IPART Independent Pricing and Regulatory Tribunal | NSW

Estimating the direct cost of rail access

Final Report

August 2024

Transport »

Acknowledgment of Country

IPART acknowledges the Traditional Custodians of the lands where we work and live. We pay respect to Elders both past and present.

We recognise the unique cultural and spiritual relationship and celebrate the contributions of First Nations peoples.

Tribunal Members

The Tribunal members for this review are:

Carmel Donnelly PSM, Chair
Jonathan Coppel
Sharon Henrick
Dr Darryl Biggar

Enquiries regarding this document should be directed to a staff member:

Mike Smart	(02) 9113 7728
Gerard O'Dea	(02) 9290 8495

The Independent Pricing and Regulatory Tribunal

IPART's independence is underpinned by an Act of Parliament. Further information on IPART can be obtained from IPART's website.

Contents

1 Introduction

Under the NSW Rail Access Undertaking, rail infrastructure owners are required to charge prices for access to their networks that sit within a range determined by a 'ceiling test' and a 'floor test'. The ceiling and floor tests in the Undertaking set out the approach that the infrastructure owner should use to determine the upper and lower bound for their access charges. Rail infrastructure owners are required to demonstrate compliance with the ceiling test in the Undertaking, confirming that their charges are not set too high. However, there is no requirement to demonstrate that charges are not too low.

In the absence of a requirement to demonstrate compliance with the floor test, we consider that providing more clarity around what floor prices may look like provides some protection against under-charging. The parties potentially benefitting from that protection include the infrastructure owner and access seekers who may compete against vertically integrated operators (above and below-rail combined) and might be subjected to predatory pricing. With access to the information set out in this report, industry participants can be better informed, pricing decisions will be more transparent, and participants can have greater confidence in those pricing decisions.

1.1 Key findings in the Final report

Our final report establishes a plausible range for the direct cost rate, in units of dollars per gross-tonne-kilometre (GTK), that could be used in regulatory floor tests under the NSW Rail Access Undertaking. Direct costs are expressed as a rate of dollars per thousand gross-tonne-kilometres (gtk), and these can be directly compared to access prices if they are expressed in the same units.

The range has been estimated based on coal networks. We consider that coal network benchmarks may be a good starting point for coal and general freight networks but may be of limited value for passenger networks. In passenger networks, the number of train movements may be a more appropriate driver of direct costs than gross train mass.

Our analysis yielded the following best-fit maintenance cost function for coal networks:

Cost = $114,650/track-km - $76,070/Aurizon track-km + **$0.84/'000 GTK**

The rate per track-km represents the fixed cost of maintenance for ARTC's network. For the Aurizon coal network, the fixed cost is lower than the ARTC rate by $76,070/track-km per year. The rate per '000 GTK represents the variable (direct) cost.

These raw results suggest a direct cost point estimate of $0.84 per '000 GTK. That estimate is consistent with prior work undertaken by the Queensland Competition Authority in 2000: their range of direct cost estimates, adjusted for inflation was $0.69 to $1.93 per '000 GTK.

1.2 Stakeholder submissions on the Draft Report

We released an information paper and sought submissions. We received three submissions on the information paper, which we incorporated into the analysis in the Draft Report released in May 2024.

We received only one submission to the Draft Report and that was from TAHE. We summarise TAHE's main comments and our responses below.

Vertical integration

Among other things, the floor test protects third party rail operators from vertically integrated operators who might otherwise cross-subsidise their own above-rail operations who compete with them. TAHE observes that this concern is hypothetical in NSW, where the only vertically integrated operators are the Government-owned passenger services, and these services face no competition.

In response, we note that some third-party passenger services do run on the Sydney metropolitan rail network and on the country regional network. While we are not aware of any current pricing-related competition issues for these services, it remains useful to have a floor test to provide that protection.

Dispersion in engineering estimates of direct cost

In contrasting our econometric approach to the engineering approaches taken by some other Australian regulators, our draft report pointed to the wide variation in these estimated direct costs. TAHE makes the point that the wide variation does not necessarily mean that these engineering approaches are inaccurate. It could also mean that there is a wide variation in cost drivers in different locations.

