



Assessment of the path-based pricing proposal in the 2016 Hunter Valley Access Undertaking

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Summary

ARTC's proposed Hunter Valley Access Undertaking (HVAU), submitted to the ACCC in late 2015, contains an important change to the price structure for trains that use its network.

ARTC proposes to change the basis of the 'take or pay' (TOP) component of charges from an approach based on the ideal characteristics of a train using ARTC's network (the indicative service approach) to an approach called 'path based pricing'. A key feature of this change is the change in pricing unit from gross tonne kilometres (GTK) to train path kilometres (Train Km).

The ACCC asked Frontier Economics to provide advice on whether this proposed change to pricing is appropriate for the purposes of assessing ARTC's undertaking under the provisions of the Part IIIA National Access Regime.

This request for advice included: an assessment of industry submissions; estimation of the impact of the change on users; and consideration of whether, if path based pricing was considered a suitable approach, Train Km was the appropriate pricing unit to use.

Our approach

For the purposes of our report, we consider whether the proposed pricing approach should be accepted as appropriate. Our understanding is that, under the Part IIIA provisions, the ACCC cannot consider whether the method proposed is the *best* method that might be used in the circumstances.

With that context, our view is that the 44ZZCA pricing criteria within Part IIIA provide general guidance but not prescriptive instructions on how access prices should be set. Of most relevance to our assessment are the objects of Part IIIA, which include to promote the economically efficient operation of, use of and investment in the infrastructure by which services are provided.

We first give consideration to economic efficiency and pricing, and develop some principles to assist the assessment of price structure. In summary:

- Good price structures are those that encourage efficient usage of capacity and investment in capacity, but are (relatively) objectively determined and verifiable, simple, practical and give confidence to access seekers about their own investment decisions.
- As much as is feasible, prices should reflect cost causation – costs should be borne by those who cause the costs to be incurred, and reflect how they are incurred.

Assessment of the proposed pricing approach

The arguments in favour of path based pricing are that it:

- is a simpler and more transparent approach to deriving prices
- incentivises the use of heavier and longer trains which is consistent with the efficient use of existing network capacity and promotes better decisions on network investment.

Both of these are relevant to economic efficiency.

The first argument seems to be broadly accepted by stakeholders as a benefit, as the current indicative service approach has been complex and contentious among users. The magnitude of this benefit is difficult to quantify.

In considering the second argument, we first consider the link between the proposed price structure (based on Train Km) and the costs incurred by ARTC. In network industries such as rail, cost causality rarely gives definitive answers on price structure because there are many users, multiple cost drivers and some costs that are not closely driven by output at all. This invariably leads to a degree of judgement in assessing causality.

Our brief review indicates that cost causality principles could provide support for a range of charging methods for the TOP component of prices. We would expect that the costs of network capacity, which are fixed in the short run, would be driven by the length of track in the long run, so it would be reasonable for these costs to be recovered in a path based Train Km charge. However, these costs might also be driven by the number of paths and the characteristics of trains (for example, the train weight and length), and arguably this also could be reflected in charging. Other costs might be best recovered without reference to capacity shares at all.

Efficient use of the network occurs if users pay charges that reflect the marginal costs of their usage and the capacity costs (and other fixed costs) are recovered in a way that least distorts usage. From this perspective, the proposed change to path based pricing has only a minor effect compared to existing arrangements based on GTK because both are take or pay charges and both relate charges to shares of capacity. To the extent that the path based pricing leads to heavier and longer trains being used without further investment in network infrastructure it could encourage more efficient use of the existing infrastructure (by allowing more coal to be shipped without an increase in train paths).

Efficient investment is promoted by price signals that reflect the longer run costs of maintaining and upgrading the network. Both the path based approach (Train Km) and a GTK approach seem capable of ensuring such investment occurs. The Train KM approach favours users making investments in heavier and longer trains, and so may defer network investment needed to deliver more train paths. This benefit is greater in times of strong demand for capacity.

Our overall conclusion is that there may be benefits to some users relating to lower costs per tonne from path based pricing, and this could provide broader benefits in increasing system capacity and coal output. The path based pricing method is also simpler and more transparent than the indicative service approach. Nonetheless, the specific value of that additional capacity at this time may be relatively low, and the incentives created for changes in train composition by changes in the structure of track charges may also only be weak. Our view is therefore that:

- Path based pricing using Train Km may have a positive effect on efficiency, but it will only likely be minor in the short term. On this basis, it can be considered appropriate.
- ARTC may wish to give further consideration to addressing the specific issues raised by stakeholders, particularly with regard to the timing of the introduction of path based pricing.

Train kilometres as the pricing unit

We are further asked by the ACCC whether, if path based pricing is preferred, whether prices should vary with Train Km or another metric.

The question here is therefore whether using Train Km, or another measure such as number of train paths, would better reflect long run costs.

In our opinion, the approach of ARTC would be suitable if it could show that a large proportion of the fixed costs subject to the TOP charge were variable in the long run with Train Km. It follows again from our earlier discussion that while some capacity costs seem to be variable with Train Km in the long run there are other kinds of costs which do not seem so variable, and so could be allocated with respect to other metrics related to share of capacity, such as train paths, or proxies for willingness to pay. On balance, Train Km is not an unreasonable choice of pricing unit, but seems to be one of a number of alternatives for which a case could be made.

Effects on users

The ACCC has asked that we estimate of the impacts of the move to path based pricing on:

- the revenues of ARTC and
- the costs allocated to users in different pricing zones of the Hunter Valley rail network compared to the use of GTK

Our understanding of ARTC's proposal is that the change to pricing methodology has no impact on ARTC's overall revenues. That is because the change only affects how costs are transformed into prices; that is, rather than attributing the TOP costs using GTK, they are attributed using Train Km.

Further, the ARTC methodology also maintains zone-based pricing. This means that there is no re-allocation of costs between zones, but only within zones. Users that run trains that have a lower GTK to train KM ratio will face a relative increase in charges while the converse is true where heavier trains are run.

Our analysis of ARTC's material suggest that, when assessed across all three zones, the impact of the changes on individual users is no more than moderate. Larger users will experience the largest gains or losses in dollar terms. However, for these users the change in payments as a share of total payments is relatively small (less than 5 per cent difference). There is one user whose charges would be likely to increase materially in percentage terms, however, this user only pays a relatively small dollar amount to ARTC (around 0.1% of ARTC's Hunter Valley revenues) (see section 5.2).

1 Introduction

1.1 The Hunter Valley Access Undertaking

In December 2015, ARTC submitted a proposed access undertaking to the ACCC for assessment pursuant to Part IIIA of the *Competition and Consumer Act 2010* (the Act).

The access undertaking relates to the provision of access to the Hunter Valley Rail Network operated by ARTC in New South Wales. The ACCC previously accepted an access undertaking on 29 June 2011 in relation to the Hunter Valley Rail Network. The 2011 Hunter Valley Access Undertaking (HVAU) expires on 1 July 2016, although the ACCC has recently accepted a variation to the current undertaking to extend it to 31 December 2016.¹

The ACCC published a consultation paper on 8 January 2016 and subsequently received submissions from stakeholders in response to the proposed undertaking.

The ACCC considered that the introduction of path-based pricing is one of the key issues for the 2016 HVAU. That is because there are divergent views within industry as to its appropriateness.

On 14 June 2016, ARTC withdrew the proposed undertaking.² Nonetheless, we have been asked to continue our assessment as the ACCC anticipates that path based pricing will continue to be relevant to assessment of any future ARTC undertakings.

The specific test that the ACCC is required to apply to assess the undertaking is in subsection 44ZZA(3) of the Act. This provides that the ACCC may accept an access undertaking from an access provider if it is appropriate to do so, having regard to various criteria.

1.1.1 Path-based pricing and indicative services

The 2011 HVAU specifies access prices for 'indicative services', which vary according to train characteristics. Under this approach the take or pay (TOP) component of access prices is levied using a unit charge per gross tonne kilometres (GTK) for the indicative service.

In contrast the 2016 HVAU proposes to adopt 'path based pricing' where access pricing for each pricing zone is largely independent of train characteristics,

¹ See <http://www.accc.gov.au/regulated-infrastructure/rail/extension-of-the-2011-hunter-valley-access-undertaking>

² See <http://www.accc.gov.au/regulated-infrastructure/rail/hunter-valley-access-undertaking-2016>

provided the train specification fits into the ‘Services Envelope’. Services Envelope characteristics include maximum length, axle load, maximum train speed empty and maximum train speed loaded.

Our understanding is that ARTC’s proposed move to path based access pricing will replace the current practice of determining the take or pay (TOP) component of access prices by gross tonne kilometres (GTK).

Instead access prices are to be comprised of:

- a TOP component (measured in \$ per Train Km), and
- a non-TOP component (measured in \$ per GTK).

The TOP component recovers fixed operating and capital costs while the non-TOP component covers variable maintenance costs. The non-TOP component is to be set in the same way as in the current (2011) HVAU.

1.2 Terms of reference

The ACCC has engaged Frontier Economics to provide independent written advice on ARTC’s proposed move to a path-based access pricing approach.

Specific regard is to be had to the Objects of Part IIIA of the Act, particularly the pricing principles in section 44ZZCA of the Act.

