and then applying a standard X-factor from that point onwards. This approach has the advantage of providing a more immediate benefit to consumers but can be expected to have adverse incentive effects.

A variation on this approach involves establishing a period over which previous period out-performance will be returned to customers. This is known as a glide path. A glide path approach partially overcomes the risk that regulated businesses will have no incentive to out-perform the X-factor by enabling them to retain some of the benefit from doing so in future periods.

These alternative approaches are illustrated in Figure 16.4.

Figure 16.4: Possible adjustment mechanisms



The difficulty with both approaches is that they encourage the regulated business to strategically alter their actions towards the end of regulatory periods in the hope of influencing future regulatory decisions to their advantage. For example, the regulated business might shift the timing of key activities, such as moving forward key maintenance activities or not adopting efficiency improvements before the review date, in order to influence the regulator to set a lower X for the next review period. The regulated business is then able to implement cost savings and gain an increase in its profits for the rest of the next fixed review period.

This approach does not mimic the operation of a competitive market because it involves periodic, relatively ad hoc changes rather than more gradual, smooth changes. It also does nothing to address the issue of windfall gains and losses.

[205] A variation of this approach is the productivity stretch factor approach which has usually been adopted where industry-wide data is used to identify productivity and input price growth rates so that the X-factor for a number of firms in the industry can be determined. The productivity stretch factor is used to tailor the regulatory regime for the circumstances of each particular firm. It distinguishes between productivity levels and productivity growth rates. Normally, firms that are at the forefront of industry performance have high productivity levels but low productivity growth rates. This is because they have removed all unnecessary slack from their operations and are only able to increase productivity at the rate of technological change for the industry. Conversely, laggard firms normally have low productivity levels but are potentially capable of high productivity growth rates. This is because they can make some easy gains by removing the slack from their operations to mimic the operations of the industry's best performers.

Rolling forward the X-factor

The rolling X-factor approach uses new productivity information which progressively becomes available to periodically update the price cap. For instance, instead of a review on set dates every 5 years to set the X-factor for the following 5 years, based on past productivity performance, the rolling X-factor approach would automatically update the X-factor each year to incorporate the latest productivity data. Thus, this year, the productivity data for last year would enter into the averaging formula and the data for the fifth year previous would drop out.

The main advantage of a rolling average approach is that there is reduced incentive for the regulated business to manipulate the system by changing the timing of key activities or initiatives. This is because the firm now has limited ability to influence the X-factor because any reduction in productivity in the current year will only have a small impact on the X-factor next year but will have an immediate detrimental impact on the firm's profits. Consequently, the change in the price cap is gradual rather than occurring in large, discrete steps at the end of each fixed review period.

As such, the rolling average approach more closely approximates the workings of a competitive market where change is generally more gradual and smooth. The rolling average approach also provides less incentive for both the firm and the regulator to divert management time and devote large amounts of resources in an attempt to influence key 'make or break' decisions towards the end of each fixed term review period.

The rolling average approach also addresses the issue of windfall gains and losses by progressively incorporating the effects of unforeseen circumstances that have either a positive or negative impact on the regulated firm's profitability. Risk is thus spread between the firm and consumers. The firm will be able to take advantage of windfall gains in the short run but these will be progressively fed into the price cap and passed on to consumers. Conversely, the rolling average provides a predictable mechanism for sharing the cost of windfall losses between the firm and consumers over time.

The keys to this approach working effectively are that the rolling average formula does not change in the future and secondly, the annual productivity growth figure is determined within a rigorous and impartial framework. The approach is used in the US for Class I railroads where the price cap is updated annually to incorporate the latest total factor productivity data within a 5-year rolling average. Productivity is calculated at the industry level by an independent agency.[206]

[206] In Victoria the Office of the Regulator General has recently announced an 'efficiency carry-over mechanism' for electricity distributors which also attempts to overcome the incentive for the regulated firm to game the system by strategically changing the timing of productivity enhancing actions. If a distributor is able to achieve an expenditure in any year that is lower than the benchmark it was set for that year, it is allowed to keep the benefits of that lower expenditure for the ensuing five years, regardless of the timing of subsequent regulatory reviews. Conversely, expenditure in excess of the relevant firm and year specific benchmark incurs a penalty that would not be compensated for for a period of five years. No attempt is made to distinguish between management induced efficiency improvements and windfall gains. The ORG estimates that benefits are shared around 30:70 between distributors and consumers in net present value terms. This mechanism differs from the rolling X-factor approach in that it requires significantly more detailed knowledge of the firm's future expenditure and output levels in order to set the cost and revenue benchmarks against which actual performance can be assessed.

Earnings sharing mechanisms

Earnings sharing mechanisms base changes in price caps on the regulated business' return on equity. If the return on equity moves above a specified range then the price cap is tightened, while if the return on equity moves below the specified range the price cap is loosened. The earnings sharing mechanism has the advantages of being easily understood, predictable and can readily handle windfall gains and losses.