In response, we note that the main source of variability in the engineering estimates is inconsistency between the costing assumptions applied in each instance. We remain of the view that a direct cost benchmark derived from econometric evidence on costs provides the most objective test.

Coal network costs are not necessarily representative of a wider range of rail traffic

TAHE makes the point that costs for coal freight networks may not be representative of costs for other freight networks and particularly for passenger networks, as these types of networks face different cost drivers.

In response, we agree with TAHE's observation.

The limitations of coal railway cost benchmarks should be recognised

The coal-based direct cost benchmarks could be used as a cross check of direct cost estimates from, say, engineering approaches and could potentially trigger more detailed investigations. However, caution should be applied when the network being investigated is not a coal network.

In response, we agree with TAHE's observation.

Comparisons between gtk-based benchmarks and passenger networks is problematic

TAHE notes that its access pricing on passenger networks is based on train-kilometres travelled, rather than gtk. Hence it is not straightforward to compare these access prices to gtk-denominated direct cost rates.

In response, we agree that coal networks have different cost drivers to passenger networks. However, we note that passenger access prices could be converted to equivalent gtk-based prices fairly easily if the standard gross mass of the passenger train is known. The mass of each train type is well known. For electric trains, there is no additional mass for fuel. While the passenger loading will affect the gross mass of the train to some degree, it is a second-order effect. A typical passenger has a mass of about 80kg, while an empty suburban passenger carriage has a mass of approximately 50 tonnes and can carry at most 125 passengers.

2 The floor test in the Undertaking

The floor test is set out in the pricing principles of the NSW Rail Access Undertaking and establishes a lower bound to access prices. The floor test has two limbs, of which direct cost is the first. While this final report focuses mainly on the first limb of the test, this chapter also sets out some clarification on how we see the second limb operating.

2.1 The first limb of the test – direct cost

The direct cost is the cost that the infrastructure provider would avoid if one train did not run. It is related to the wear and tear that the train causes. The access price paid for that train should not be less than this amount. The direct cost is also known as the marginal cost of rail infrastructure and measuring it is not straightforward.

According to Professor Andrew Smith, an expert at the University of Leeds,[a] three methods have been used in the literature to measure rail infrastructure marginal cost:

1. Engineering approach (model based)—simulate damage done by traffic, determine action needed to remedy it, apply unit cost to the volume of activity to determine the marginal cost
2. Engineering approach (judgement based)—allocate costs either to variable or fixed categories and sum the variable costs across activities
3. Top down statistical/econometric approach—relate costs to traffic in statistical regression.

2.2 The second limb of the test – full incremental cost

The second limb states that:

> *for any Sector or group of Sectors, revenue from Access Seekers together with Line Sector CSOs (if applicable) should, as an objective, meet the Full Incremental Costs of those Sectors*

The key points are that:

- the required comparison is between avoided costs and avoided revenue
- the avoided cost is clearly set out (full incremental cost of the chosen group of sectors)
- but the avoided revenue is not explicitly set out
- avoided revenue is the access revenue earned from the entire journeys of freight that would be disrupted if the sectors in the group were all out of service.

The words “for any Sector or group of Sectors” introduce the concept of combinatorial analysis to the floor test. That is, the test must consider a range of possible combinations of sectors. There is a parallel to the ceiling test, which requires an examination of every possible combination of access seekers.

[a] Andrew Smith, “Estimating marginal wear and tear costs: econometric methods and evidence”, Track Access Charges Summit, April 4, 2018, Amsterdam.

Considering the commercial viability of a collection of track segments, we need to think about the concept of avoided revenue and compare that to avoided costs. The avoided costs from mothballing a group of track segments is easy enough to calculate, but note it includes the fixed costs of maintenance. (It does not include sunk costs like ROA and depreciation for these track segments.)

The avoided revenue is the access revenue earned from the entire journeys of freight that would be disrupted if the identified track segments were out of service. The 2nd limb requires that avoided costs for a combination of track segments are no greater than the avoided revenue. Situations where this limb of the floor test is hard to pass tend to be those where avoided revenue is minimised while avoided cost is maximised.