The written advice is to include:

- An assessment of stakeholder submissions, received on path based pricing, to the ACCC consultation paper published 8 January 2016.
- An estimation of the impacts of the move to path based pricing, on the revenues of ARTC and the costs allocated to users in different pricing zones of the Hunter Valley rail network, compared to the use of GTK.
- Consideration of whether, for the purpose of path based pricing, the adoption of Train Km as the pricing unit for the TOP component of prices is appropriate.

1.3 The conduct of this review

Frontier Economics was engaged by the ACCC in early June 2016.

Our review has encompassed:

- a desktop review of submissions made to the ACCC
- a desktop review of other written materials relating to the HVAU, including on indicative services
- teleconference meetings with stakeholders, including ARTC, Aurizon, Whitehaven, Idemitsu and Centennial Coal

- an analysis of ARTC's pricing spreadsheets (on a confidential basis)

Given the short timeframe for our analysis, we have not reviewed ARTC's costs or cost drivers for its network in detail but have relied on secondary materials for this purpose.

We provided a draft report to the ACCC for its comments on 22 June and a final report on 29 June.

2 Assessment framework

As noted in Section 1 of the report, the ACCC's task is to determine whether it would be *appropriate* to accept ARTC's undertaking, having regard to various matters set out in Part IIIA (subsection 44ZZA(3)) of the Act.

2.1 The objects of Part IIIA and the 44ZZCA pricing principles

The first two criteria to which the ACCC must have regard are the objects of Part IIIA, and the pricing principles specified in Section 44ZZCA of the Act.

The objects of Part IIIA are to:

- (a) promote the economically efficient operation of, use of and investment in the infrastructure by which services are provided, thereby promoting effective competition in upstream and downstream markets; and
- (b) provide a framework and guiding principles to encourage a consistent approach to access regulation in each industry.

Section 44ZZCA specifies:

- (a) that regulated access prices should:
 - (i) be set so as to generate expected revenue for a regulated service or services that is at least sufficient to meet the efficient costs of providing access to the regulated service or services; and
 - (ii) include a return on investment commensurate with the regulatory and commercial risks involved; and
- (b) that the access price structures should:
 - (i) allow multi-part pricing and price discrimination when it aids efficiency; and
 - (ii) not allow a vertically integrated access provider to set terms and conditions that discriminate in favour of its downstream operations, except to the extent that the cost of providing access to other operators is higher; and
- (c) that access pricing regimes should provide incentives to reduce costs or otherwise improve productivity.

Other criteria in subsection 44ZZA(3) refer to the legitimate business interests of the access provider, the interests of persons that might want access to the service, and the public interest more generally.

2.1.1 Guidance provided by the criteria

For the purposes of our report, we adopt the appropriateness criterion in making our assessment of path based pricing. That is, we consider whether or not this part

of the undertaking should be accepted as appropriate, and do not specifically opine on whether the method proposed is the *best* method that might be used in the circumstances. We do, however, offer some comments on the use of the method that touch on ways in which its application might be improved.

With that context, our view is that the 44ZZCA pricing criteria provide general guidance but not prescriptive instructions on how access prices should be set.

Our reading of both sub-sections (a) and (c) is that the former is relevant to the costing approach and the latter to what kind of constraints are applied to ARTC's prices (e.g. price or revenue caps, caps on rates of return). Neither criterion seems directly relevant to the structure of prices. A wide range of price structures can generate expected revenue to recover efficient costs, and provide incentives for cost reduction and productivity improvement by ARTC.³

Sub-section (b) of the pricing criteria is more relevant. However, in this case, it is the *form* of multi-part pricing that is at issue here as opposed to whether multi-part pricing should be adopted. While sub-section (b)(i) refers to access price structure it is not obvious that the proposed change is designed to improve ARTC's ability to price discriminate (even if it might have that effect).

The 44ZZCA criteria are therefore unlikely to be able to help differentiate the path based pricing approach and alternative approaches.

Instead, the more general objects of the Act relating to the efficient use of, and investment in, infrastructure are likely to have greater relevance to assessing whether ARTC's proposed move to a path based approach to pricing is appropriate.

2.2 Prices that promote economic efficiency

2.2.1 The first best and second best

Any discussion of efficient pricing must necessarily start with the consideration of (short run) marginal costs. Marginal cost is the increase in total costs that arises from a decision to produce an extra unit of output.⁴

Economics always defines costs in terms of opportunities that are forgone as a result of particular decisions. The marginal cost is the value of opportunities that are forgone as the result of a decision to increase the rate of output by one unit. The idea behind the rule that prices should equal marginal costs (the 'first best') is

³ Different structures may affect incentives in downstream markets, but this does not appear relevant to the assessment of ARTC's prices and their incentives on ARTC's behaviour under section 44ZZCA.

⁴ This definition can be found in all introductory textbooks of microeconomics. See, for example, J. Gans, S. King and N. Mankiw, *Principles of Microeconomics*, Thomson, 2nd ed, 2002, p 271.

that this will ensure that individual producers' decisions on how much to produce (to maximise their profits) will be consistent with economic efficiency — namely, maximising the value that can be generated by the resources that are available to society at large.

However, pricing at marginal cost is only optimal assuming the firm does not need to recover fixed costs (with respect to units of output), or common costs (costs that are common to different types of output).⁵

To address these considerations, economists have developed 'second best' pricing rules.

The role of two-part tariffs in promoting efficiency

The 'second best' pricing approach that is of most relevant to the assessment of path based pricing is the two-part (or multi-part) tariff. Two-part tariffs that consist of a fixed access charge and a variable usage charge can be shown to improve on a linear pricing schedule in terms of minimising loss in economic welfare.

That is because marginal usage prices can be closer to marginal costs with fixed costs recoverable through other means. Indeed, it is actually possible for a two-part tariff to achieve first best outcomes if fixed costs can be completely recovered by fixed fees, and usage is charged at short-run marginal cost.⁶

The interesting feature with two-part tariffs, and a great difficulty with the implementation in access pricing settings, is how to set the fixed fees. Gans and Williams describe this as follows:

The determination of fixed fees has always been a contentious issue in regulation. In the past, its choice has been seen as arbitrary – essentially, redistributing income from access seeker to provider – without any real efficiency consequences. However, from the point of view of market participants, the level of fixed charges is a contentious issue. This is because providers realise that it affects the overall return on their investments and access seekers realise it influences their incentives to enter markets and compete with incumbents.⁷

The obvious fixed fee solution (as suggested by Coase) is just to set the fixed fee as an equal amount per access seeker (including the access provider, if it also operates in the downstream market). However, the number of customers may well be endogenous (i.e. depend on the size of the fixed fee set).

⁵ Other reasons from diverging from marginal cost include externality considerations, but this does not appear to have any specific bearing here.

⁶ This result is first attributed to R. Coase, "The Marginal Cost Controversy", *Economica*, 13: 169-82.

⁷ J. Gans and P. Williams, "A primer on access regulation and investment", in ACCC / PURC, *Infrastructure Regulation and Market Reform*, May 1998, p. 151.

An alternative approach to setting fixed fees would be to follow Ramsey principles in order to minimise distortion. This would mean that customers with the least elastic demand (for its downstream services) would bear more of the fixed cost.⁸

In regulatory settings, regulators commonly require firms to price on the basis of long-run costing concepts, such as long-run marginal or incremental costs.

The efficiency justification for this type of pricing is that it explicitly allows for consumers to face the costs of maintaining and expanding service capacity over time.⁹ These prices will generally be higher than short-run marginal or incremental costs, because they allow the firm to recover fixed and sunk costs (including depreciation costs and a return on capital invested). This is particularly important in situations where future investments must be made to maintain and expand productive capacity, and where infrastructure-based competition is potentially feasible in the longer-term.

2.2.2 Guiding principles for assessing prices

Given the above discussion, we suggest four principles for prices that would promote efficient use of, and investment in, infrastructure such as rail networks. These are as follows:

- It is desirable that access prices are as close to short run marginal cost as is feasible. By feasible, we mean that the firm must be able make an adequate return on its investments.
- For pricing to be conducive to efficiency, price structures should generally reflect cost structures. Using fixed fees (that do not vary directly with use of infrastructure) to recover fixed costs would promote better efficiency outcomes because they allow (marginal) prices for trains or tonnage to be closer to marginal costs.
- Basing prices or components of prices on long-run marginal or incremental cost pricing are helpful to avoid cross-subsidies and provide guidance on the costs of future investments and optimal levels of capacity.
- Access prices which allow for a regulated firm to set prices on the basis of demand as well as cost information can promote more efficient recovery of fixed (and common) costs.

Complications

These principles will not always point in a consistent direction. Consequently, trade-offs sometimes have to be made. For example, setting prices to recover long

⁸ See R. Sherman, *The Regulation of Monopoly*, 1989, p. 146

⁹ See e.g. A. Kahn, *The Economics of Regulation*, 1988, pp.88-89.

run marginal cost might promote efficient investment in capacity, but might result in prices being too low to allow recovery of existing fixed costs.

Another example is that while costs should be recovered from those whose actions cause the costs to be incurred at the margin, this does not mean it maximises efficiency to set prices to reflect any and all differences in costs. Factors such as the size of the cost difference are also important. The smaller the differential, the less likely it is to be taken into account because the transactions costs from accounting for the cost differences are too high.