However, it has a number of incentive problems. In particular, it dulls managers' incentives to reduce costs as they know the benefits to the firm will be partly taken away in the following period and thereby creates a strong incentive to shift costs.

Analysis of alternatives

Whilst the QCA is attracted to a mechanism that minimises the incentive for QR to change its conduct in anticipation of being able to influence future review outcomes, the absence of an effective proxy for movements in the efficiency of below-rail operations limits the alternatives for sharing out-performance.

Accordingly, out-performance by QR during the first regulatory period will be analysed with a view to identifying whether cost reductions during the first period are the result of genuine efficiencies or deferrals that QR incorporates into second period cost forecasts.[207]

To provide certainty, the Authority intends that out-performance in the first regulatory period will be carried forward in accordance with a gains maintenance approach, which will enable QR to retain the benefit of outperformance for 5 years. For example, if the assessment undertaken as part of the next review period reveals outperformance in year 2 of the initial regulatory period, then QR would retain that benefit for a further 4 years. This approach is more invasive than the Authority considers appropriate in the long term. During this first regulatory period, the Authority intends to further investigate measures to enable a rolling-forward approach to be adopted as part of the second period review.

Finally, any reduction in ballast cleaning on the Goonyella system, attributable to the fouled state of the ballast should be excised from the assessment of out-performance as this expenditure has already been effectively deducted from QR's opening asset value through the Authority's assessment of the level of depreciation to be applied to these assets.

QCA's Position

In assessing QR's proposed reference tariffs, the QCA proposes that QR retain any gains from out-performance for the term of the regulatory period and that a glide path be applied in the next review period following an assessment of the source of out-performance.

[207] It is recognised that deferrals of expenditure represent an efficiency in its own right. This will be recognised in the regulatory arrangements as QR will effectively retain the benefits from deferrals of expenditure for at least the review period.

16.6 Triggers for the review of reference tariffs

Reference tariffs are intended to reflect the cost structure of the regulated firm, adjusted where appropriate to reflect efficient costs. A cost passthrough allows (requires) a regulated organisation to increase (decrease) its price or revenue cap in response to an increase (decrease) in an input cost that is both typically beyond the regulated organisation's control and readily observable.

Cost pass-through arrangements shift the risk associated with a specific input cost from the regulated organisation to the customer. However, because cost pass-through usually only applies to costs that are beyond the regulated organisation's control, the approach could be seen as a way to avoid regulated organisations being subject to windfall gains and losses.

Price caps assign the risk associated with variability in output to the regulated business. Accordingly, the issue arises as to whether or not thresholds should be established beyond which reference tariffs are reviewed to reduce the risk to the regulated entity of sharp downturns and to allow customers to share in the benefits of greater than expected increases in output.

QR's Position

QR argued that it is appropriate for its revenue limit to be adjusted to take account of events that are entirely outside of its control. Without such an adjustment, QR would be faced with windfall gains or losses.

QR proposes that a reassessment of reference tariffs be triggered by the occurrence of a material change event. If a material change event occurs that could reasonably be expected to result in QR materially exceeding its revenue limit, QR proposes that it will notify the QCA of that fact. This notice would trigger a review of the reference tariffs. QR also reserves the right to notify the QCA of the occurrence of any other material change event (that is one that causes QR to fail to recover its revenue limit): sub-clause 5.3.2.

QR proposes that the results from a review of the reference tariffs would apply retrospectively from the date the trigger occurred. QR proposes that the assessment be limited to preserving the financial position of QR, compared to the position QR would be in if the material change event did not occur and that any amendment should apply for the remaining life of the reference tariff.

Events proposed by QR to trigger a review would include:

- factors imposed by any government agency, department or court;
- a change in the cost of capital;
- changes in traffic volume; and
- changes in the cost of business inputs outside the control of QR.

With respect to the change in the cost of capital, QR proposed that it is appropriate to incorporate significant changes (that is, those greater than a 100 basis point movement in the 10-year Commonwealth bond rate) in the list of review triggers for immediate pass-through to reference tariffs. QR also acknowledged that any change in the reference tariff as a result of this review should only reflect the degree to which the annual escalation of reference tariffs (that is the X% of CPI adjustment) will not compensate QR for any change in interest rates.

QR recommended that, with regard to volume changes, the review and immediate pass-through into reference tariffs will only occur for volume changes outside the range of approximately ± 10% of the expected traffic volume over the reference tariff review period. The volume review trigger will only apply to coal carrying services. For other services where QR is unlikely to earn revenues approaching revenue limits, QR does not consider it appropriate to adjust reference tariffs for increases in traffic volumes.

The review of reference tariffs at the end of the 3-year reference tariff review period would only adjust tariffs to reflect minor changes in the cost of capital, minor changes in volume and changes in other cost inputs over which QR had no control. In addition, the reference tariff would be adjusted at this time to reflect other issues such as variations to QR's anticipated capital investment program. Also a full review of the reasonable/efficient costs would also occur where the reference tariff review period coincides with a regulatory review period.

Stakeholder Comments

There was no consensus as to whether interest rate changes should trigger a review of reference tariffs.