For example, lightly used branch lines can have minimal avoidable access revenue if very few freight journeys emanate from them, yet they can have high avoidable fixed costs, particularly if they are long. These tend to be track segments at the periphery of the network. Contiguous stretches of track segments starting at the periphery are the combinations that are more likely to fail the floor test.

In contrast, if the combination of track segments includes a piece that is removed from the middle of a trunk line, then that combination would be very unlikely to fail the floor test. Cutting off the trunk line would disrupt maximum traffic and therefore have high avoided revenue consequences, yet a single small piece of track might have low avoidable cost. For the same reason, a collection of small, isolated track segments plucked at random from the network would entail maximal disruption to revenue, yet possibly a small avoided cost.

3 Previous work on direct cost estimates

Direct cost estimation has rarely been attempted in an Australian regulatory setting.[b] In 2000, the Queensland Competition Authority published a working paper "Usage-related infrastructure maintenance costs in railways" that provided engineering-based estimates of the direct cost. This comprehensive study was an example of Professor Smith's first engineering approach (model-based). It provides a high degree of transparency.

Other studies since published by Australian economic regulators have employed either the first or second of Professor Smith's engineering approaches. His second approach was judgement-based, which is less transparent and objective than the first approach. Their engineering models were not published. See the appendix for more explanation of these studies and the approaches they took.

In a 31 January 2024 information paper, IPART employed regression analysis econometric approach) to estimate the direct costs for coal trains. This represents the only known Australian example of Professor Smith's third, econometric approach.

3.1 Engineering approach – Queensland Competition Authority

In 2000, the QCA was considering Queensland Rail's first access undertaking. In support of its analysis, the QCA published a working paper on usage-related infrastructure maintenance costs in railways. This working paper adopted an engineering-based approach. It derived the estimates of what they referred to as incremental maintenance costs shown in Table 1 below.

Network	Incremental maintenance cost
Moura	$1.00 per '000 Gtk
Blackwater	$0.54 per '000 Gtk
Goonyella	$0.37 per '000 Gtk
Newlands	$1.04 per '000 Gtk

As used in the QCA working paper, the term incremental maintenance cost represents the same thing as what we are here calling the direct cost of usage.

These estimates are now more than two decades old. The Australia all groups CPI increased by 86% between December 2000 and December 2023. If we applied that percentage increase to the figures tabulated above, the range (in dollars of December 2023) would be from Goonyella ($0.69/'000 gtk) to Newlands ($1.93/'000 gtk).

[b] Significant work on this topic has been done in the UK and Europe. The Appendix summarises some of this work, including several examples of Australian regulatory reports on the topic.

3.2 Engineering approaches used in other jurisdictions

TAHE's submission identified four instances of Australian regulators estimating floor prices using engineering-type approaches. These are discussed in more detail in the appendix. In these instances, the methodology included some fixed costs so was not applicable to the question of estimating direct cost. Also, some of these studies yielded widely varying estimates, limiting their usefulness.

3.3 Econometric approach – IPART information paper

The data on gross-tonne-kilometres and maintenance costs for several of their coal systems was sourced from regulatory reports made by ARTC and Aurizon networks to the ACCC and the QCA, respectively.

IPART undertook regression analysis to derive new estimates of the direct cost rate. This work relied on regulatory reports submitted by ARTC to the ACCC and by Aurizon networks to the QCA for years between 2018 and 2021. There were four different networks in Queensland for the 2021 financial year, and two different networks in the NSW Hunter Valley for each of the calendar years 2018-2020. Each network-year combination was treated as a separate data point. The data consisted of traffic levels (GTK), track length, and maintenance costs including major periodic maintenance (renewal allowance). Regression on the entire data set yielded a maintenance cost function:

Cost = $99,000 per track-km + $1.18 per '000 GTK

Regression on a restricted data set in which an apparent outlier (Newlands – Goonyella-Abbot Point Expansion)[c] was excluded yielded the following maintenance cost function:

Cost = $124,000 per track-km + $0.77 per '000 GTK

The rate per track-km represents the fixed cost of maintenance, and the rate per '000 GTK represents the variable (direct) cost. These raw results suggest a range of direct cost estimates from $0.77 per '000 GTK (lower regression result) to $1.18 per '000 GTK (higher regression result). Both ends of this range are expressed in dollars of the year 2020.