Pragmatic regulators have adopted approaches which allow for cost recovery but also take into account broader considerations, including how well the pricing approach promotes competition, transparency and ease of implementation.

For example, as discussed above, in most situations ‘second best’ efficient prices are determined by considering both demand and cost conditions. To the extent that service characteristics do not have a *major* impact on costs or have a *major* influence on demand for rail track services, the benefits of accounting for them may be more than outweighed by the costs of designing and administering a pricing regime to take them into account.

Aside from the more technical conditions about whether prices promote allocative or productive efficiency, our view is that pricing approaches need to be able to be:

- practically applied (has low transactions costs); and
- transparently verified and explained.

A final point which is relevant to efficient pricing is the notion of pricing consistency or stability. In some circumstances, material changes in prices might be undesirable because they change an implicit contract between the regulated firm and downstream firms (miners), and on which investment decisions involving sunk assets have been made.¹⁰ The relevance of this criterion will depend very much on the facts and the extent to which such an implicit contract could be said to exist.

Key points

In summary:

- As much as is feasible, prices should reflect cost causation – costs should be borne by those who cause the costs to be incurred, and reflect how they are incurred.
- Good price structures are those that
 - encourage efficient usage of capacity and investment in capacity,

¹⁰ See section 4.2.5 for further discussion of the relevance of this point.

- are (relatively) objectively determined and verifiable, simple and practical and
- are consistently determined or result in prices that are reasonably stable to give confidence to access seekers about their own investment decisions.

The task is to apply these principles to the ARTC proposal.

3 Stakeholder submissions on path-based pricing

The ACCC has asked that we assess the stakeholder submissions in response to the change by ARTC to path based pricing.

We first set out ARTC's rationale for the change as set out in its submission supporting the undertaking. In Section 3.2, we provide a summary of submissions as they provide context for the discussion in Section 4. In Section 6, we provide an assessment of the submissions after we have further analysed the issues and considered the effects on different users in Section 5.

3.1 ARTC's undertaking

ARTC explains its proposed change to path-based pricing in its main submission in support of its undertaking, and in Appendix A to that submission.

ARTC states that:

- The indicative service approach was designed to maximise the use of network and coal chain capacity as a whole, but that there remained divergent views within industry of the characteristics of an appropriate indicative service.
- ARTC has been unable to achieve consensus among users about how differentiation factors for services other than the indicative service should be reflected in pricing. Further, more robust modelling would be costly and expensive and may not achieve a consensus in the short term.
- The characteristics of trains traversing the Hunter Valley network have evolved since the commencement of the 2011 HVAU, which has occurred independently of the indicative service.
- A path based pricing approach would charge all trains within the same 'service envelope' that same per train kilometre as the take or pay (TOP) component of the charge. This change would significantly simplify pricing for a majority of coal train services and would no longer rely on ARTC imposing train service characteristics on access holders.
- The adoption of path based pricing will reward the consumption of capacity by higher payload trains and provide an appropriate incentive to use the network efficiently, without the need for judgements on appropriate train configurations.

3.2 Responses in submissions

3.2.1 Overview of issues raised in submissions

The ACCC received a number of submissions from stakeholders, which raised a diverse range of issues.¹¹

Several submissions support change, for similar reasons to those pointed to by ARTC. A number of submissions questioned whether the change proposed would actually increase economic efficiency, and whether the change would be discriminatory and inequitable towards certain users that faced network constraints outside of their control.

3.2.2 Glencore

Glencore is supportive of ARTC's proposed change to path based pricing.

Glencore's view that the proposed change will help to incentivise the efficient utilisation of the available capacity on the network. It also notes it was in favour of the indicative service approach previously but that it has 'proved impossible' to determine an efficient train size.¹²

Glencore considers that the adverse impact on access holders which do not operate trains that maximise the efficiency of the utilisation of train paths is reasonable in light of that less efficient utilisation.

3.2.3 Centennial Coal

Centennial Coal's trains use only a small component of the Hunter Valley network – around 7 kilometres to finish journeys to the Port of Newcastle.

Centennial's primary concern with path based pricing is that its coal trains are limited by its use of the Sydney Trains Network. This means that it cannot use trains that are as heavy or long as those undertaking journeys entirely within the Hunter Valley network.

Centennial submits that the price structure should not discriminate against trains restricted by their travel over other networks, and that Centennial should pay no more than the 'most efficient user'.

¹¹ These submissions are available at: <http://www.accc.gov.au/regulated-infrastructure/rail/hunter-valley-access-undertaking-2016/consultation-paper>.

¹² Glencore submission, p. 2.

3.2.4 Idemitsu

Idemitsu is not supportive of the proposed change. While Idemitsu acknowledges the simplicity of the proposed pricing (which it terms ‘distance based pricing’) it suggests that the pricing scheme is not cost reflective.

Idemitsu states that the signals being sent by ARTC using the proposed path based pricing are to:

1. Reward the consumption of capacity by higher payload trains
2. Charge distant mines more than mines closer to the port

Idemitsu is concerned that these are not the correct signals, in the sense that it could cause inefficient capital expenditure.

On the use of Train Km for the non-TOP charge, Idemitsu states that this mechanism is not cost reflective. In particular, it says that Train Km indicates all costs are variable or linear with distance when this is clearly not the case given the cost categories provided by ARTC.

Idemitsu provides a table used by Aurizon in Queensland which identifies a different pricing mechanism (with more than two parts) based on the different cost drivers. This table is replicated below.

Table 1: Aurizon pricing mechanism and cost categories

Category	Pricing mechanism
AT1 – Incremental maintenance	per 000 GTK
AT2 – Infrastructure capacity charge	per path each way
AT3 – Allocative NTK	per 000 NTK ¹³
AT4 – Allocative payload	per tonne
AT5 – Electricity overhead	per 000 GTK
EC – Electricity as a fuel	per 000 GTK
QCA Levy – Regulatory	per tonne

Source: Idemitsu submission

Idemitsu concludes that further analysis is required to determine an appropriate structure.

¹³ NTK = Net Tonne Kilometres. This refers to the weight of coal shipped, rather than the total weight of the train plus its payload.

3.2.5 Asciano

Asciano states that the indicative service model put forward for the 2011 HVAU has been subject to diverging industry views, and that throughout the consultation process on indicative services Asciano has consistently put forward the position that “longer and higher payload trains configured with sufficient power to operate within system assumptions are the most efficient trains for the Hunter Valley coal supply chain.”¹⁴

Asciano states that while it believes the path based approach has the potential to encourage more efficient utilisation of capacity, this should be subject to review to assess whether the pricing structure does actually provide the incentives which are expected.

3.2.6 Aurizon

Aurizon, a train operator in the Hunter Valley, provided a number of comments on path based pricing.¹⁵ It noted that it did not seek to interfere with commercial outcomes that had been agreed between industry and ARTC, but that it wished to raise several matters for consideration in the (potential) move to path based pricing.

Aurizon’s comments covered three broad areas:

- the use of path based pricing
- whether path based pricing is necessary in the absence of a need for more capacity
- the impact of path based charges on total costs across the supply chain.

The role of path based pricing

Aurizon suggests that train path charges are typically applied as a means to signal the opportunity costs of the consumption of network capacity. Aurizon argues that on its Central Queensland coal network, efficiencies have been pursued and achieved without path based pricing, and that path based pricing is usually limited to some concept of opportunity cost rather than as a means of recovering the average costs of the network capacity.

Aurizon further notes that if the efficient train path charge (reflecting opportunity costs of capacity) is not sufficient to recover the full economic costs of capacity

¹⁴ Asciano submission, p. 14.

¹⁵ Aurizon submission, Section 3, pp. 3-7.

then it is typically supplemented with another pricing mechanism. This mechanism may not be related to the cost drivers of providing the service.

Scarcity of capacity

Aurizon argues that current demand projections mean that the scarcity value of train paths in Pricing Zone 1 is immaterial. Aurizon then argues that if industry participants respond to the price incentives caused by path based pricing, say by increasing train lengths, then this would decrease revenues for ARTC by reducing the required number of train paths. In turn, ARTC would have to raise access charges – making the strategy self-defeating.

Path based pricing may increase costs in other parts of the system

Aurizon argued that the introduction of path based pricing may incentivise upstream or downstream investment without any commensurate economic benefit. This might arise because the incentives created by path based pricing (i.e. longer and heavier trains) might require investments at mines or ports but not reduce track costs for access holders. Further, it might introduce a discriminatory price impact between different train users based on legacy investment decisions.¹⁶

Aurizon concludes that “the implementation of path based pricing could be deferred until it becomes apparent that ARTC would need to undertake further network investment to increase network capacity.”¹⁷

3.2.7 Whitehaven Coal

Whitehaven Coal argued that:

“a producer should not be negatively impacted in any pricing zone when they are operating at the most efficient level. Path based pricing negatively impacts a Zone 3 producer in Zone 1 by increasing the access price per tonne for 8,000 tonne trains.”

Whitehaven further stated that Path based pricing would be fair and equitable if *either* there was an adjustment to Pricing Zone 3 path rates to provide a similar rate per tonne to an efficient Pricing Zone 1 train, or if there was a removal of the three zone pricing concept.

Without these options, Whitehaven submitted that the existing GTK method should apply.

¹⁶ Aurizon submission, p. 6.