Table 16.7: Reference tariff review triggers

Stanwell - reference tariffs should only serve as an indication of access charges and the final agreed tariffs should be based on contractual negotiations between QR and operators/customers. Interest rate changes should not trigger an interim tariff review.

QMC - QR's definition of a material change event is too broad, for example interest rate changes should not be included as an interim trigger given the intention to review tariffs every three years.

Queensland Government - an investigation should be carried out to measure the potential for the CPI to not fully reflect interest rate changes. If interest rate changes are not fully reflected in the CPI figure then they should trigger price reviews.

FreightCorp - price stability should be the guiding principle determining the frequency and extent of price reviews. Therefore it is inappropriate to use frequent events, that is annual events, to trigger reviews of reference tariffs. On this basis, changes in interest rates should not be defined as a material change event unless it was in the order of say 4 to 5 percentage points. An annual review of prices will sufficiently capture movements in the CPI.

QCA's Analysis

The QCA's concerns with QR's proposed approach are two-fold:

- the definition of material change event is too wide; and
- the application of the test is not symmetrical.

Width of the test

The definition of a material change event incorporates several matters that increase the uncertainty of the arrangements by allowing reference tariffs to be potentially reviewed upon the following events:

- factors imposed by any government agency, department or court;
- a change in the cost of capital;
- changes in traffic volume; and

- changes in the cost of business inputs outside the control of QR.

QR proposes that reference tariffs be potentially reviewed whenever there is a change in the law, the interpretation of the law, or the term of a permit which is either favourable or unfavourable to it. In the QCA's view, such a wide range of triggers creates considerable uncertainty which is unnecessary and represents an inappropriate assignment of risk from QR to its customers.

Incentive regulation normally assigns the risk associated with cost changes to the regulated business, as is the usual case for organisations operating in competitive markets. The Authority considers similar arrangements should apply for the provision of access to QR's network.

However, in theory, the incidence of a tax will fall relatively more heavily on the supply side where it is relatively less elastic (or less responsive to the price change) than the demand side. The converse also holds.

Consequently the QCA accepts that a change in a tax should constitute a material change event, but only where that change materially affects QR's commercial position. It is likely that this would require case-by-case consideration by the QCA, rather than allowing automatic pass through of costs. However, the Authority considers changes in costs induced by factors other than tax changes should not trigger reference tariff reviews during the regulatory period. These other changes in the cost of QR performing its functions would be reassessed in conjunction with future regulatory reviews.

The QCA considers that the interest rate risk that is assumed by QR is a risk for which it is compensated through its weighted average cost of capital. Establishing triggers to review QR's weighted average cost of capital in the event of a material rise in interest rates during the course of a regulatory review would have the effect of reducing its assessed rate of return. It would also assign a risk to users that access charges could become very unstable during the course of a regulatory review period. Accordingly, this proposal is not accepted.

The issue of the volume collar to be applied to the review of reference tariffs is of particular significance for several reasons. First, it effectively defines whether QR is subject to a price or a revenue cap and thereby assigns volume risk between QR and its customers. The importance of this issue is highlighted by the fact that traffic levels will largely drive QR's earnings. Moreover, there is considerable uncertainty surrounding the impact of the totality of QR's Draft Undertaking on industry output.

The QMC has suggested that reviews of reference tariffs be triggered by a 5% shift in traffic levels relative to those assumed for the reference tariff analysis. QR has proposed a 10% collar so that traffic levels beyond this would cause a review of reference tariffs.

The QCA considers that 10% is a more appropriate margin against which to assess whether or not reference tariffs ought to be reviewed. This is because the regulatory period is relatively short and that it is desirable there be a measure of certainty in the first price review.

Application of a symmetrical test

The reason that the application of the test is not symmetrical is that QR may request a review of reference tariffs at any time a material change event occurs which results in QR in being below its reference tariff. However, the occurrence of a material change event that results in QR exceeding, but not in QR's view in a material way, its revenue limit would not cause a review of the reference tariffs.

The Authority considers that the only reasonable way of addressing this concern is for the QCA to perform the role of assessing whether or not a material change event causes QR to materially exceed or fall below the revenue forecast contemplated at the time the reference tariffs were settled.

In performing this role, the QCA notes that QR's proposed approach allows for a 10% deviation in respect of changes in volumes, and that is the order of magnitude the QCA considers is appropriate for a tax change to be material. Moreover, changes in several taxes will feed into the CPI itself and care would have to be taken to avoid double counting such an effect. Finally, if a review is to be undertaken, it is desirable that the trigger event be assessed in the context of all relevant departures from the assumptions that underpinned the assessment of reference tariffs.

QCA's Position

In assessing QR's proposed reference tariffs, the QCA:

- **has limited material change events to a change in taxes or a departure in actual traffic volumes of greater than 10% from the forecasts adopted in the QCA's analysis of QR's reference tariffs; and**
- **considers any review would have to take account of the totality of departures from forecasts that underpinned the Authority's original assessment of reference tariffs.**