[c] The initial regression results from the Information Paper indicated that the Newlands-Gooyella-Abbot Point Expansion network had different cost characteristics than the other systems studied. However, as will be seen below, the additional information from Aurizon Networks allowed us to investigate different regression models in which the Newlands – GAPE network was no longer an outlier.

4 IPART estimates of direct cost

4.1 Summary of IPART results

IPART undertook regression analysis to derive new estimates of the direct cost rate. This work relied on regulatory reports submitted by ARTC to the ACCC and by Aurizon networks to the QCA for years between 2018 and 2021. The Aurizon network submission contained updated data which we incorporated in the draft report and this final report.

There were four different networks in Queensland for the 2021 financial year, and two different networks in the NSW Hunter Valley for each of the calendar years 2018-2021. Each network-year combination was treated as a separate data point. The data consisted of traffic levels (GTK), track length, and maintenance costs including major periodic maintenance (renewal allowance).

We note that our regression model had 12 data points and two independent variables: mgtk/track-km and a binary category variable for Aurizon network. The dependent variable was annual cost per track-km. The coefficients shown below were derived from this model.

Regression on the entire data set yielded a maintenance cost function:

Cost = $114,650/track-km - $76,070/Aurizon track-km + **$0.84/'000 GTK**

The rate per track-km represents the fixed cost of maintenance for ARTC's network. For the Aurizon coal network, the fixed cost is lower than the ARTC rate by $76,070/track-km per year. The rate per '000 GTK represents the variable (direct) cost.

These raw results suggest a direct cost point estimate of $0.84 per '000 GTK. That estimate is consistent with prior work undertaken by the Queensland Competition Authority in 2000: their range of direct cost estimates, adjusted for inflation was $0.69 to $1.93 per '000 GTK.

4.2 Regression method and data

Maintenance costs for coal and general freight tracks have a variable component that depends mainly on the number of gross tonne-kilometres (gtk) carried and a fixed component that depends on the length of track that must be maintained (track-km).

The maintenance task consists of routine maintenance (RM), also called routine corrective and reactive maintenance, and major-periodic maintenance (MPM), which captures the cyclical renewals of rail, sleepers and ballast. Because MPM tends to be lumpy and infrequent, it is common to estimate an annual allowance for MPM rather than rely on actual MPM expenditures in a given year.

From regulatory submissions by ARTC and Aurizon networks, we compiled a data set of annual RM, MPM, and gtk for the major coal networks in NSW and Queensland for certain available years between 2018 and 2021. We were able to determine track-km for each network by examining track diagrams or from information packs provided by the network owners. This data set had 10 data points with matched inputs.

The submission from Aurizon networks identified several points of non-comparability between the ARTC and Aurizon cost data that we used in the Information Paper. Helpfully, that submission provided updated Aurizon cost data that was compiled on a comparable basis to the ARTC cost data. We have used that updated information in this analysis and therefore have higher confidence in the present regression results.

The excel workbook "mtce cost function for coal railways – post Aurizon sub incl W Moreton.xlsx" contains the data and analysis described in this note. ARTC data is in the tab of the same name. Aurizon data is in the tab of that name. Tab CPI contains inflation data used to convert all dollar figures to real values of 2020.

The tab "Data" contains the data set used for regression analysis.

We used this data to estimate the parameters of the following maintenance cost function:

Total cost/track-km = Intercept + X1 million gross tonnes + X2 Aurizon dummy variable

These variables have the following units:

- Total cost, Intercept and X2 are in units $m/yr/track-km
- X1 is in units $/gtk

The motivation for using this functional form is the intuition that maintenance costs are driven by two main factors. The fixed costs are proportional to the track length that must be maintained. The variable costs are proportional to the wear and tear caused by the passage of trains, quantified using gross-tonne-kilometres.

At the suggestion of Aurizon Networks, we explored using cost and traffic information for the West Moreton system of Queensland Rail. However, we did not report results from that analysis because we were not able to reliably estimate track renewal costs for West Moreton from the available information.