¹⁷ *ibid.*

3.2.8 Hunter Valley Coal Chain Coordinator

The HVCCC stated that while it could not comment on the commercial implications on pricing changes, its view was that ARTC's proposed change was likely to be beneficial for overall coal chain efficiency and may better motivate the adoption of train configurations that result in a system-wide minimum mine-to-ship cost per tonne of coal exported, subject to meeting a total export tonnage target.¹⁸

3.2.9 Other submissions

Submissions including from Port Waratah Coal Services, IPART and the Bloomfield Group expressed support for path based pricing.

¹⁸ Hunter Valley Coal Chain Coordinator submission, p. 3.

4 Assessment of path-based pricing

In this section, we provide our assessment of the proposed path based pricing approach.

We first consider how the approach differs from the current approach.

4.1 ARTC's two-part pricing approach

ARTC's 2011 and 2016 undertakings both propose the use of two-part tariffs to recover its long run efficient costs.

The tariffs comprise a variable and a fixed component. ARTC's pricing principles (4.14 of its undertaking) specify that, in determining Charges, ARTC will have regard to separate cost elements as follows:

- variable component of costs being Direct Costs; and
- fixed component of costs being fixed operating costs and Depreciation of, and return on, assets.¹⁹

Direct costs are further defined in the undertaking to specify that these essentially mean maintenance expenditure that varies with usage of the Network.

The latter charging component is take or pay (TOP), while the former is not. In broad terms, the non-TOP component recovers variable costs (a proxy for marginal costs) while the TOP component recovers the cost of providing capacity for trains and fixed operating costs. This TOP component differs by pricing zone.

The key difference in the 2016 undertaking is the judgement about how capacity costs should be apportioned among different users.

- The existing pricing method using indicative services to apportion capacity and fixed operating costs according to GTKs contracted
- The proposed (path based pricing) method apportions costs according to Train Km contracted.

4.2 Is path based pricing appropriate?

Simply stated, we understand that the arguments in favour of the path based approach are that:

- Path based pricing simplifies the process of calculating TOP charges.

¹⁹ ARTC Hunter Valley Coal Network Access Undertaking, 23 December 2015. Capitalisation refers to defined terms in the undertaking.

- Path based pricing incentivises a move towards longer and heavier trains.

In considering these arguments, we first examine the link between proposed price structure and cost structures in ARTC's network. This provides some guidance about whether proposed approach is appropriately cost reflective. Then we consider the likely efficiency benefits from doing so.

4.2.1 Cost and price structures

As we suggested in Section 2, for pricing to be conducive to efficiency, price structures should ideally reflect cost structures, and costs should be recovered from those whose actions cause the costs to be incurred at the margin. In some cases, this exercise is straightforward. For example, where there is only one user, issues of price structure are relatively simple because it is trivial that the best solution has both marginal cost pricing and the user paying all fixed costs in a single fixed charge. However, in network industries such as rail, issues of cost causality are difficult because:

- a. There are many users of the infrastructure and genuine variable or marginal costs are low.
- b. There are multiple cost drivers and some costs that are not closely driven by output at all. This invariably leads to a degree of judgement in methods.
- c. Information on the willingness to pay of users, which can guide efficient allocation of costs, is not readily discernible by the access provider.

The particular split of fixed and variable costs proposed by ARTC puts costs into two categories:

- costs that vary with weight and distance travelled
- costs that are recovered with reference to contracted train paths and associated Train Km.²⁰

The costs in the first category include variable track maintenance, including major periodic maintenance.

There seems to be little controversy that these costs are appropriately treated by ARTC in pricing structures (the non-TOP component).

The costs in the second category include:

- Fixed Track Maintenance
- Business Management
- Network Control

²⁰ Therefore costs do not vary with the weight of the train.

- Corporate Support
- Return of capital (depreciation)
- Return on capital

The treatment of these costs in prices is clearly more controversial. In part, this is because some of these costs are not likely to materially vary with train paths and kilometres, in either the short or long run. In addition, there may be no single cost driver that is relevant, but multiple cost drivers that could provide a reasonable proxy for changes in costs.

In Table 2, we provide a high level indication of cost variability in the long and short run due to changes in output (i.e. train paths) for ARTC's major cost categories as provided in its pricing spreadsheets. In examining these costs, we have benefited from reviewing a report by the ACCC's consultants WIK on ARTC's costs.²¹

Table 2: Drivers of cost variability

ARTC Cost category	Likely cost driver/s	Vary in the short run with increase in output?	Vary in the long run?
Variable track maintenance	Weight, usage of track	Yes	Yes
Fixed Track Maintenance	Time, length of track, speed of trains, weight	No	Yes
Business Management	Unclear	No	Unclear
Network Control	Length of track	No	Yes
Corporate Support	Unclear	No	Unclear
Return of capital (depreciation)	Length of track, weight, train length	No	Yes
Return on capital	Length of track, weight, train length	No	Yes

Source: ARTC, Frontier Economics

There are two key costs that will vary with Train Km in the long run; the capital cost items. These costs will, however, also vary with the weight and length of trains

²¹ WIK-Consult, *Assessment of the Incremental Costs of Pricing Zone 3 Access Holders' Use of Pricing Zone 1 and 2 of the Australian Rail Track Corporation's Hunter Valley Rail Network*, 30 September 2015.

because heavier and longer trains will require more capacity investment (e.g. network strengthening and longer passing loops).²² They also lead to earlier requirements for capital expenditure on renewals of existing infrastructure. Arguably, therefore, these could also be taken into account in setting (separate) charges. Taking that approach would appear to be more in line with the approach of Aurizon on the Queensland Coal Network as described in Section 3 and Annex A, which uses a combination of metrics including net tonnes, gross and net kilometre tonnes, and path kilometres in its charging. This reflects that some costs have different long run cost drivers, and some costs do not appear well aligned to shares of network capacity at all (and so should be allocated to users in ways that do not detract from usage).

Some of the costs described do not appear to link with any particular output of ARTC in the short or the long run, such as corporate support costs. We therefore expect that these costs may be allocated in a variety of ways that may have little or no impact on economic efficiency – in the sense of changing the output of ARTC and the economic value that it creates. Economic efficiency suggests that distortions would be minimised by linking recovery of these costs with willingness to pay: using contracted Train Km to allocate these costs is one possible approach that could be consistent with economic efficiency, but other approaches could be equally or more efficient.

This brief review indicates that a range of charging methods (but no single method) could be supported with reference to cost causality.

4.2.2 Will path based pricing improve the usage of the ARTC network, and investment in the network?

ARTC's proposed path based pricing approach is said to offer benefits related to economic efficiency as we have described in Section 2:

- By rewarding heavier or longer trains within the 'service envelope', path based pricing provides incentives to increase the capacity of trains. This is because charging by Train Km can result in lower average track charges per tonne of coal shipped. Increasing the payload of trains can also reduce the demand for train paths and therefore increase the capacity of the *existing network*.
- It simplifies the calculation and transparency of prices compared to the 'indicative service' approach which sought to quantify the impact of differences from the indicative service in charges.

Dealing with the second issue first, our consideration of the issues and evidence around the move to path based pricing has suggested that there is support for the

²² WIK-Consult, *op.cit.* p. 32.

notion that the indicative price system was unduly complex and lacking in transparency.

While it is difficult to point to the likely materiality of inefficiency due to pricing complexity, we note that this was agreed to be an issue that was consistently raised by stakeholders as part of the indicative service process.²³ Indeed, prior to ARTC's proposal of the new approach, the ACCC specifically requested that ARTC give consideration to whether a less complex and transparent methodology could achieve the objective of signalling to user the relative costs of their use of the network.²⁴

Promoting efficient usage

Efficient use of ARTC's network occurs if users pay charges that reflect the marginal or variable costs of their usage, and the capacity costs (and other fixed costs) are recovered in a way that least distorts usage. From this perspective, the proposed change to path based pricing has only a minor effect compared to existing arrangements based on GTK because both are take or pay charges and both relate charges to shares of capacity. To the extent that the path based pricing leads to heavier and longer trains being used without further investment in network infrastructure, we accept that it could encourage more efficient use of the existing infrastructure (by allowing more coal to be shipped without an increase in train paths).

Will more investment be induced?

A key point of contention between stakeholders is whether path based pricing will (a) induce more investment and (b) induce investment that is efficient.

On the first issue, it is clear that there will only be some users for whom a pricing incentive is directly relevant. In particular, users outside of Pricing Zone 1 and Pricing Zone 2 appear to be limited in their ability to respond to changes in price signals. Nonetheless, to the extent that there are users in Pricing Zone 1 and Pricing Zone 2 that have the ability to increase the length and weight of trains, then the pricing signal may influence decisions.

Will the incentive created by the change in pricing method be sufficient to drive further changes in train configuration? We would expect that users that have the flexibility to change may be able to derive some benefit from doing so, if either:

- A user can ship higher coal volumes from the same TOP commitments. In this case, users would change behaviour if the additional revenues from coal

²³ ACCC, Position Paper, *ARTC's HVAU Undertaking, Indicative Services Variation*, August 2014, p. 52.

²⁴ Ibid.

shipped were higher than the costs of new or different rolling stock and higher variable non-TOP charges (as these are measured on a GTK basis).

- The user ships the same amount of coal using fewer train paths, and the costs of investing in rolling stock are less than the reductions in charges from reduced TOP commitments (assuming these can either be negotiated with ARTC or that TOP commitments may be traded with other users).

Will the induced investment be efficient?

Supposing that (downstream) investment does occur, the further question is whether any induced investment will be efficient – in the sense of increasing total economic value.²⁵ This could depend on the particular decisions of users and which of the two cases described above is applicable.

In the first case described, the investment would have increased total coal output with no change to use of track capacity and the decisions of individual users should therefore be consistent with the creation of more economic value and economic efficiency.

In the second case described above, where there is no increase in output of coal, the kinds of investment caused by path based pricing effectively increase track capacity because they imply more tonnes of coal shipped per path and so a reduced requirement for paths. This provides a benefit if there are alternative uses for these paths, i.e. other trains to use the paths to ship more coal. If there is already sufficient capacity on the network to meet all reasonable demands, then downstream investment which further increases network capacity might be wasteful. It would be wasteful in the sense that the total (above and below rail) costs of supplying coal have increased but no more coal has been shipped.²⁶

The different views expressed in submissions mean this issue is ultimately difficult to resolve. Some network users, including Asciano, favour longer and higher payload trains (configured with sufficient power) because of the implications for network utilisation²⁷, and a pricing structure that encourages that; whereas other users (such as Aurizon) consider that there is no immediate need for more capacity and that the change in pricing method could be delayed until further network

²⁵ Economic value is simply the difference between the willingness to pay of buyers and the willingness to sell of sellers (which is defined by marginal opportunity costs).

²⁶ This outcome is not entirely implausible. ARTC's revenue cap means access prices per path can increase as demand for paths falls. However, the gains to individual users from reducing paths (if this can be negotiated with ARTC or other users) may outweigh losses from higher path prices as the higher prices would be spread across all users in a pricing zone. Such an outcome would essentially mean that users that do not change train configurations would face an increase in price to offset the lower revenues received from users that do.

²⁷ Asciano submission, p. 14.

investment would be required (and then potentially avoided through more efficient use of train paths).²⁸

ARTC's Hunter Valley Corridor Capacity Strategy indicates that on the basis of contracted volumes, there are no expansion projects planned for Pricing Zone 1 and that this appears to hold even on the basis of 'contracted plus prospective' volumes.²⁹ This raises the question of whether there is an immediate need to encourage heavier and longer trains and that the potential gains from doing so could be small.

Our overall conclusion is that there may be benefits to some users relating to lower costs per tonne of coal shipped from path based pricing, and this can provide broader benefits in increasing system capacity and increasing overall coal production. The path based pricing method is also simpler and more transparent than the indicative service approach. Nonetheless, the specific value of that additional capacity at this time may be relatively low, and the incentives created for changes in train composition by changes in the structure of track charges may also only be weak. Our view is therefore that path based pricing may have a positive effect on efficiency, but it will only likely be minor.

4.2.3 Alignment between efficiency in the rail network and efficiency in the coal supply chain

A key issue that arises in stakeholder submissions is the distinction between the efficiency of the rail network and that of the coal chain as a whole. We understand this has been an issue over the course of the existing HVAU and in the definition of indicative services.

As discussed in section 3.2.6, Aurizon notes that ARTC's change to path based pricing (per km) will encourage investment in longer and heavier trains, as this will minimise costs per tonne of coal carried. This might have the benefit of increasing network capacity by reducing demand for train paths. However, it will also increase the costs of rail operators (and miners) because investments are required to support changes to train configurations. From a system perspective, this will only be worthwhile if the benefits (in the form of higher coal earnings and lower costs from deferring future capacity investment) exceed the costs of the above-rail investments. However, given ARTC's form of regulation (revenue capping) we would expect that its primary concern is to minimise network costs, including through deferring capacity costs.

Our understanding is that the essence of the different incentives is as follows:

²⁸ Aurizon submission, p. 5.

²⁹ ARTC, *2015-2024 Hunter Valley Coal Capacity Strategy*, Tables 5-6.

- Coal miners, which receive revenue from sales of coal, seek to minimise the cost of shipping (below and above rail charges) per net tonne of coal.
- Rail operators receive revenue from net tonnes of coal shipped and seek to minimise operational costs, which include track costs. This implies a focus on minimising the difference between gross and net tonnes as this implies a lower cost of shipping.
- ARTC seeks to minimise the cost of maintaining and expanding its network over time to meet its contractual obligations to miners. This implies a focus on providing incentives to train operators to ship coal in ways that maximise the capacity of existing infrastructure and reduce the need for investment in new infrastructure.

In some cases, there may be alignment of the various incentives. ARTC's interests in minimising costs and expanding capacity will generally be consonant with those of users. But, in certain cases, ARTC's interests will be rationally narrower than the broader interests of all users. This may lead to some conflict between achievement of broader, system-wide efficiencies and rail network efficiencies which are difficult to resolve in an undertaking assessment process which focuses only on ARTC's incentives.

4.2.4 Path based pricing where network constraints exist

The submissions by Whitehaven, Idemitsu and Centennial Coal raise a similar issue. Each suggest that there are network constraints which prevent them from running trains that are as long and heavy of those trains operating in Pricing Zone 1 or Pricing Zone 2 alone. It follows that their costs per net tonne of coal will be higher even if they traverse the same path kilometres as users in located entirely in Pricing Zone 1 or Pricing Zone 2.

The issue raised is clearly of some importance to users, because it could be construed as being not equitable or discriminatory in its treatment of miners. It is not clear that the proposed approach would classify as price discrimination. Price discrimination refers to charging different prices for the same service (or the same price for a different service). ARTC's proposal would reflect a policy of charging users the same amounts for the same service, in that there is no difference in the path offered to services within the 'service envelope'. In terms of equity, the difficulty seems to be even if miners use the most efficient trains for their available infrastructure, they would still pay higher charges.

Regardless of characterisation, it is difficult to see that the higher charges paid have a direct consequence for the efficiency of use of the network, or investment in the network.

Efficient use of the network occurs if fixed costs in Pricing Zone 1 are recovered in a way that least distorts consumption as possible. From this perspective, the charges would only have an impact on efficiency if the increase in charges would

reduce consumption of capacity; for example, if the higher charges (per tonne) faced by some users reduced TOP quantities and this was not compensated for by higher TOP quantities from those users facing lower (per tonne) charges. This is difficult to determine as it would depend on the cost structure of the different miners.

Efficient investment requires price signals that reflect the longer run capacity costs of maintaining and upgrading the network. Both the path based approach (Train Km) and the GTK approach seem capable of ensuring such investment occurs in Pricing Zone 1. Neither appears strongly favoured over the other from a longer run cost causality perspective, as capacity costs are driven by kilometres but other cost drivers including weight and train lengths are also relevant.

Arguably, a potential disadvantage of offering a lower (weight based) charge rather than a path based charge to reflect the reduced capability of the trains in Pricing Zone 3 would be that it could reduce the incentive to upgrade infrastructure in Pricing Zone 3. We accept, however, that this should not be overstated, as there are a range of factors other than track charges which might drive above rail investment, and that it is not obvious that there is a short-term need to drive further investment in network capacity by increasing the capacity of trains.

We note that ARTC's undertaking also includes a section (4.16(b)) which allows ARTC to differentially charge for services operating on the Hunter Valley and other networks, if the use of the other network prevents the trains from operating to the maximum characteristics of the Services Envelope defined by ARTC. Although this provision cannot be used to address the concerns of users in Pricing Zone 3, it may prove a more appropriate means of addressing disadvantages created by network constraints for users constrained by other networks, users such as Centennial Coal.

4.2.5 Sunk investments and changes in pricing methods

A final point raised by users in submissions and further consultation was the detrimental effect on the switch of pricing method on their returns to past investments (e.g. in optimising train configurations for the prevailing pricing structure).

Changes in returns will occur to the extent that the past investments are at least to some degree sunk. From an efficiency perspective, sunk costs are not relevant to decision making, and so the change in pricing might have little direct consequence on whether assets remain in their current use. However, this would ignore that past behaviours are an important signal about what might happen in future. It would be concerning if, for example, a change in pricing approach reduced returns to sunk investments and this meant that rail users were less likely to make efficient

investments *in future*. This argument is analogous to that made by Biggar³⁰ when he suggests a key reason for regulation is to protect the sunk investments of users from expropriation by a natural monopoly. We are not necessarily arguing that ARTC could appropriate the gains of users (given the form of regulation on ARTC this seems unlikely), but that changes in pricing can have this effect.

To the extent such concerns are well-founded, it does not necessarily imply that the price change should not occur. This would forgo any benefits from the change. Rather, it suggests that ARTC may wish to give further consideration to mechanisms which introduce change more gradually, such as introducing the change at a fixed future date.

4.3 The use of Train Km in path based pricing

We were further asked by the ACCC whether, if path based pricing is preferred, should prices vary with path kilometres or another metric.