4.3 Regression results in detail

The results are shown in Table 4.1 below.

Table 4.1 Updated regression results

Summary Output

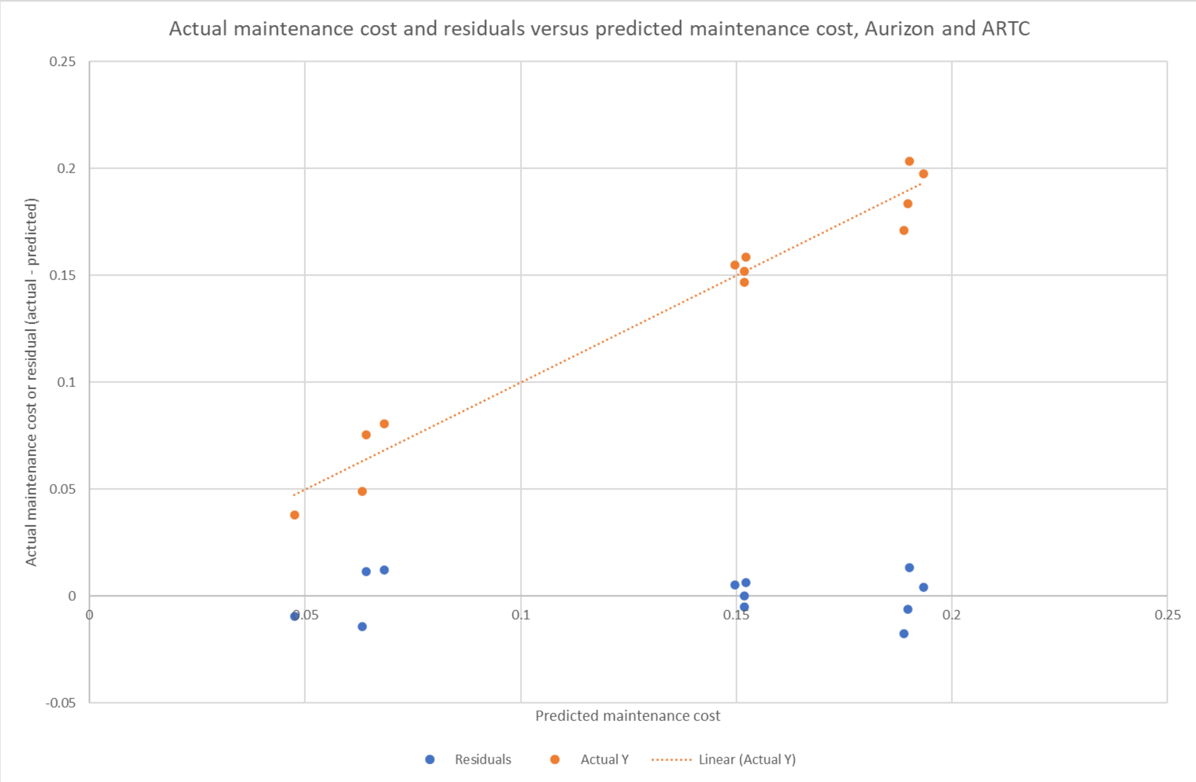
			NB: X1 coeff implies that gtk rate is				
			0.84	$m/billion gtk = $/'000 gtk			
Regression Statistics							
Multiple R	0.983437		Intercept implies that fixed cost rate is				
R Square	0.967149		114.65	$k/track km/yr			
Adjusted R Square	0.959848						
Standard Error	0.0116		X2 coeff implies that Aurizon fixed cost is				
Observations	12		-76.07	$k/track km/yr cheaper than the ARTC fixed cost[d]			

ANOVA		**ARTC PZ2-3 used instead of PZ1-3**					
	df	**SS**	**MS**	**F**	**Significance F**		
Regression	2	0.035656	0.017828	132.4805	2.11E-07		
Residual	9	0.001211	0.000135				
Total	11	0.036867					Y = cost ($m/yr)/trkkm
	Coefficients	**Standard Error**	**t Stat**	**P-value**	**Lower 95%**	**Upper 95%**	
Intercept	0.11465	0.01	9.53	0.00	0.09	0.14	
X Variable 1	8.39E-04	1.69E-04	4.98	0.00	4.58E-04	1.22E-03	mgtk/trkkm
X Variable 2	-0.07607	0.01	-7.72	0.00	0.10	0.05	Aurizon dummy

The scatter plot for this regression model is shown in Figure 4.1 below.