It follows from our previous discussion that:

- Path based pricing divides fixed costs, including capacity costs and fixed operating costs, using Train Km.
- This allocates more fixed and capacity-related costs to those that use more Train Km, meaning that mines further from the Port on Newcastle would pay more per tonne of coal shipped.
- Given that the capacity costs are fixed in the short run, there is an argument that many different ways of allocating the capacity costs would be consistent with economic efficiency. This is because the allocation of fixed costs will not affect usage decisions at the margin. For example, each user could pay an equal share of costs per path (regardless of Train Km).³¹ If this alternative resulted in the same number of paths being used as an approach that took Train Km into account, then there would be no direct effect on economic efficiency.
- Other ways of dividing costs which do not take account of the weight or length of the train would encourage the same kinds of incentives as Train Km (such as the number of train paths) to use heavier and longer trains.
- With that said, an approach that divides fixed costs in ways not related to long run cost drivers may not be consistent with users recovering the (long run) incremental costs of serving them. Recovering long run incremental costs of

³⁰ Biggar, Darryl R., *Is Protecting Sunk Investment by Consumers a Key Rationale for Natural Monopoly Regulation?* (January 24, 2008). Available at SSRN: <http://ssrn.com/abstract=1086866>

³¹ This appears to be the approach taken to these costs on Aurizon's Central Queensland Coal Network. See Annex A for more details.

users and groups of users is desirable to avoid cross subsidies and to promote better signals about longer run investments.

The question here is therefore whether using Train Km, or another measure such as number of train paths, would better reflect the drivers of costs in the long run or the willingness to pay of users.

In our opinion, the approach of ARTC would be suitable if it could show that a large proportion of the fixed costs subject to the TOP charge were variable in the long run with Train Km. It follows again from our earlier discussion that while some capacity costs seem to be variable with Train Km in the long run there are other kinds of costs which do not seem so variable, and so could be allocated with respect to other metrics related to share of capacity, such as train paths, or proxies for willingness to pay. On balance, Train Km is not an unreasonable choice of pricing unit, but seems to be one of a number of alternatives for which a case could be made.

5 An assessment of the effect of the change to path based pricing on users

The ACCC has asked that we estimate of the impacts of the move to path based pricing on:

- the revenues of ARTC and
- the costs allocated to users in different pricing zones of the Hunter Valley rail network compared to the use of GTK

Our understanding of ARTC's proposal is that the change to pricing methodology has no impact on ARTC's overall revenues. That is because the change only affects how costs are transformed into prices; that is, rather than attributing the TOP costs using GTK, they are attributed using Train Km.

Further, the ARTC methodology also maintains zone-based pricing. This means that there is no re-allocation of costs between zones, but only within zones. Users that run trains that have a lower GTK-to-Train-Km ratio will face a relative increase in charges; while the converse is true where heavier trains are run.

We now describe the impacts on particular users within the pricing zones.

5.1 Methodology

To calculate the impact of the change in pricing methodology on individual users, we use the ARTC's Hunter Valley forecast model which provides us with the inputs to our calculations.

The forecast model does not provide a complete picture of all current charges with particular TOP differentiations. However, the model does provide both GTK and path kilometres for all mines, so we proceed by estimating the changes between:

- A 'factual case' of the new methodology based on TOP charges which vary with Train Km.
- A 'counterfactual' case of a methodology based on TOP charges that vary with GTK.

The data provided by ARTC includes:

- Unit Variable Costs (\$/GTK) by pricing zone over time, which are the same under both the factual and counterfactual pricing methodology
- Unit Fixed Costs (\$/GTK) by pricing zone over time
- Unit Fixed Costs (\$/Train KM) by pricing zone over time
- GTK (000) by user and pricing zone over time

E) Train KM (000) by user and pricing zone over time

Using these inputs, we calculate the following:

F) Total charges under factual pricing methodology (\$) = (A x D) + (C x E).
This is calculated by user and pricing zone over time

G) Total charges under counterfactual pricing methodology (\$) = (A x D) + (B x D). This is calculated by user and pricing zone over time

H) Impact of change in pricing methodology on individual users over time, by pricing zone (\$) = F – G.

I) Impact of change in pricing methodology on individual users over time, by pricing zone (%) = H/G

Note that we also show the impact of change in pricing methodology on individual users over time (H and I), aggregated over pricing zones.

5.2 Estimate of effects on users

5.2.1 Qualifications

Before providing the estimates as described above, it is also necessary to point out the limitations and qualifications associated with this analysis. These include:

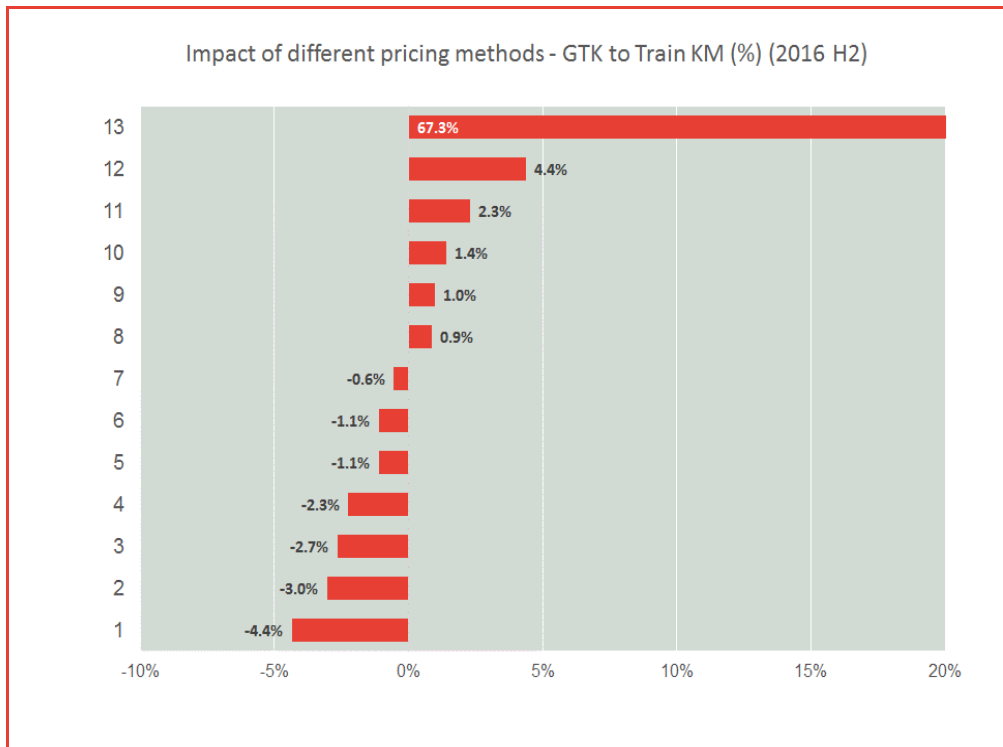
- The revenue calculations are gross figures and calculated prior to the impact of any unders/overs provisions and loss capitalisation. These provisions may result in a deferral of revenue for Pricing Zone 3, and thus ARTC would likely calculate lower implicit charges than those calculated here (although the revenue is ultimately recovered from these users)
- It assumes that the opex and capex plan developed and sent to the ACCC on 23 December 2015 as part of the HVAU is accepted in full. Lower costs would reduce prices and revenues.
- It assumes that the Weighted Average Cost of Capital (WACC) and Remaining Mine Life proposed by ARTC in the 23 December 2015 HVAU are accepted. A change in WACC or increase in Mine Life would change prices and revenues.
- Mines outside of the three pricing zones can apply to ARTC for a lower charge (as per section 4.16 of the HVAU). As such, prices for certain users including Centennial Coal and Yancoal may well be lower than what is derived here (this applies to both factual and counterfactual prices).

We further understand that ARTC is likely to conduct some of its own modelling to estimate the impacts of the price changes. As noted, given that ARTC will have greater visibility of actual charges in both the factual and counterfactual scenarios, ARTC's modelling is likely to be a more accurate assessment of the effects than those presented here.

5.2.2 Estimates

To illustrate the effects on users, we start by indicating the impact of a GTK vs Train KM approach to the TOP charge in the second half of 2016 (the first period in the forecast model).

Figure 1: Changes in charges for 2016 H2 – across pricing zones



Source: ARTC forecast model

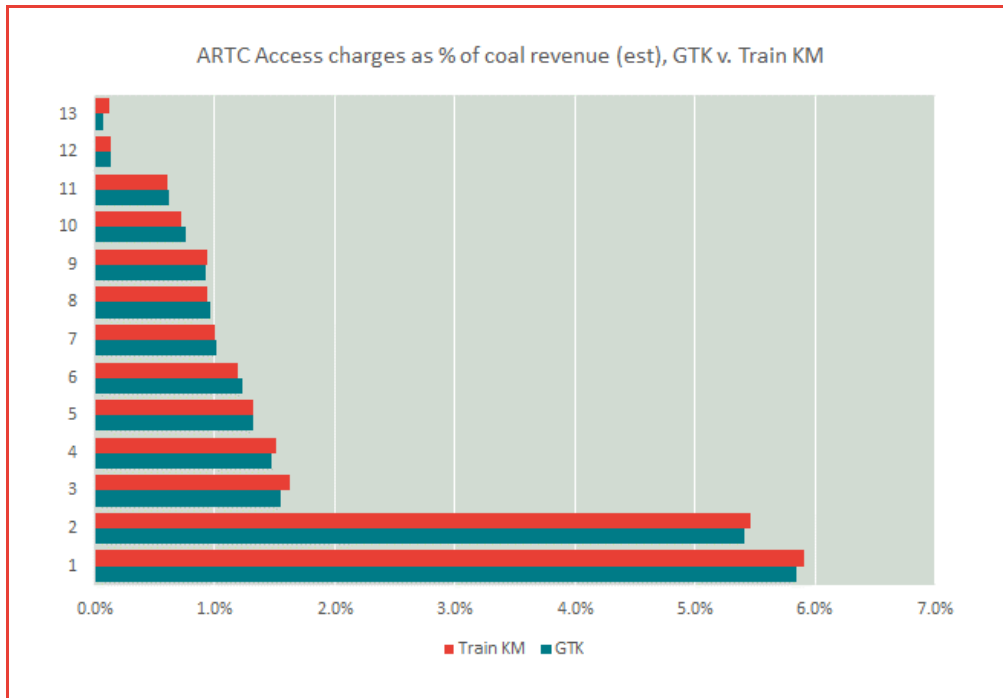
Note: Users are not consistently referred to by the same number in the figures in this report.