[d] Note that the negative sign of the X2 coefficient implies that the fixed cost per track km per year for the Aurizon network is lower than the fixed cost for the ARTC network. This likely reflects the fact that the terrain is more suitable to low cost infrastructure in Central Queensland and that narrow gauge track may be somewhat cheaper to maintain than standard gauge track. While Aurizon's network contains some additional infrastructure to supply electric traction energy to trains, this cost was removed in the calculations provided in the Aurizon submission.

Figure 4.1 Scatter plot for updated regression model



In figure 4.1, the horizontal axis is predicted cost per track-km. The vertical axis is actual cost per track-km (or the residual, being actual – predicted). The trend line for actual versus predicted is shown (slope = 1).

A Appendix: Prior regulatory work on floor costs

TAHE's submission identified several possible sources for direct cost estimates made by Australian regulators since the QCA's 2000 working paper.

A.1 ERA of WA 2004 and 2009

Floor cost rates were based on simulation model runs conducted in 2004. These were indexed to 2009 values using a Building Cost Index (prepared by the WA Department of Housing). These determinations did not express the floor cost as a rate per gtk, but rather as an annual total cost for particular track sections. Hence they are not directly applicable to our present purpose.

A.2 ESCV 2011

This review established a floor cost rate of $6.07/'000 gtk (in dollars of 2010). This figure was established by summing costs for the Melbourne metropolitan rail network that were judged by an engineering consultant to be either:

1. variable maintenance/operations cost
2. fixed maintenance cost for freight-only lines
3. access-specific overheads
4. overhead mark-up.

and dividing by the relevant freight gtk. Note that this floor cost calculation yields a higher rate per gtk than our regression estimates or the QCA working paper because it includes certain fixed maintenance costs, which would be excluded under the first (direct cost) limb of the NSW floor test.

A.3 ESCV 2012

This review established a range of incremental costs for freight on VLINE passenger networks that ranged from $13.25 to $32.00 /'000 gtk, depending on the track class. These estimates were based on the V/Line Steady State Model. In an appendix, a Booz & Company report provides an alternate set of results for the incremental costs for freight on the passenger network that ranged from $4.59 to $9.12/'000 gtk. This wide discrepancy between estimates of the same cost rate by different analysts is concerning.

A.4 ACCC interstate undertaking 2008 draft decision

This report referred to an ARTC financial model, which was used to calculate floor revenue limits for ARTC's interstate track sections. ARTC's proposed basis for the floor was the avoidable cost of each segment. The ACCC largely accepted that approach. The avoidable cost approach brings in some fixed costs which would be excluded under the first (direct cost) limb of the NSW floor test.

B Submissions to the Information Paper

We received three submissions, from Aurizon Networks, the Transport Asset Holding Entity (TAHE), and Pacific National.

B.1 Aurizon Network submission

Aurizon Network's submission commented on several aspects of the Information Paper:

1. It noted some concerns about the comparability of ARTC and Aurizon Network data used in IPART's regression model.
2. Using publicly available data, Aurizon Network made several adjustments to the data contained in the 'Aurizon' tab of IPART's spreadsheet model to facilitate a like-for-like comparison with the ARTC data.
3. It provided references to published work in Europe on the measurement of direct costs.

Aurizon Network identified several input data errors in our Information Paper related to track lengths in Queensland and provided updated cost information that was compiled on a comparable basis to the ARTC cost data.

We employed Aurizon's data in the updated regressions presented in the draft report and this final report.