These charts suggest that, when assessed across all three zones, the impact of the changes on individual users is no more than moderate. Larger users will experience the largest gains or losses in dollar terms. However, for these users the change in payments as a share of total payments is relatively small (less than 5 per cent difference). While one user's charges would be likely to increase materially in percentage terms, this user only pays a relatively small dollar amount to ARTC (around 0.1% of ARTC's Hunter Valley revenues).

We have further sought to place the charges (and change in charges) in the broader context of the revenues earned from sales of coal. These calculations indicate that the increase in charges is likely to have only a modest impact on business operations and profitability for coal mines. In the following chart we use a notional

coal price of \$50 (close to but below current spot market prices³²) and multiply this by contracted volumes for each miner, to estimate total revenues. The charges and changes in charges are then compared to this total revenue. In all cases, the proposed changes would result in a change in costs of less than 0.1% of revenue earned.

Figure 2: Impact of methodology change on costs as a share of coal revenues, GTK vs Train KM

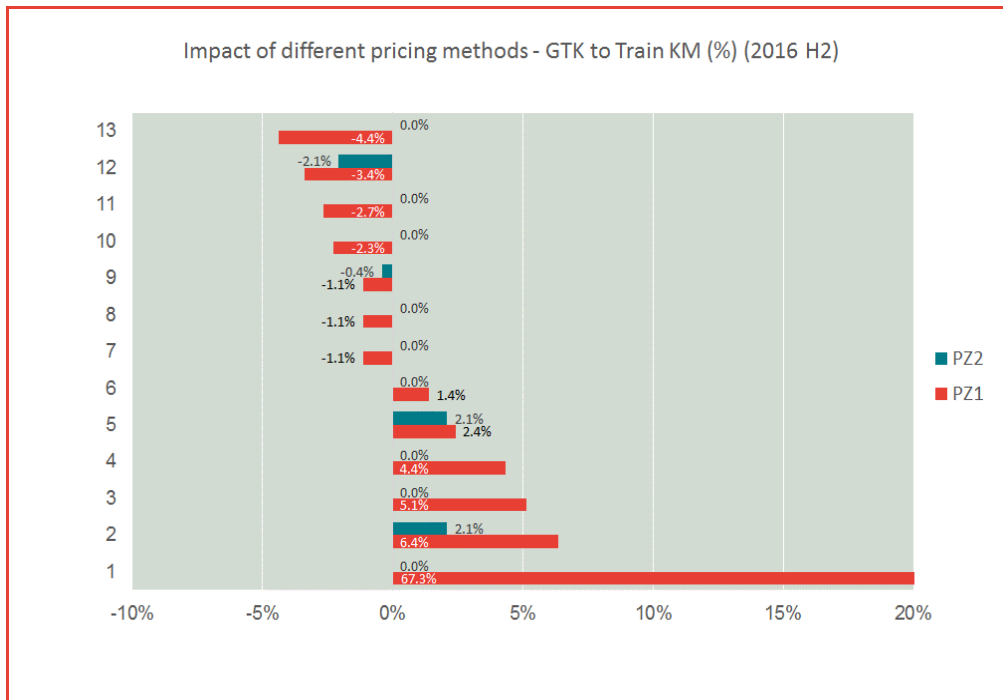


Source: Frontier Economics

The results of the change can be further analysed within pricing zones. This is shown in the following chart, which separates out the effect in Pricing Zones 1, 2 and 3. Note that there is no change reported in Pricing Zone 3 as user shares are not affected by the use of GTK or Train Km (reflecting uniformity in train configuration).

³² Recent media reports suggest a thermal coal spot price of around \$54 in May 2016. See: <http://www.smh.com.au/business/mining-and-resources/coal-20160404-gnxwgl.html>, accessed June 2016. Using a higher price would indicate a lower impact of the change in charging arrangements.

Figure 3: Change in charges for 2016 H2 – within pricing zones



Source: ARTC forecast model

The impact on Pricing Zone 1 charges alone appears greater in percentage terms. For example, one user's charges in Pricing Zone 1 increase by 5.1%. Although as a percentage of its total charges the increase for this user is only around 1%.

This chart further demonstrates that beneficiaries from the change will tend to benefit in both Pricing Zone 1 and Pricing Zone 2.

6 Assessment of submissions

Summary of submission and comments	Frontier comment
ARTC ARTC explains its proposed change to path-based pricing in its main submission and in Appendix A to that submission. ARTC states that: • The indicative service approach was designed to maximise the use of network and coal chain capacity as a whole, but that there remained divergent views within industry of the characteristics of an appropriate indicative service. • ARTC has been unable to achieve consensus among users about how differentiation factors for services other than the indicative service should be reflected in pricing. Further, more robust modelling would be costly and expensive and may not achieve a consensus in the short term. • The characteristics of trains traversing the Hunter Valley network have evolved since the commencement of the 2011 HVAU, which has occurred independently of the indicative service. • A path based pricing approach would charge all trains within the same 'service envelope' that same per train kilometre as the take or pay (TOP) component of the charge. This change would significantly simplify pricing for a majority of coal train services and would no longer rely on ARTC imposing train service characteristics on access holders. • The adoption of path based pricing will reward the consumption of capacity by higher payload trains and provide an appropriate incentive to use the network efficiently, without the need for judgements on appropriate train configurations.	• We concur with ARTC that a benefit of the path based approach is that it is conceptually simpler (and potentially more transparent) than the indicative service approach which used GTKs and differentiation factors. • The fact that train characteristics have been changing without changes to indicative services reinforces the notion that track access charges are not the only or dominant factor in determining train characteristics, and so we should not expect that the change to path based pricing will have a large impact on the use of the network or investment in the network. • We recognise the potential benefits stated by ARTC in the form of network efficiency. As we have discussed, these benefits may not be large in a period of lower demand for capacity.

Summary of submission and comments	Frontier comment
Glencore Glencore is supportive of ARTC's proposed change to path based pricing. Glencore's view that the proposed change will help to incentivise the efficient utilisation of the available capacity on the network. It also notes it was in favour of the indicative service approach previously but that it has 'proved impossible' to determine an efficient train size.³³ Glencore considers that the adverse impact on access holders which do not operate trains that maximise the efficiency of the utilisation of train paths is reasonable in light of that less efficient utilisation.	• We note in particular Glencore's comments about the difficulty in determining efficient train configurations.
Centennial Coal Centennial Coal's trains use only a small component of the Hunter Valley network – around 7 kilometres to finish journeys to the Newcastle Ports. Centennial's primary concern with path based pricing is that its coal trains are limited by its use of the Sydney Trains Network. This means that it cannot use trains that are as heavy or long as those using the other parts of the Hunter Valley network. Centennial submits that the price structure should not discriminate against trains restricted by their travel over other networks, and that Centennial should pay no more than the 'most efficient user'.	• We note Centennial's comments with respect to disadvantages it faces relative to other producers. We find, however, that ARTC's pricing is not discriminatory, but that even if it were so it would not be inefficient. ARTC may wish to consider the particular circumstances of Centennial through other provisions in the HVAU.

³³ Glencore submission, p. 2.

Summary of submission and comments	Frontier comment
Idemitsu Idemitsu is not supportive of the proposed change. While Idemitsu acknowledges the simplicity of the proposed pricing (which it terms 'distance based pricing') it suggests that the pricing scheme is not cost reflective. Idemitsu states that the signals being sent by ARTC using the proposed path based pricing are to: 1. Reward the consumption of capacity by higher payload trains 2. Charge distant mines more than mines closer to the port Idemitsu is concerned that these are not the correct signals, in the sense that it could cause inefficient capital expenditure. On the use of \$ per train kilometre for the non-TOP charge, Idemitsu states that this mechanism is not cost reflective. In particular, it says that \$/kilometre indicates all costs are variable or linear with distance when this is clearly not the case given the cost categories provided by ARTC. Idemitsu provides a table used by Aurizon in Queensland which identifies a different pricing mechanism (with more than two-parts) based on the different cost drivers. This table is replicated below.	• Idemitsu's position that the path based pricing approach is not entirely cost reflective may be correct. While we consider that some costs, in particular capacity costs, are likely to vary with Train Km in the long run there are other costs which appear to have different cost drivers (or no clearly identifiable cost drivers). That said, our view is that it would not be unreasonable for ARTC to recover these other costs using the same pricing method if no better cost drivers were able to be identified. We also note that other methods could also be reasonable, including the use of further tariff parts, or charging in line with willingness to pay.
Asciano Asciano states that the indicative service model put forward for the 2011 HVAU has been subject to diverging industry views, and that throughout the consultation process on indicative services Asciano has consistently put forward the position that "longer and higher payload trains	• We note Asciano's comments on system efficiency. • The concept of a review may have merit but is not specifically within our terms of reference.