B.2 TAHE submission

The TAHE submission commented on several aspects of the Information Paper:

1. The terms 'direct cost' and 'incremental cost' are not interchangeable, yet the Information Paper uses them as though they are equivalent.
2. Coal rail network costs are not appropriate benchmarks for passenger networks.
3. TAHE provided references to publications by other Australian economic regulators on their assessment of floor costs and/or incremental costs.
4. IPART's regression analysis methodology appears to be reasonable.
5. As an alternative methodology, TAHE suggests using its actual direct costs as currently adopted in its compliance submissions.

In response to TAHE's comments, we have clarified the terminology point by explaining that the 'incremental cost' wording was used by the QCA in its working paper to refer to an equivalent concept to our direct cost.

Clearly the direct cost rate per gtk of a coal railway will be somewhat different from that of a passenger network. However, given the absence of public data on life-cycle maintenance costs for non-coal railways in Australia, the coal-based estimates represent an available benchmark that captures many of the most relevant cost drivers and maintenance activities.

In Appendix A we summarise the methods used in the publications by other Australian economic regulators referred to by TAHE. Each of these studies employed engineering methods of Professor Smith's type one or two. The data used in these studies was not published and neither were the engineering models. Where floor price estimates were indicated in units of rates per GTK, the estimates tended to be higher than those derived by IPART. One reason for this was that certain fixed costs for freight-only lines were included. This approach is not necessarily suitable for the first limb of the floor test as specified in the NSW Rail Access Undertaking.

TAHE's annual compliance submission contained estimates of its own direct costs. These estimates were higher than the range derived by IPART. TAHE's approach was similar to Professor Smith's second engineering approach, although it was based on actual, not efficient costs. It relied on judgements about the classification of certain activities as variable with traffic. It has not been feasible to independently verify those judgements.

B.3 Pacific National submission

Pacific National questioned the following points related to the Information Paper:

1. Commencing a floor test compliance process is an unnecessary additional regulatory mechanism which is not required, and it imposes an unnecessary burden on access providers and access seekers, given that IPART is not proposing to take action if prices don't meet the floor test.
2. The regression work for coal networks contains a small number of data points.
3. The calculated coefficient for the track-km variable appears not to have good statistical properties.
4. Beyond the mathematics, Pacific National questions the premise of combining Aurizon Central Queensland Coal Network (CQCN) data with NSW Hunter Valley coal system data to develop a maintenance cost function via linear regression.
5. The submission pointed to several differences between the ARTC Hunter coal network and Aurizon's Central Queensland Coal Network that are likely to affect the cost comparisons:
   - There are different soil / terrain types and climate differences that impact the propensity for flooding and heat-stress on tracks and in turn influence the cost of maintenance.
   - The Hunter Valley system is older track while CQCN is a more modern system.
   - The CQCN includes electrified systems.
   - NSW Hunter Valley has a higher proportion of mixed traffic including grain and passenger service, as well as coal. By contrast much of the CQCN has purpose-built coal corridors, although there is still some mixed-use.
   - Queensland is a narrow gauge line while NSW is standard gauge.
   - Axle loads are different (higher) in ARTC's network. The higher axle loads in the Hunter Valley can therefore lead to reductions in the life of track components and can increase track maintenance costs.

On the merit of conducting a floor test, we consider that it provides useful additional information, but imposes a minimal additional regulatory compliance burden on rail infrastructure owners or access holders. To perform the direct cost floor test, it is only necessary to compare access prices in $/'000 gtk units to the direct cost benchmarks provided in this report.

In response to the remaining points, the draft report reflected the following changes from the Information Paper.

- We have slightly increased the number of data points, but we acknowledge the limitations imposed by the small amount of available data.
- In the revised calculation, the coefficients for the intercept and the X2 variable (both in units of $'000/ track-km/yr) have very good statistical properties.
- The adjustments made to the Queensland data in the Aurizon submission have improved the comparability of ARTC and Aurizon cost information, largely addressing point 4 raised by Pacific National. For example, Aurizon removed the costs of electric traction infrastructure from their maintenance costs.
- The remaining sources of cost difference between NSW and Queensland are now estimated with the explicit inclusion of the X2 variable. This variable allows us to quantify the differences in fixed costs between the ARTC and Aurizon networks, reflecting the dot points under point 5 of the Pacific National submission.