Summary of submission and comments	Frontier comment
configured with sufficient power to operate within system assumptions are the most efficient trains for the Hunter Valley coal supply chain.”³⁴ Asciano states that while it believes the path based approach has the potential to encourage more efficient utilisation of capacity, this should be subject to review to assess whether the pricing structure does actually provide the incentives which are expected.	
Aurizon Aurizon, a train operator in the Hunter Valley, provided a number of comments on path based pricing.³⁵ It noted that it did not seek to interfere with commercial outcomes that had been agreed between industry and ARTC, but that it wished to raise several matters for consideration in the (potential) move to path based pricing. Aurizon’s comments cover three broad areas: • The use of path based pricing Aurizon suggests that train path charges are typically applied as a means to signal the opportunity costs of the consumption of network capacity. Aurizon argues that on its Central Queensland coal network, efficiencies have been pursued and achieved without path based pricing, and that path based pricing is usually limited to some concept of opportunity cost rather than as a means of recovering the average costs of the network capacity. Aurizon further notes that if the efficient train path charge (reflecting opportunity costs of capacity) is not sufficient to recover the full economic costs of capacity then it is typically supplemented	• Path based pricing need not only recover the opportunity costs of capacity although it may be particularly suited to that role. Although we concur that not all costs vary with Train Km, in our view, using other tariff structures may be no more efficient and transparent to users. • Aurizon’s comments with respect to existing capacity are important and we agree these are relevant to the likely efficient benefits of any proposed pricing change. • We also further agree with Aurizon that price changes could in principle lead to an increase in system costs even if some users are better off, and that it could lead to reduced incentives for investment if it penalises existing investments. This may not obviate the

³⁴ Asciano submission, p.

³⁵ Aurizon submission,

Summary of submission and comments	Frontier comment
with another pricing mechanism. This mechanism may not be related to the cost drivers of providing the service. • Whether path based pricing is necessary in the absence of a need for more capacity Aurizon argues that current demand projections mean that the scarcity value of train paths in Zone 1 is immaterial. Aurizon then argues that if industry participants respond to the price incentives caused by path based pricing, say by increasing train lengths, then this would decrease revenues for ARTC by reducing the required number of train paths. In turn, ARTC would have to raise access charges – making the strategy self-defeating. • The impact of path based charges on total costs across the supply chain. Aurizon argued that the introduction of path based pricing may incentivise upstream or downstream investment without any commensurate economic benefit. This might arise because the incentives created by path based pricing (i.e. longer and heavier trains) might require investments at mines or ports but not reduce track costs for access holders. Further, it might introduce a discriminatory price impact between different train users based on legacy investment decisions.³⁶ Aurizon concludes that “the implementation of path based pricing could be deferred until it becomes apparent that ARTC would need to undertake further network investment to increase network capacity.”³⁷	desirability of the price change but the timing of its implementation.

³⁶ Aurizon, p. 6.

³⁷ Aurizon submission, p. 6.

Summary of submission and comments	Frontier comment
Whitehaven Whitehaven Coal, a producer in pricing zone 3 of the Hunter Valley network, argues that “a producer should not be negatively impacted in any pricing zone when they are operating at the most efficient level. Path based pricing negatively impacts a Zone 3 producer in Zone 1 by increasing the access price per tonne for 8,000 tonne trains.”³⁸ Whitehaven further states that Path based pricing would be fair and equitable if either there was an adjustment to Zone 3 path rates to provide a similar rate per tonne to an efficient Zone 1 train, or if there was a removal of the three zone pricing concept. Without these options, Whitehaven submits that the existing GTK method should apply.	• Whitehaven is made worse off by the transition to a path based pricing method compared to the use of GTK under indicative pricing. However, as we discuss it is not obvious that this leads to any inefficiency. It may be that Whitehaven is unable to respond by changing train configurations due to ARTC’s network constraints; however, as well as signalling investment, prices also play the role of allocating existing network capacity among users. • Discounting prices to Pricing Zone 3 users could be justified from an efficiency perspective if it increased the ability of ARTC to recover its fixed costs in Pricing Zone 1. This would require the discounts to increase ARTC’s total revenue (so that the price change induced new services that improved contributions to fixed cost recovery). This seems unlikely given the prevailing revenue cap method of regulation that currently applies to ARTC.
HVCCC The HVCCC stated that while it could not comment on the commercial implications on pricing changes, its view was that ARTC’s proposed change was likely to be beneficial for overall coal chain efficiency and may better motivate the adoption of train configurations that result in a system-wide minimum mine-to-ship cost per tonne of coal exported, subject to meeting a total export tonnage target.³⁹	• We note HVCCC’s support for pricing structures that lead to changes in train configurations that lower per tonne shipping costs.

7 Conclusion

In this short report, we have assessed ARTC's proposed change to its pricing approach. In line with the relevant Part IIIA criteria, this has focused on an assessment of the effect of the change on the efficient use of, and investment in, infrastructure. We have also estimated the effects of the change on different users.

Our overall conclusion is that there may be benefits to some users relating to lower costs per tonne from path based pricing, and this could provide broader benefits in increasing system capacity and coal output. The path based pricing method is also simpler and more transparent than the indicative service approach. Nonetheless, the specific value of additional capacity at this time may be relatively low, and the incentives created for changes in train composition by changes in the structure of track charges may also only be weak. Our view is therefore that:

- Path based pricing using Train Km may have a positive effect on efficiency, but it will only likely be minor in the short term. On this basis, it can be considered appropriate.
- ARTC may wish to give further consideration to addressing the specific issues raised by stakeholders, particularly with regard to the timing of the introduction of path based pricing.

Annex 1: Aurizon Network's tariffs for the Central Queensland Coal Network

The QCA has recently made a final decision on Aurizon Network's proposed 2014 draft access undertaking (DAU).⁴⁰ This final decision included consideration of issues with existing tariff arrangements.

Aurizon Network's existing tariffs have five parts. Two components are 'incremental tariff' components, in the sense that they vary with usage of the network, while a further three components are not usage-related and so create a 'distance taper', meaning the average network cost per net tonne kilometre declines as haul length increases. The QCA notes that the purpose of the distance taper may have been to increase economic efficiency, by better reflecting capacity to pay of miners.

The distance taper was implemented with the objective of compensating longer-haul mines which may have a lesser ability to contribute to the common costs. This was considered to potentially encourage development of the Queensland mining industry, resulting in greater use of capacity and potentially lower charges for all users.⁴¹

The QCA also noted the role of cost reflectivity in pricing:

Under the current pricing arrangements, a key objective is to ensure that users are subject to the costs they impose on the system. If the existing multi-part tariff system results in tariff components that are not cost reflective, then the resulting price signals are likely to deliver adverse outcomes to users.⁴²

The QCA indicated in the final decision that there was a strong case for the simplification of Aurizon Network's reference tariff structure. It suggested that the tariff structure should aim to:

- provide appropriate signals to users regarding the cost of holding capacity and therefore contribute to the efficient cost of infrastructure
- recover costs in a way that minimises distortions on the production decisions of mines
- ensure that customers face the full economic costs of their decisions.⁴³

The QCA suggests that a two-part tariff structure is a potential alternative, where:

The variable charge is normally equated to the marginal cost of supply with reference to either the short- or long-run marginal cost of supply, depending on context.

⁴⁰ QCA, *Final decision: Aurizon Network 2014 draft access undertaking Volume III—Pricing & tariffs*, April 2016

⁴¹ Ibid, p. 5.

⁴² Ibid.

⁴³ Ibid., p. 6

Normally, the variable charge is based on those costs that vary with usage (i.e. variable costs), although it might also signal the scarcity of available capacity, if network capacity is constrained. Therefore, the variable charge may also include:

- costs associated with congestion
- capital costs associated with the expansion of capacity.

The fixed charge is set to recover the remainder of the costs that cannot be directly attributed and is usually levied in a way that minimises the distortion of customers' capacity decisions, having regard to fairness between customers. This fixed component could be based on contracted capacity (e.g. charged on a contracted train path basis) and, as a result, would not vary with actual usage. This is a more stringent form of take-or-pay arrangement, providing greater accountability for access holders for the use of their contracted capacity.⁴⁴

We understand that the preferred approach of the QCA would be to limit the fixed charge to recovering unattributable costs. However, the fixed charge would not be entirely discretionary or based on willingness to pay of users, but differ between users based on contracted capacity. Our understanding is that it would not vary by distance, so whether this approach improves efficiency compared to an alternative depends on the alignment of willingness to pay of users with contracted capacity.

The QCA has ultimately recommended that Aurizon Network undertake a comprehensive review of existing pricing arrangements prior to the next undertaking, supported by full stakeholder consultation. This review should clarify the effects on customers of any proposed changes and the development of transitional arrangements to deal with them.

⁴⁴ Ibid, p. 7.

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